



Intrusive Coal Mining Risk Assessment (CMRA) and Geotechnical Assessment

St Marys Primary School Gomersal

March 2026

Bowmer and Kirkland

Reference: 251009.SC.01

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EXECUTIVE SUMMARY	
<i>Purpose of the Report</i>	This report has been prepared for the purpose of assisting in the evaluation of the potential risk to the site associated with the historic coal mining legacy at and below the site, to inform the potential risks posed from ground instability to future structures. This report also provides geotechnical information and characteristic parameters to inform foundation design.
<i>Future Site End-use</i>	REL understands that the Client intends to demolish the existing school buildings and develop a singular, larger three-storey rectangular building along the eastern periphery of the site.
SITE INFORMATION	
<i>Grid Reference</i>	Approximately centred upon 420796, 425706.
<i>Current Site Status</i>	The site comprises a parcel of land currently used as the main school site for St Mary's Primary School. The main school building is positioned on the northern and western portions of the site. The eastern and southern areas currently comprise soft landscaping, used for play areas and playing fields, respectively. Car parking and temporary classrooms were present in the northwest of the site.
<i>Geology</i>	<p>The site is recorded to be free of superficial deposits and underlain by the Pennine Middle Coal Measures. However, during the REL ground investigation, Made Ground and reworked natural deposits were encountered overlying bedrock. Bedrock was encountered at relatively shallow depth and comprises the Emley Rock Sandstone, which occurs from approximately 2–15 m bgl. This unit is generally described as weak to moderately strong sandstone and represents the most competent rock encountered during the investigation.</p> <p>Beneath the Emley Rock, the sequence comprises Pennine Lower Coal Measures mudstone and siltstone. These strata are typically described as very weak to weak, thinly bedded and closely fractured, indicating significantly lower strength compared with the overlying sandstone. Several coal seams were encountered within this sequence, some of which contained recorded voids.</p> <p>Voids were recorded throughout the boreholes at differing depth horizons, consistent with what has previously been recorded by third-party ground investigation.</p>
<i>Coal Mining Risk Assessment</i>	<p>Based on a 10:1 rule as outlined in CIRIA C758D, there is either insufficient intact rock overburden to the surface to mitigate possible mine collapse and instability, or there is insufficient rock interval between two potential layers of identified coal workings.</p> <p>As such, stabilisation works are considered to be required in the form of grouting. A suitable grouting specification should be produced using the findings of this investigation and provided to a suitably qualified and experienced grouting contractor for review. Upon completion of the grouting works, a declaration and sign-off for the remedial works should be provided prior to further works taking place on-site.</p>
<i>Foundation Design</i>	<p>Strip/trench fill was deemed unlikely to be cost-effective due to the presence of fractured coal seams and the presence of weathered bedrock recovered as soft to firm clay across the site. A raft foundation solution was suggested by RSK to minimise the risk posed by differential settlement; however, it is not considered feasible due to off-site disposal considerations and differential material properties across the formation.</p> <p>Piling using Continuous Flight Auger or Rotary Bored techniques are recommended. The pile design would need to allow for highly variable bedrock strength characteristics, the groundwater table and possible zones of negative skin friction. Given that foundations are likely to advance through coal measures geology and significant oxidation is unlikely to occur, a worst-case scenario concrete Design Class of DS-3 and an ACEC Class of AC – 3 should be applied.</p>

1. Scope & Objectives

The Services	Intrusive Coal Mining Risk Assessment (CMRA) and Geotechnical Assessment
The Client	Bowmer and Kirkland
Appointment Details	The Services have been carried out in accordance with the Proposal dated 30 September 2025 and REL's Terms and Conditions of Engagement, (together " the Agreement ") as accepted by the Client on 19 th January 2026.
Site Name	St Marys Primary School.
Site Address	Shirley Avenue, Gomersal BD19 4NA (" the Property ")
Proposed Use	REL understands that the Client intends to demolish the existing school buildings and develop a singular, larger three-storey rectangular building along the eastern periphery of the site.
Information Sources	<p>Online Source</p> <ul style="list-style-type: none"> Environment Agency Database and Mapping. Magic Map Web Mapping Service. Coal Authority Interactive Map Viewer. British Geological Survey, Database and Mapping. BGS Geindex web mapping service. British Geological Survey. (BGS) 1: 50,000 scale Provisional Series, Geological Map, England and Wales, Sheet 077 (Huddersfield), available on the BGS map portal.
	<p>Previous REL Reports</p> <p>REL have produced the following previous reports relating to the site and proposed future development:</p> <ul style="list-style-type: none"> Geo-Environmental Interpretative Report Review. St Marys Primary School, Shirley Avenue, Gomersal, Cleckheaton BD19 4NA. Ref: 250913.R.01. Dated 30 September 2025. Coal Tar Assessment - St Marys Primary School, Shirley Avenue, Gomersal BD19 4NA. Ref: 251009.CT.01. Dated 4 December 2025. BRE 365 Infiltration Assessment - St. Marys Primary School, Shirley Avenue, Cleckheaton BD19 4NA. Ref: 251009.R.001.MH. Dated 4 December 2025. Contamination Assessment - St. Mary's Primary School, Gomersal BD19 4NA. Ref: 251009.02. Dated 12 December 2025.
	<p>Previous Reports</p> <p>The following third-party reports have been provided to and reviewed by REL to assist with informing this report:</p> <ul style="list-style-type: none"> Gomersal St Mary's C of E Primary School. Preliminary Risk Assessment. RSK Environment Ltd. Ref: 350556-R01 (00). Dated November 2022. Coal Mining Risk Assessment. Gomersal St Mary's Church of England Voluntary Controlled Primary School. SWECO UK Limited. Ref: 65208322-SWE-XX-XX-T-J-2001. Dated 27 February 2023. Gomersal St Mary's CE (C) Primary School. Phase 1 and Phase 2 Geo-environmental and Geotechnical Factual and Interpretative Report. RSK Environment Ltd. Ref: 323198 R02 (00). Dated February 2024.

2. Site Location and Layout

Site Name and Address	St Marys Primary School, Shirley Avenue, Gomersal BD19 4NA
National Grid Ref.	420796, 425706
Ground Level Topography	The site is generally flat in nature. Variations in topography may exist in some areas.
Location	The subject site is located to the south of Shirley Avenue within a predominantly residential area of Gomersal village, approximately 7 km north-west of Huddersfield. The site lies approximately 250 m to the west of the A651 Oxford Road and approximately 300 m to the south of the A643 Spen Lane.

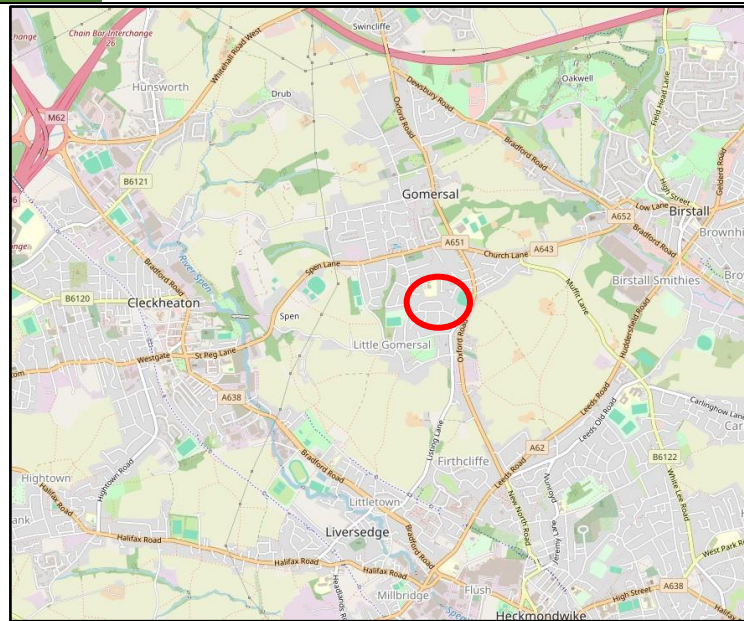


Figure 1: Approximate Site Location Highlighted in Red

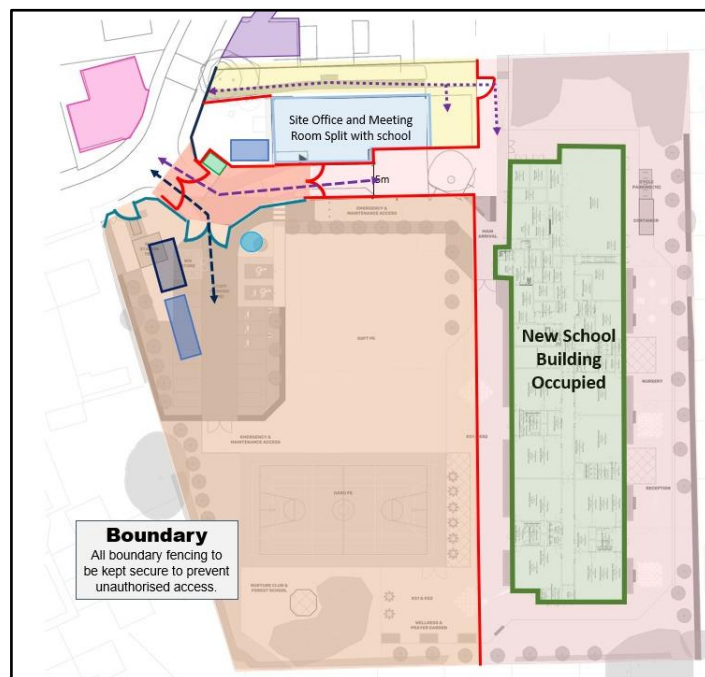


Figure 2: Finalised proposed development plan provided by the Client.

3. Site Description

Current Site Description and Activities	<p>The site comprises a parcel of land currently used as the main school site for St Mary's Primary School. The main school building is positioned on the northern and western portions of the site. The eastern and southern areas currently comprise soft landscaping, used for play areas and playing fields, respectively. Car parking and temporary classrooms were present in the northwest of the site.</p> <p>No issues of environmental significance were noted associated with the current use of the site.</p>
Site Area	~0.91 hectares (as recorded by previous third party reporting).
Occupancy	Active Primary School.
Surrounding Land Uses	<p>The surrounding land use is predominantly residential, with local services such as petrol stations and shops located approximately 300 m to the west of the site along Oxford Road.</p>

4. Review & Summary of Previous Reports

Previous Reports

Coal Mining Risk Assessment. Gomersal St Mary's Church of England Voluntary Controlled Primary School. SWECO UK Limited.

SWECO undertook a Coal Mining Risk Assessment to understand the potential for ground instability risk caused by potential historical mine workings beneath the site area. At the time of the study, multiple masterplan options for future structures were under consideration and is therefore not specific to the current, specific layout which REL now assume to be final.

SWECO confirmed that the site is situated within a Mining Remediation Authority (Coal Authority) designated Development High Risk Area, which indicates that historical mining activity may have taken place directly beneath or in the local vicinity of the site and may present risks to future construction and structures.

Published geological mapping indicated to SWECO that the site is underlain by bedrock belonging to the Pennine Lower Coal Measures Formation, which typically consists of interbedded mudstone, siltstone, and sandstone containing coal seams. Historical borehole records highlighted by SWECO, located approximately 60 m north of the site indicated that the ground conditions comprise of weathered bedrock, formed of stiff clay at depths proximal to the surface, becoming shelly clay at depths of approximately 2.8–3.8 m below ground level. Layers of interbedded mudstone with occasional sandstone layers were then recorded to extend to around 10 m below ground level.

SWECO observed that possible voiding at approximately 3.2 m and 6 m depth was recorded within these boreholes, which was interpreted to potentially be indicative of shallow mining activity or weakened ground conditions.

Historical mining data obtained from the Coal Authority by SWECO indicated that underground coal mining has taken place beneath the site. Records presented that a coal seam (not named by SWECO but understood to be the Middleton Main) was extracted at a depth of approximately 106 m below ground level, with an extraction thickness of around 0.57 m. In addition, SWECO recorded that the site lies within an area where probable unrecorded shallow coal workings may exist. REL infer from this that shallower workings above the Middleton Main may therefore be present but not known to the Coal Authority.

SWECO identified that two mine shafts were also recorded approximately 100 m south of the site boundary. Additionally, SWECO observed that a coal seam outcrop, named as the the Flockton Thick seam, is also recorded within the site area.

The risk assessment undertaken by SWECO identifies several potential hazards associated with historic coal mining. These include the presence of shallow recorded or unrecorded mine workings, possible mine entries such as shafts or adits, the potential for mine gas emissions, contamination associated with historical mining materials, and geological features such as faults or fissures that could influence ground stability. SWECO state that without mitigation, these hazards could lead to ground instability, collapse of shallow workings, or migration of mine gases during construction. SWECO do outline recommendations for further work given the above reviewed assessment, such as reviewing abandoned mine plans (obtained from the Coal Authority), undertaking intrusive ground investigation using boreholes, monitoring of ground gases, and if deemed to be required following further assessment, the implementation of implementing appropriate stabilisation.

SWECO concluded that due to the presence of historical coal mining activity and evidence which suggest the potential for unrecorded shallow workings, the risk to any future development was considered significant and could not be fully discounted at this stage.

Gomersal St Mary's CE (C) Primary School. Phase 1 and Phase 2 Geo-environmental and Geotechnical Factual and Interpretative Report. RSK Environment Ltd.

A combined 'Phase 1 and Phase 2 Geo-Environmental & Geotechnical Factual and Interpretative Report' was undertaken by RSK Environment Ltd (RSK) to assess the potential contamination, geotechnical and coal mining legacy constraints at the site location, in the context of the redevelopment of the school site to realise facility improvements, via the construction of a new primary school building. At the time of producing this assessment, RSK Environment Ltd were considering these issues without a finalised development masterplan. Three development options and thus, three locations for the new school building, were being considered at this time.

The scope of works undertaken by RSK comprised the advancement of six windowless sampler boreholes achieving depths between 2.12 m and 4.70 m, all terminated within or upon bedrock strata. A further five locations were advanced using a combination of rotary open-hole and coring methods using water flush. These boreholes achieved depths between 20 m and 32 m. RSK states that these locations were undertaken to investigate the potential for shallow, worked coal seams and to obtain relevant geotechnical data on the bedrock. Monitoring wells were installed to allow the collection of representative water samples and to enable ground gas monitoring.

RSK recorded a sequence of topsoil or Made Ground (approximately 0.3–0.9 m thick) overlying weathered Pennine Lower Coal Measures, consisting predominantly of cohesive clay up to a thickness of approximately 3.9 m. Below this horizon, RSK recorded bedrock comprising of interbedded sandstone, mudstone and coal, with two shallow coal seams. Evidence of voiding was recovered in one borehole, R05, between 14.80 m – 16.20 m bgl and 27.90 m – 29.30 m.

Other ground-related features of note relate to an intact coal seam recorded between 16.0 m and 16.90 m in RO2 and non-intact coal seams in RO4, possibly related to localised workings or backfilling, recorded between 17.67m – 17.82m and 18.46m – 18.50m.

Groundwater levels recorded during subsequent monitoring ranged between 6.58m (141.13 m AOD) and 8.65m (143.20 m AOD) within bedrock strata. Shallower, perched bodies were also recorded within the shallower wells.

The weathered coal measures within the upper horizons were described by RSK as soft to stiff cohesive clay with relatively high moisture contents (up to approximately 42%), plasticity indices of up to 38, SPT N-values as low as 2 and CBR values between approximately 6% and 10%. REL suggest that these values are indicative of variable weathered bedrock horizons where geotechnical performance can vary. RSK observed that the above characteristics indicate soils of variable compressibility and strength, with a low to medium volume change potential. RSK stated that the materials are consequentially susceptible to settlement and seasonal moisture-related movement.

Geotechnical strength testing undertaken by RSK recorded bedrock of Underlying bedrock units were very weak to medium strong strength, with point load-derived UCS values ranging generally between approximately 0.75 MPa and 24 MPa. One UCS result of approximately 38 MPa was also recorded. REL would expect this behaviour within coal measures bedrock, demonstrating a variability in intact rock strength between mudstone, sandstone and siltstone horizons. Mudstone units generally exhibit low strength while sandstone layers provide more competent horizons.

RSK identified two shallow coal seams were identified within the bedrock sequence, with the upper seam located close to subcrop level (which REL infer represents the Flockton Thick seam) and a second seam encountered at depths of approximately 16–18 m below ground level with thicknesses of up to approximately 1.2 m. The voids encountered in RO5 were indicative of historical shallow coal workings. RSK stated that this introduces a potential risk of localised ground instability and differential settlement if workings are present and remain untreated. The report therefore recommended that further rotary borehole investigation and, where necessary, stabilisation through grouting.

When considering foundation options and assuming suitable remedial measures are undertaken, RSK stated that conventional shallow strip or trench fill foundations may be unsuitable due to the risk of differential settlement, particularly where foundations span zones of variable strength. Raft foundations or deeper solutions were therefore recommended.

Elevated sulphate concentrations were also identified within the weathered bedrock, indicating that concrete used in foundations should be designed in accordance with the appropriate BRE sulphate class to prevent chemical attack.

The RSK report also undertook six rounds of ground gas monitoring during the site investigation. Methane concentrations were recorded at levels not exceeding 0.3% v/v, while the maximum concentration of carbon dioxide (CO₂) recorded was 7.3% v/v. Taking these results into account, along with the initial assessment of potential gas hazards, the site was conservatively characterised as Characteristic Situation 2 (CS2).

RSK recommended that further investigation be undertaken to further delineate the extent of the workings (including rockcoring) to confirm the lithological sequence and determine the area where ground treatment is likely to be required.

REL Comment & Closing Review Comments

In general, REL agree with the technical findings of both reports and the interpretation of the ground model recorded.

The main observation in relation to these assessments is the broad and baseline context of the assessments, given the lack of a fixed masterplan at the time of producing the assessments. Therefore, whilst the assessments provide valuable insight into the geo-environmental and geotechnical behaviour and constraints of the ground model beneath the site, specific investigation of an area relative to the proposed building footprint was not adequately undertaken. It is this issue that this report seeks to address and provide adequate risk quantification, and if possible, risk reduction, relative to the proposed three-storey school building.

At this stage and considering the information provided at the time of these assessments, REL would agree that the main constraint shallow foundations is the differential strength and compressibility properties of shallow, weathered bedrock strata. Ensuring a consistent load-bearing horizon is not likely to be achieved, given the variability in the condition of the weathered bedrock strata. It is therefore anticipated that a deeper foundation solution will be necessary. Further commentary is provided regarding foundation design considerations in **Sections 8 and 9** of this assessment.

The RSK ground investigation and assessment has identified suspected voids within RO5 at two specific depth horizons, 14.80 m to 16.20 m bgl and between 27.90 m and 29.30 m. RO5 is positioned, relative to the finalised masterplan, to the south-west of the proposed building footprint. Whilst no voiding was encountered within RO4, evidence of worked ground/backfilled workings was encountered between 17.67m – 17.82m and 18.46m – 18.50m. RO4 is situated beneath the southern extremity of the proposed building.

REL highlight that the site has been classified as Characteristic Situation 2 (CS-2) by RSK. Whilst commentary on specific ground gas issues is outside the remit of this report, from a geotechnical and structures point of view, any future foundation design will need to accommodate the gas characteristic situation, in accordance with BS8485:2015+A1:2019.

The additional investigation requirements highlighted by RSK in relation to the coal mining issues and to also provide additional geotechnical information are captured by this REL ground investigation.

5. Site Investigation Design

The site investigation has been designed in order to provide further geotechnical and coal mining information to allow the further quantification of risk, refined and focused on the finalised development layout plan and proposed structure, as provided to REL. The table below summarises the overall design rationale and constraints of the site investigation.

Preliminary Geotechnical Assessment and Coal Mining Risk Assessment	
Objectives	<ol style="list-style-type: none"> 1) Characterisation of Made Ground (if present) and natural deposits across the site for geotechnical consideration. 2) To investigate the potential for coal mining-related voiding to be present beneath the site, taking into consideration the expected ground model derived by SWECO and RSK during previous studies. 3) To undertake in-situ geotechnical testing, including Standard Penetration Tests (SPT) to inform geotechnical assessment. 4) To undertake geotechnical laboratory analysis to further inform the geotechnical assessment and to supplement the in-situ test data. 5) To determine the groundwater regime beneath the site and any associated engineering implications. 6) To establish the load-bearing characteristics of the various strata across the site and beneath the proposed building footprint to provide a refined appraisal of appropriate founding techniques. Additional information will be provided for deeper foundation solutions if considered appropriate. 7) To establish any required mitigation measures, such as grouting, for any legacy coal mining related voiding which may highlight ground instability risk for future structures.
Design Reference Documents	<ul style="list-style-type: none"> • Site Investigation Steering Group (2012) UK Specification for Ground Investigation; • British Standard (BS) 5930:2015+A1:2020 Code of Practice for Ground Investigations; • CIRIA C758D Abandoned Mine Workings Manual; • BS 8004:2015 Code of practice for foundations (+A1:2020); • BS 1377-2:2022 – Methods of test for soils for civil engineering purposes – Classification tests and determination of geotechnical properties; • BS EN ISO 14688:2018 Geotechnical Investigation and Testing – Identification and Classification of Soil; • BS EN ISO 14689:2018 Geotechnical Investigation and Testing – Identification, Description and Classification of Rock; • BS EN ISO 22475-1:2006 Geotechnical Investigation and Testing – Sampling Methods and Groundwater Measurements; • BS EN ISO 22476:2012 Geotechnical Investigation and Testing – Field Testing; • CIRIA R 143 The Standard Penetration Test (SPT): Methods and Use; • BRE SD1 (2005) Concrete in Aggressive Ground; and • BS EN 1997-1:2004+A1:2013 Eurocode 7 - Geotechnical Design.

Site Investigation Scope of Works

The site investigation comprised the following:

- Site supervision and logging of soils and bedrock in general accordance with BS5930:2015+A1:2020;
- Buried services scanning and clearance of borehole locations prior to drilling;
- Advancement of three rotary boreholes utilising Geobore S recovery technique (RB01 – RB03) to a maximum depth of 40.00 meters below current ground levels (m bcgl). The boreholes were undertaken in accordance with a Coal Authority provided Permit, included in **Appendix I**; and
- Sampling of selected undisturbed / disturbed soil and rock arisings and submission of samples for geotechnical laboratory testing.

Limitations & Constraints

The ground conditions reported relate only to the point of excavation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the site.

Additionally, the following specific data gaps and uncertainties apply to this assessment:

- Investigation locations were distributed cognisant of the proposed development, however due to ongoing site use, locations were positioned to minimise impact to the current site use, avoid buried services and within the confines of accessibility/safety.
- The labelling of 'voids' or 'broken ground' are derived from observations made during the drilling process (from the drilling crew), flush behaviour, drilling resistance and also from visual inspection of bedrock core recovery. Whilst REL are confident in the interpretation provided, the conclusions and recommendations provided are based off individual borehole arisings and relate to that specific borehole location only. The nature of the ground conditions may differ between borehole location.
- Sampling dependent on moisture content is representative of the ground conditions at the time sampling / testing was undertaken. The geotechnical analysis does not necessarily allow for seasonal variations and isolated meteorological events such as heatwave and heavy rainfall.

Quality Control

All geotechnical soil samples were delivered directly to Ian Farmer Associates (IFA) and Eurofins Chemtest, both of which are UKAS-accredited laboratories.

Health and Safety

All work carried out on site was in accordance with REL Health and Safety Policy. In addition, a risk assessment was produced prior to the works beginning on site. Prior to any excavation being undertaken, available service plans were reviewed. All exploratory boreholes were positioned in areas recorded to be free from services.

Before the progression of the boreholes, all locations were cleared for services prior to the breaking of ground by REL using a Cable Avoidance Tool (CAT) and Gennie where anomalies were encountered.

On completion of each rotary borehole, they were immediately reinstated with a combination of arisings and bentonite to the original ground level. REL can confirm that no incidents occurred during these site works.

Geotechnical In-Situ Testing

The following *in-situ* testing was undertaken within the rotary boreholes to support laboratory analysis:

- Standard Penetration Testing (SPT) were undertaken within residual bedrock recorded at 1.00m intervals until "competent" bedrock was proven. Rotary coring was then commenced once SPT N value refusal was obtained. The SPT N values are included on borehole logs included as **Appendix II**, together with the SPT Calibration Certificate(s), in accordance with BS EN ISO 22476-3:2005+A1:2011, Geotechnical investigation and testing – Field testing – Part 3: Standard penetration test for trip hammers.

Geotechnical Laboratory Testing & Sampling Strategy

A selection of soil samples comprising of undisturbed and disturbed bulk samples and rock core samples were obtained from the strata encountered and submitted to Ian Farmer Associates (IFA), a UKAS accredited laboratory for a range of geotechnical testing, the laboratory test results sheets for IFA (reference: 2282839/1) and Chemtest (reference: 26-04442-1) for the soil samples tested are attached in **Appendix IV**.

The rationale for the laboratory testing undertaken is provided in the table below.

Laboratory Test	Test Standard	Number of Samples Tested	Rationale
Soil Classification			
Water content	BS1377-2:3 or BS EN ISO 17892:2014	1	To assess the soils moisture characteristics.
Liquid and Plastic Limits	BS1377-2:4 or BS EN ISO 17892:2018	1	To assess the potential for cohesive soils to shrink and swell due to changes in the water content of a soil. Often used to inform the impact of the existing presence, removal or addition of trees and shrubs.
Bedrock Strength Testing			
Uniaxial Compression Test	ISRM (2007)	5	To derive the maximum axial compressive stress of a selected undisturbed rock specimen.
Point Load Test (PLT)	ISRM (2007)	22	To determine the point load strength of a rock specimen ($i_{s(50)}$) for a standardized diameter equal to 50mm for use in preliminary foundation design and alongside UCS data..
Geochemical – Soil Samples			
pH	BRE Special Digest 1 or other	11	To assess the soils conditions of the site in accordance with BRE Special Digest 1 Concrete in Aggressive Ground (2005) and specify an appropriate concrete class to resist chemical attack.
Water Soluble Sulphate (2:1 water / soil extract)		11	

6. Encountered Ground Conditions

The following ground conditions succession was recorded by the REL ground investigation, formed of three rotary boreholes, to accurately profile the geological succession and in particular, any notable evidence of historical coal mining-related activity beneath the proposed footprint of the building. The locations of the rotary boreholes, RB1, RB2 and RB3, are included on the Rotary Borehole Location Plan included as **Appendix II** and the borehole logs are included as **Appendix III**.

Note that the coal seams and bedrock unit designations are REL's interpretation of the ground succession, based upon reference to local British Geological Survey mapping and memoirs:

Strata	Boreholes		
	RB1	RB2	RB3
Residual Soils	1.20	1.20	2.45
Flockton Thick Coal	1.20 – 2.30 m: Coal recovered as black angular gravel	Not recorded	Not recorded
Emley Rock Sandstone	2.30–14.7 m: Weak to moderately strong thinly bedded sandstone, fine–medium grained with horizontal closely spaced fractures	1.20–14.5 m: Weak to medium strong sandstone with thin mudstone and siltstone interbeds	2.45–14.7 m: Weak to medium strong thinly bedded sandstone with mudstone bands
Flockton Thin Coal Seam	17.6–18.9 m: Coal seam recovered as coal gravel with void recorded at 17.6 m and additional void associated with seam around ~18.7–18.9 m	15.5–18.3 m: Coal seam recorded mainly as coal gravel with mudstone partings	16.7–18.3 m: Coal recovered as angular gravel within mudstone
Pennine Lower Coal Measures	18.9–24.9 m: Extremely weak to weak thinly bedded mudstone becoming carbonaceous with closely spaced horizontal fractures	18.3–25.5 m: Weak mudstone and siltstone sequence, thinly bedded with closely spaced fractures	18.3–27.5 m: Weak to very weak mudstone, locally weathered and recovered as clayey gravel
Birstall Rock Sandstone	24.9–25.3 m: Strong grey sandstone with closely spaced fractures	Not Recorded	Not Recorded
Thin Coal Band	Not recorded	25.5 m: Thin coal seam	Not recorded
Pennine Lower Coal Measures	25.3–29.2 m: Weak to very weak thinly bedded mudstone	25.5–29.7 m: Weak mudstone with occasional siltstone	27.5–31.5 m: Weak mudstone sequence
First Brown Metal Coal	29.2–32.0 m: Coal seam with void recorded from ~29.2–32.0 m	29.7–31.2 m: Void associated with coal seam	31.5–31.9 m: Coal recovered followed by void
Pennine Lower Coal Measures	32.0–33.1 m: Weak thinly bedded mudstone	31.2–33.1 m: Weak mudstone	31.9–33.5 m: Weak mudstone
Second Brown Metal Coal	Not Recorded	33.1–33.5 m: Void recorded within coal seam	Not recorded
Pennine Lower Coal Measures	33.1–40 m: Weak mudstone with closely spaced fractures	33.5–40 m: Weak mudstone sequence	33.5–40 m: Weak mudstone sequence

*Depths are metres below ground level

7. Intrusive Coal Mining Risk Assessment (CMRA)

To inform a finalised intrusive CMRA, REL have utilised the data obtained from this ground investigation, as well as the data obtained from the previous RSK investigation, to form an accurate and detailed appraisal/risk assessment of the coal mining legacy beneath the site:

- Gomersal St Mary's CE (C) Primary School. Phase 1 and Phase 2 Geo-environmental and Geotechnical Factual and Interpretative Report. RSK Environment Ltd. Ref: 323198 R02 (00). Dated February 2024.

Based on the conclusions of this CMRA, recommendations will be provided to reduce perceived ground risk and provide advice for the design of future structures.

Two cross sections, one produced by REL detailing the geological relationship between RB1 – RB3, as well as a third-party section produced by RSK, extracted from the above report, are included as **Appendix III**. Both of the sections will be referred to in order to demonstrate clearly the geological relationships identified.

The table below seeks to compile all available information to date regarding the potential for broken ground and voiding:

Borehole	Void/Broken Ground?	Depth (m bgl)	Intact Rock Cover Required (10:1)	Rock Cover Present?
RB1 (REL)	Void	17.00 – 17.60	6.00	12.90
	Void	29.20 – 32.00	28.00	11.60*
RB2 (REL)	Void	30.15 – 31.20	10.05	28.95
	Void	33.10 – 33.50	4.00	2.90*
RB3 (REL)	Void	31.90 – 33.50	16.00	29.45
RO4 (RSK)	Broken Ground	17.67 – 17.82	1.50	15.97
	Broken Ground	18.46 – 18.50	0.40	16.76
RO5 (RSK)	Void	14.80 – 16.20	14.00	12.40
	Void	27.90 – 29.30	14.00	11.70*

Notes:

* - The intact rock cover from these horizons is calculated to the above void or broken ground. Green indicates satisfaction of the 10:1 rule. Red represents insufficient intact bedrock cover.

In reference to CIRIA C758D Abandoned Mine Workings Manual, a general rule applies whereby for every 1m of worked /voided ground, 10 m of intact bedrock overburden must be present above the working to provide suitable ground stability. This is referred to as the 10:1 rule. This rule may be changed to become more conservative if the ground model dictates. For this assessment, the 10:1 rule is considered appropriate to assess risks posed by voided ground.

Generally, there is either insufficient intact rock overburden to the surface to mitigate possible mine collapse and instability, or there is insufficient rock interval between two potential layers of coal workings.

As such, stabilisation works are considered to be required in the form of grouting. A suitable grouting specification should be produced using the findings of this investigation and provided to a suitably qualified and experienced grouting contractor for review. Upon completion of the grouting works, a declaration and sign off for the remedial works should be provided prior to further works taking place on-site.

8. Geotechnical Material Properties

The material properties generated from both the in-situ and laboratory test results are summarised in the table below. It should be noted that the values presented are summary ranges of the data collected to inform this assessment. The values provided in red are summarised from previous RSK assessment for comparison against REL data. Unless otherwise stated, the ranges presented do not constitute characteristic design values:

Material Parameter	Unit	Value or Range	Justification
Residual Weathered Bedrock Strata			
w (Water Content)	%	13.0 17.2 – 42.5	Laboratory classification testing.
IP (Plasticity Index)	%	16 19 – 38	
IP' (Modified Plasticity Index)	%	7 18 – 38	Derived using the relationship: $IP' = (IP \times \%_{\text{passing } 425\mu\text{m}}) / 100$
PL (Plastic Limit)	%	24 26 – 45	Laboratory classification testing.
LL (Liquid Limit)	%	40 44 – 76	
Volume Change Potential	-	Medium	Derived using NHBC Chapter 4.2.4, considered industry best practice.
Uncorrected SPT 'N'	Blows	20 – 50	In-situ testing.
Corrected SPT 'N ₆₀ '	-	21 – 53	SPT N values corrected for energy ratio (Er) after BS EN ISO 22476-3:2005. SPT Hammer ID GS Er = 63%
C _u (Inferred Undrained Shear Strength)	kPa	92 - 230	Derived using Stroud (1975), defined as $C_u = (f_1 \times N)$. f ₁ derived from IP = 38%
Pennine Lower Coal Measures - Mudstone			
Is (50) (Axial Point Load Strength Index)	MPa	0.02 – 0.67 0.01 – 0.12	Bedrock strength testing. The Point Load Test (PLT) was undertaken as an index test to predict the Uniaxial Compressive Strength (UCS) of core too broken for UCS testing.
UCS' (Inferred Uniaxial Compressive Strength)	MPa	0.16 – 5.36	Derived using point load is (50) data using: $UCS' = (k) \times is_{(50)} = 8 \times is_{(50)}$
UCS (Uniaxial Compressive Strength)	MPa	0.7 – 10.2	Bedrock strength testing.
TCR (Total Core Recovery)	%	20 – 100	TCR calculated using: $TCR = (\text{total length of core pieces} / \text{total length of core run})$
SCR (Solid Core Recovery)	-	3 – 82	SCR calculated using: $SCR = (\text{total length of core pieces with full core diameter} / \text{total core run})$

RQD (Rock Quality Designation)	-	0 – 47	RQD calculated using: $RQD = (SUM \text{ (length of intact pieces } < 100\text{mm)} / \text{Total length of core run}) \times 100$.
Pennine Lower Coal Measures - Siltstone			
<i>I_s</i> (50) (Axial Point Load Strength Index)	MPa	0.35 – 0.71	Bedrock strength testing. The Point Load Test (PLT) was undertaken as an index test to predict the Uniaxial Compressive Strength (UCS) of core too broken for UCS testing.
UCS' (Inferred Uniaxial Compressive Strength)	MPa	2.8 – 34.08	Derived using point load <i>i_s</i> (50) data using: $UCS' = (k) \times i_{s(50)} = 8 \times i_{s(50)}$
UCS (Uniaxial Compressive Strength)	MPa	10.2 – 49.9	Bedrock strength testing.
TCR (Total Core Recovery)	%	20 – 100	TCR calculated using: $TCR = (\text{total length of core pieces} / \text{total length of core run})$
SCR (Solid Core Recovery)	-	8 – 90	SCR calculated using: $SCR = (\text{total length of core pieces with full core diameter} / \text{total core run})$
RQD (Rock Quality Designation)	-	0 – 56	RQD calculated using: $RQD = (SUM \text{ (length of intact pieces } < 100\text{mm)} / \text{Total length of core run}) \times 100$.
Pennine Lower Coal Measures - Sandstone			
<i>I_s</i> (50) (Axial Point Load Strength Index)	Mpa	0.37 – 4.26 0.07 – 1.13	Bedrock strength testing. The Point Load Test (PLT) was undertaken as an index test to predict the Uniaxial Compressive Strength (UCS) of core too broken for UCS testing.
UCS' (Inferred Uniaxial Compressive Strength)	MPa	5.55 – 63.9	Derived using point load <i>i_s</i> (50) data using: $UCS' = (k) \times i_{s(50)} = 15 \times i_{s(50)}$
UCS (Uniaxial Compressive Strength)	MPa	30.9 – 37 38.50	Bedrock strength testing.
TCR (Total Core Recovery)	%	64 – 100	TCR calculated using: $TCR = (\text{total length of core pieces} / \text{total length of core run})$
SCR (Solid Core Recovery)	-	61 – 96	SCR calculated using: $SCR = (\text{total length of core pieces with full core diameter} / \text{total core run})$
RQD (Rock Quality Designation)	-	7 – 94	RQD calculated using: $RQD = (SUM \text{ (length of intact pieces } < 100\text{mm)} / \text{Total length of core run}) \times 100$.

Notes:

1. In reference to a published comparison between point load and uniaxial compressive strength for sedimentary rock, Das (1995) produced conversion factors ranging between 8 for mudstone and siltstone, and 15 for sandstone.

Rock Core Recovery and Rock Quality

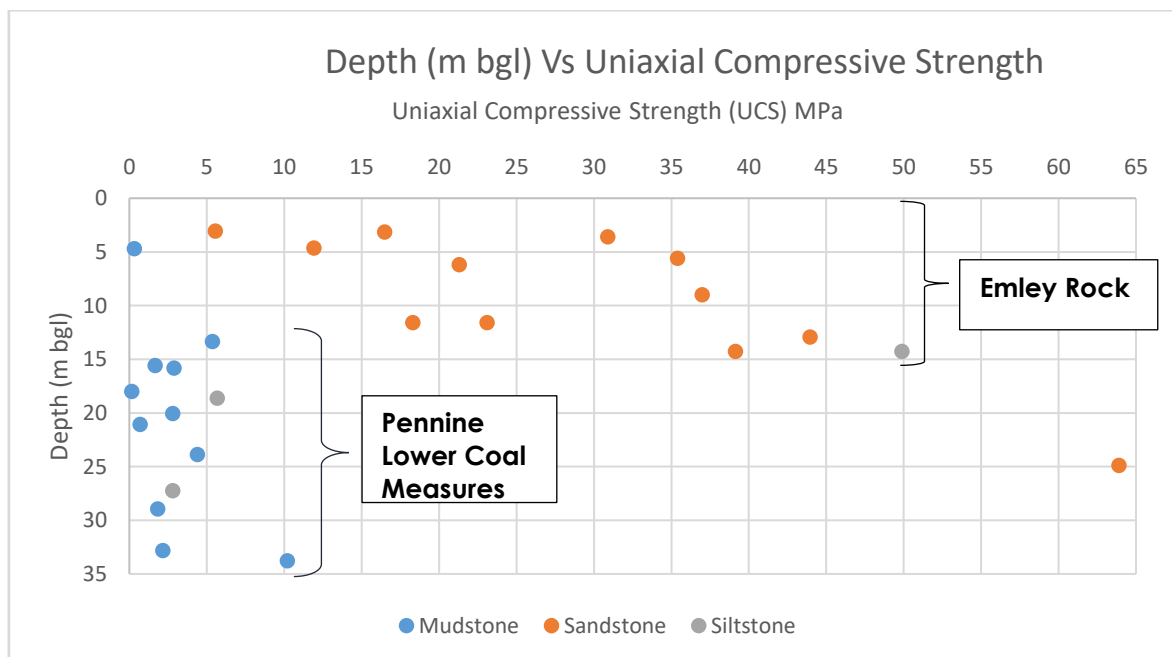
Recovery of core samples utilising Geobore-S' drilling techniques produced varied results regarding rock core recovery. Generally, Total Core Recovery (TCR) ranged between 20 – 100%. The recovered rock exhibited fracturing, with some horizons recording drilling induced fracturing. The TCR recorded within the mudstone/siltstone was generally poorer than that recorded within the sandstone.

Rock Quality Designations (RQD) ranged between 0% and 47% in mudstone, 0% - 56% in siltstone and 7% - 94% in sandstone. The RQD data in the sandstone recorded frequently higher RQD values. As the sandstone was more present in the shallower rock sequences, a notable reduction in RQD with depth can be observed, due to the prevalence of mudstone with increasing depth. The RQD data recorded is considered typical of coal measures bedrock geology, indicating highly variable bedrock integrity, fracture spacing and strength characteristics.

Point Load Data & Uniaxial Compressive Strength (UCS)

The graph below presents the UCS data obtained for mudstone, sandstone and siltstone and the relationship of this data with increasing depth. The UCS values are either derived directly from a UCS test or via a correlation with Point Load Strength Index ($IS_{(50)}$) and a suitable modulus value (k):

$$UCS = (k) \times is_{(50)} = 15 \times is_{(50)}$$



Overall, there is no reliable trend of bedrock strength with increasing depth. There is, however, a more obvious relationship between bedrock strength and lithology (i.e. mudstone, siltstone or sandstone). As the Emley Rock sandstone is situated at shallower depths (up to approximately 10 m bgl), the bedrock sequence is considered more competent, albeit with a significant spread of strength data, throughout this initial sequence. The UCS of sandstone varies between ~5 MPa and ~45 MPa.

At depths beyond 10 m bgl, the geological sequence becomes dominated by mudstone, which correlates with a reduction in strength, varying between ~0.5 MPa and typically, <5MPa. There are frequently values recorded close to or less than 1.0 MPa. These deposits may be associated with zones of fractured, destructured bedrock, which may exhibit negative skin friction when considering deeper foundation design.

On the whole and in accordance with BS5930:2015+A1:2020, deposits of mudstone and siltstone could be described as 'extremely weak' to 'very weak', whereas deposits of sandstone could be described as 'weak' to 'moderately strong'.

The data reviewed from the RSK investigation generally aligns with the above-mentioned data distribution.

The geotechnical laboratory test results sheets for Ian Farmer Associates Limited (Ref: 2282839/1) are attached in **Appendix IV**.

Geochemical Testing

Geochemical analysis was undertaken upon 11 No. rock core samples, tested for selected contaminants as part of a suite deemed suitable for the ground model (BRE Special Digest 1: 2005 (3rd Edition), Concrete in Aggressive Ground). The results are summarised in the table below:

Test Analyte	No. of Tests	Minimum	Maximum
Pennine Lower Coal Measures			
Rock - pH	11	5.8	8.5
Rock – Water soluble sulphate (g/l)	11	0.017	0.072
Rock – Total Sulphate (%)	11	0.024	3.20
Rock – Total Sulphur (%)	11	0.051	0.71

The results are shown in the table above and are also contained within the Chemtest Limited Analytical Report (reference: 26-04442-1), a copy of which can be seen in **Appendix IV**.

9. Geotechnical Assessment

Summary of Development Proposals

It is understood that the Client intends to demolish the existing school buildings and construct a new three-storey school building with associated infrastructure, including car parking and external playing areas, situated in the eastern area of the site. The proposed structure is anticipated to be formed of masonry construction.

At the time of writing, no anticipated structural loadings or formation levels have been provided to REL for review. As such, this assessment may be considered preliminary and should be revisited once loadings are known to ensure the suitability and relevance of this assessment.

Preliminary Geotechnical Hazards

The geohazards listed below have been identified to follow guidance presented in the HE documents CD622 'Managing Geotechnical Risk' (2020), which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance. This process has been used in a private development setting to provide a robust assessment of geohazards and consequential construction phase risk.

The following geohazards are considered to represent substantial ground-related risks associated with the proposed development:

- *Volume change potential:* The weathered mudstone deposits (formed of clay) are of medium volume change potential as inferred from the modified plasticity indices. Proposed new planting may result in desiccation of soils, leading to subsidence/heave processes.
- *Desiccation – Heave / Subsidence:* Heave or subsidence occurring as a result of changes in moisture content within cohesive soils may have the potential to impact new foundations, floor slabs and hardstanding.
- *Coal Mining Legacy & Voided Ground:* Voiding has been identified by both previous RSK investigation and observed within the boreholes undertaken as part of this investigation. A specification and programme of grouting is likely to be required to stabilise voided ground ahead of implementing future foundations.
- *Presence of Flockton Thick Coal Subcrop:* Within RB1, coal deposits were recorded near the ground surface, which are considered representative of the Flockton Thick, recorded to outcrop/subcrop on the site. Coal has variable geotechnical performance and should not be relied upon for load-bearing purposes.

- *Residual/Weathered Bedrock Strength & Compressibility:* The shallow deposits of weathered bedrock, recovered as gravelly clays, are likely to exhibit differential strength and compressibility characteristics. When loaded, differential settlement may represent a significant constraint to the feasibility of shallow foundations.
- *Bedrock Strength Variability:* The UCS results demonstrate the significant variability in bedrock strength, ranging between extremely weak to moderately strong. This variation was observed not only between different bedrock lithologies but also within the data spread for specific lithologies. This requires careful consideration for future foundation designs.
- *Aggressive Ground Conditions:* Pennine Lower Coal Measures geology is frequently formed of sulphurous mineralogy, with elevated hotspots where pyrite may be present. Coal seams are also often of high sulphur content. When oxidised, sulphates can combine to create acidic compounds which may attack and degrade buried concrete if not sufficiently resistant.
- *Negative Skin Friction Effects:* Due to the variability in bedrock strength, zones, and horizons, negative skin friction may be present and would need consideration as part of future pile design.
- *Ground Gas/Mine Gas:* The site has been classified as CS-2, which will need to be factored into any future foundation design. There may be a requirement to demonstrate that a deeper foundation design, such as piling, does not represent a viable pathway to built structures. Such works may be undertaken as a Foundation Works Risk Assessment.

Legacy Mine Workings Stabilisation

It is assumed that prior to undertaking enabling works at the site, the grouting of coal workings has been successfully undertaken to an approved specification. It would need to be demonstrated that the stabilisation works have been carried out in accordance to appropriate UK guidance, and a signed statement or declaration signing off the grouting works has been prepared by a suitably qualified and competent person. This declaration may also be required as part of the planning process.

Enabling Earthworks

At the time of writing, finished levels were not known to REL. It is understood that to some degree, limited earthworks will be required as part of the proposed development. This may include the near-surface removal of hardstanding, removal of Made Ground and other, otherwise unsuitable engineering materials to prepare the formation level. Significant level changes are not anticipated at the time of writing. Any open excavations left from grubbing out of relict obstructions/foundations should be suitably infilled with granular fill to a suitable specification / performance.

In the event localised and limited reprofiling of the site is required, materials used as fill will need to be placed to a suitable engineering specification, with the degree of compaction required dependent on end-usage and serviceability criteria. For example, a lesser degree of compaction may be suitable for paved areas in comparison to building platforms supporting foundations and ground bearing slabs.

Whilst it is encouraged to re-use as much site won volume as possible under the waste hierarchy, this may not be feasible. If re-use of any materials is proposed, the material would need to be subject to a Materials Management Plan (MMP), informed by supplementary chemical testing, screening and processing to ensure suitability for re-use from both a physical and chemical perspective.

On the basis that significant earthworks are not anticipated at the site, further earthworks testing and associated detailed specifications are unlikely to be required at the time of writing.

Foundation Options

Previous third-party RSK assessment concluded that strip or trench fill foundations were not feasible for the proposed development due to low-strength residual weathered bedrock deposits, which extended to a minimum depth of 4.70 m. Assuming a beam and block construction, trench fill was deemed unlikely to be cost-effective due to the presence of fractured coal seams and the presence of weathered bedrock recovered as soft to firm clay across the site.

A raft foundation solution was suggested to minimise the risk posed by differential settlement and is often used to spread and distribute the loading over a wide area, favoured in higher-risk coal mining areas. Whilst REL agree with the above rationale, the risk of differential settlement would remain, assuming that it would be unfeasible to excavate and remove significant volumes of residual natural bedrock and replace it with imported granular fill to effectively

reduce this risk item to an acceptable level. The off-site disposal costs and the practicality of removing such materials may also prove unfeasible.

Regardless of the foundation solution adopted, the voids at depth associated with coal extraction would still require remedial works. Therefore, to address the risk of differential settlement and reduce as far as possible any off-site disposal requirements, a deeper foundation solution is considered to be more appropriate.

Piled Foundation Solution

A piled foundation solution utilising either continuous flight auger (CFA) or traditional rotary bored methods, transferring loads to competent geology, likely to comprise the Pennine Lower Coal Measures Formation, may be suitable for the proposed or anticipated design loads, utilising a combination of skin friction and end bearing capacity/rock socket into competent, natural strata. Temporary casing may be required in the event that rotary bored piles are adopted.

REL consider it unlikely that driven/percussive methods will be acceptable given the nearby residential dwellings and the associated vibration/noise restrictions associated with this.

Prior to piling works commencing, it should be ensured that stabilisation works have been completed and approved. Piles should not end-bear directly onto cured grout and should be advanced through and beyond into competent natural bedrock if pile design dictates this.

The precise method of pile installation, diameters and depths required would need to be informed based on the results of this investigation, by discussions with a piling contractor with suitable experience, whose design should be warranted.

Pile groups are assumed to be free-standing with a spacing no less than three pile diameters. Commercial designers may use different parameters, design factors or safety factors than published methods.

Individual pile/pile group loads will be a function of the surface area of the piles to be employed at the site and their method of construction.

Normal static and dynamic load testing (including uplift testing) should be considered to achieve satisfactory quality control / assurance in accordance with good practice.

There will be a requirement for the placement of a suitably engineered piling mat, which should be designed and validated by a suitably qualified and experienced engineer, in accordance with BRE 470 'Working Platforms for Tracked Plant'.

It is anticipated that a Foundation Works Risk Assessment may be required in the event that piling is adopted. The combination of piling and grouting may theoretically alter the ground gas conceptual model beneath the site, and it may need to be demonstrated that these works do not form preferential pathways for the migration of ground/mine gas. The assessment, if required, should be undertaken in accordance with relevant EA guidance and Coal Authority Guidance on Managing the Risk of Hazardous Gases when Drilling or Piling Near Coal.

Floor Slabs

On the basis that a proposed Uniformly Distributed Load (UDL) has not been provided, preliminary floor slab advice can only be provided at this stage. Given the proposed use as a school, high dead and live floor slab loadings are not anticipated.

A preliminary assessment of shallow residual weathered bedrock has concluded that soils are of a medium volume change potential and are of varying plasticity across the footprint of the building. A ground-bearing floor slab would be subjected to similar ground movement risks to a raft foundation, principally associated with a variation in strata strength and compressibility characteristics across the footprint. A suspended floor slab is therefore recommended.

A piled foundation solution would likely complement the suspended construction of the floor slab, transferring slab loads to pile caps, groupings and beams. A suspended construction may also be favourable to the CS-2 ground gas characterisation provided by RSK.

Excavations & Obstructions

It is expected that conventional mechanical excavators will readily remove relict foundations likely to be encountered in shallow excavations, although a breaker may be required to remove any existing hardstanding.

No relict footings or obstructions were identified during these intrusive works.

Any shallow excavations undertaken should be risk assessed and designed appropriately in reference to CIRIA R97 – Trenching Practice (Second Edition).

Concrete Classification

Based on the geochemical data summarised in **Section 8**, and known characteristic properties of the geology / ground conditions recorded, the ground model is of a net pyritic condition.

In accordance with the recommendations as set out in BRE Special Digest 1, 'Concrete in Aggressive Ground' (2005), the condition of the shallow soils at the site can be classified purely based upon the relationship between water-soluble sulphate and total sulphate/total sulphur.

Assuming soluble sulphate in isolation, Design Sulphate Class DS-1 and ACEC Class AC-1 would apply, assuming mobile groundwaters in potentially pyritic soils. If a worst-case scenario is adopted whereby high concentrations of sulphate can oxidise readily, an elevated classification of DS-5 AC-5 would apply, likely driven by high sulphate concentrations in coal and carbonaceous mudstone deposits.

On the basis, however, that CFA or bored piling is to be adopted and assuming a shallow groundwater table (<10 m bgl), consideration may be given to a reduced classification. The philosophy surrounding this concerns the level of oxidation that in reality, is likely to take place at depth.

Limited disturbance of the strata via piling will result in much lower oxidation potential, particularly when below the groundwater table. Sulphate hotspots were identified in RB1 and RB2 at 34.4 m and 15.60 m, respectively. Given that oxygen diffusion is likely to be very minimal, primarily due to the groundwater table situated at 8 m depth, a reduced classification is likely to be more appropriate. When removing the above hotspots from the assessment, a conservative classification (assuming oxidation will occur) of **Design Sulphate Class DS-3** and **ACEC Class AC-3** is recommended.

10. Conclusions

Current site description	The site comprises a parcel of land currently used as the main school site for St Mary's Primary School. The main school building is positioned on the northern and western portions of the site. The eastern and southern areas currently comprise soft landscaping, used for play areas and playing fields, respectively. Car parking and temporary classrooms were present in the northwest of the site.
Proposed Development	REL understands that the Client intends to demolish the existing school buildings and develop a singular, larger three-storey rectangular building along the eastern periphery of the site.
Encountered Geology	<p>No superficial deposits were identified during the progression of the ground investigation.</p> <p>A sequence of residual, weathered bedrock geology was encountered in all rotary borehole locations to depths between 1.20 m (RB1) and 2.45 m (RB1). From this depth, sandstone of the Emley Rock was recorded in all boreholes before giving way to Pennine Lower Coal Measures Formation mudstone and siltstone until the completion depth of the boreholes.</p> <p>Voids were encountered across all three boreholes, with some evidence of broken ground. Drilling flush throughout the boreholes was frequently lost below the Emley Rock in increasingly fractured mudstone and siltstone geology.</p>
Groundwater	Previous ground investigation works undertaken by a third party recorded groundwater typically from approximately 8 m bgl. Perched groundwater was encountered throughout shallow residual deposits.
Coal Mining Risk Assessment	<p>Based on a 10:1 rule as outlined in CIRIA C758D, there is either insufficient intact rock overburden to the surface to mitigate possible mine collapse and instability, or there is insufficient rock interval between two potential layers of identified coal workings.</p> <p>As such, stabilisation works are considered to be required in the form of grouting. A suitable grouting specification should be produced using the findings of this investigation and provided to a suitably qualified and experienced grouting contractor for review. Upon completion of the grouting works, a declaration and sign off for the remedial works should be provided prior to further works taking place on-site.</p>
Foundations Options	<p>Assuming a beam and block construction, strip/trench fill was deemed unlikely to be cost-effective due to the presence of fractured coal seams and the presence of weathered bedrock recovered as soft to firm clay across the site.</p> <p>A raft foundation solution was suggested by RSK to minimise the risk posed by differential settlement, often used to spread and distribute the loading over a wide area, favoured in higher-risk coal mining areas. Whilst REL agree with the above rationale, the risk of differential settlement would remain and significant volumes of residual soils for off-site would be required.</p> <p>Therefore, to address the risk of differential settlement and reduce as far as possible any off-site disposal requirements, a deeper foundation solution is considered to be more appropriate.</p> <p>Piling using Continuous Flight Auger or Rotary Bored techniques are recommended. The pile design would need to allow for highly variable bedrock strength characteristics, the groundwater table and possible zones of negative skin friction.</p> <p>Given that foundations are likely to advance through coal measures geology and significant oxidation is unlikely to occur, a worst-case scenario concrete Design Class of DS-3 and an ACEC Class of AC – 3 should be applied.</p>

11. Recommendations

As part of the proposed redevelopment, we recommend that the client undertake the following action:

- Based on the voids identified in the RSK and REL investigations, which are associated with historical coal mining, it is recommended that stabilisation works in the form of grouting is undertaken.
- A Grouting Specification should be produced to inform the grouting requirements for the site, informed by the findings of this assessment and associated previous, third-party data.
- A Foundation Works Risk Assessment may be required to demonstrate that the pile design does not create preferential pathways for ground/mine gases.
- It is recommended that the findings of this report and a suitable grouting specification be provided to specialist grouting contractors to provide a design for the stabilisation works.
- The results and data provided by this assessment should be provided to specialist pile designers to begin compiling a suitable design for the proposed structure.
- Material waste classification testing may be required on pile arisings at a later date to inform off-site disposal requirements.
- Construction and maintenance work should be subject to risk assessment. Workers should use appropriate procedures and to manage residual risk to site and adjacent users from exposure to materials used or generated on site.
- Foundation and concrete design recommendations are presented within **Section 9**.

APPENDIX I

COAL AUTHORITY PERMIT



Mining
Remediation
Authority

Permit to Enter or Disturb Mining Remediation Authority Interests

Permit 30953

Name and Address of Permit Holder:

*Department for Education
20 Great Smith Street
London
SW10 2BT*

Site Location:

*St Marys Primary School
Shirley Avenue
Gomersal
BD19 4NA*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by three boreholes to 40m to determine presence of shallow mine workings

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of **12 months** from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: Christopher Bunyan Granted Date: 23rd December 2025

For and on behalf of the Mining Remediation Authority

Nominated Representative: Christopher Bunyan, Permitting Manager;



Mining
Remediation
Authority

Granted Permit Boundary

Permit Ref: 30953

Permit Boundary:



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The Mining Remediation Authority is the trading name of the Coal Authority ('TCA') established pursuant to Section 1 of the Coal Industry Act 1994, of 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG. The Coal Authority remains the legal name of the Authority

APPENDIX II

ROTARY BOREHOLE LOCATION PLAN



Legend

-  Rotary Borehole locations
-  Site Boundary

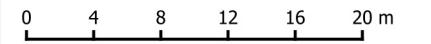


Figure
Exploratory Rotart Borehole Location Plan

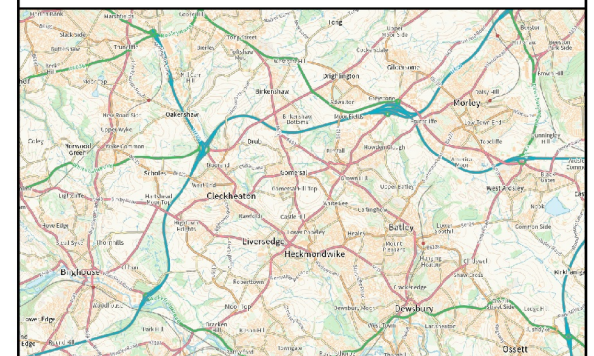
Job
St Mary Primary School, Gomersal

Client
KPS Ltd

Figure No.	Revision	Date
1	1	04 March 2026

Drawn by	Checked by	Scale
CD	BB	1:450.054

Job No.
251009



DO NOT SCALE. NOT FOR CONSTRUCTION

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APPENDIX III

ROTARY BOREHOLE LOGS, SPT HAMMER CERTIFICATE & CROSS SECTIONS

Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	SPT(C) - SPT using cone



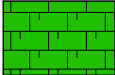




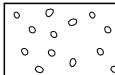
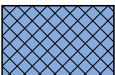

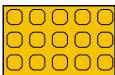
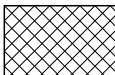
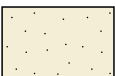
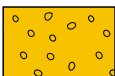


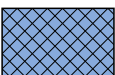
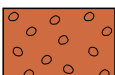
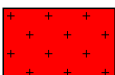
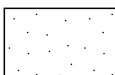
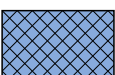



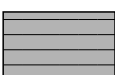




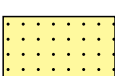

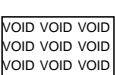
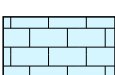
GROUNDWATER

 Groundwater strike	 Groundwater rest level
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ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		 Plain pipe
 Gypsum	 Siltstone		
 Coal	 Sandstone		 Slotted pipe
 Void	 Limestone		



Rotary Core Log

RB1
Sheet 1 of 6

Hole Type RC	Easting 420799.00	Northing 425732.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-20	End Date 2026-01-22	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
		1.20	SPT	N=20 (2,2/4,6,6,4)							(1.20)	MADE GROUND COHESIVE Dark brown silty clayey TOPSOIL overlain by grass. (Re-worked natural)	0.5
		2.00	SPT	N=50 for 285mm (3,4/6,13,19,18 for 60mm)							(1.32)	COAL [Pennine Lower Coal Measures Formation]	1.5
		2.30-2.42 2.30-2.42	D 1 D 2									Black angular clayey GRAVEL comprising of coal (Flockton Thick)	2.0
					2.00 3.50	100	90	67			2.52 (0.07) 2.59 (0.25) 2.84	Clayey GRAVEL [Pennine Lower Coal Measures Formation]	2.5
		3.15-3.25	C 3						7		(0.51)	Organish brown clayey angular to subangular fine to coarse GRAVEL of Mudstone. (2.52 - 2.59m)	3.0
												Gravelly CLAY [Pennine Lower Coal Measures Formation]	
		3.60-3.90	C 4								3.35 (0.15) 3.50	Firm orangish brown gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone and coal. (2.59 - 2.84m)	3.5
											(0.60)	SANDSTONE [Pennine Lower Coal Measures Formation]	4.0
		4.70-4.80	C 5		3.50 5.00	100	89	71	7		4.10	Weak brownish grey SILTSTONE. Fractures are horizontal, closely spaced, undulating, smooth, very tight to tight and clean. (Emley Rock)	4.5
											(0.53)	MUDSTONE [Pennine Lower Coal Measures Formation]	4.5
		5.28-5.35	C 6						NR		4.63	Extremely weak grey thinly bedded MUDSTONE with brown iron staining. (Emley Rock)	5.0
												SANDSTONE [Pennine Lower Coal Measures Formation]	5.0
		6.20-6.27	C 7		5.00 6.50	100	90	86	NR		(1.37)	Moderately Strong grey with brown mottling fine grained SANDSTONE. Fractures are horizontal, closely to medium spaced, planar rough with very tight to tight and clean with dark brown iron staining. (Emley Rock)	5.5
												[Pennine Lower Coal Measures Formation]	5.5
											6.00	Extremely weak to weak grey with orange mottling thinly bedded SILTSTONE. Fractures are horizontal, closely spaced, undulating smooth, very tight to tight, and clean with orange surface staining. (Emley Rock)	6.0
												MUDSTONE [Pennine Lower Coal Measures Formation]	6.5
					6.50 8.00	100	98	58			(2.00)	Extremely weak to moderately weak grey thinly bedded MUDSTONE. Fractures are horizontal, closely to medium spaced, planar rough and tight with infilling of clay between 4.83m and 4.85m and grey mudstone gravel between 7.20m	6.5
Continued on next page												7.0	

Remarks

- Boreholes were logged in general accordance with BS 5930 + A1:2020.
- Utilities were identified and cleared prior to the commencement of drilling.
- Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
- Water flush drilling was used during advancement; water was lost at approximately 15 m bgl and did not recover.
- On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
0.00 - 40.00m RC Comocchio GEO 602

Logger
CD

Checked By: CD Approved By: BB



Rotary Core Log

RB1
Sheet 2 of 6

Hole Type RC	Easting 420799.00	Northing 425732.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-20	End Date 2026-01-22	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
		7.25	D 8										
		7.65-8.00	C 9									Moderately weak grey thinly bedded SANDSTONE. Fractures are horizontal, very closely to closely spaced, planar smooth and clean. (Emley Rock)	7.5
												SANDSTONE [Pennine Lower Coal Measures Formation] Medium Strong SANDSTONE. Fractures are horizontal, very close to closely spaced, planar smooth and tight with infilling of clay at 8.20m. Remaining fractures clean. (Emley Rock)	8.0
		9.00-9.30	C 10		8.00 9.50	88	88	81			(1.65)		8.5
		9.70-9.90	D 11									MUDSTONE [Pennine Lower Coal Measures Formation]	9.5
												Extremely weak to weak brownish black MUDSTONE. Fractures are horizontal, very closely to closely spaced, planar smooth, tight and clean. (Emley Rock)	10.0
		10.87-11.00	C 12		9.50 11.00	100	84	64				SANDSTONE [Pennine Lower Coal Measures Formation] Weak to moderately weak greyish brown medium grained SANDSTONE. Fractures are horizontal, very closely to closely spaced, undulating rough, tight and clean. (Emley Rock)	10.5
													11.0
		11.60-11.90	C 13		11.00 12.50	91	72	44	9			MUDSTONE [Pennine Lower Coal Measures Formation]	11.5
												Very weak to weak brownish black MUDSTONE. Fractures are horizontal, very closely spaced, planar smooth and infilled with brown silty clay. (Emley Rock)	12.0
		12.95-13.10	C 14		12.50 14.00	94	76	16	8			SANDSTONE [Pennine Lower Coal Measures Formation] Moderately Weak greyish black SANDSTONE. Fractures are horizontal, very closely spaced, planar smooth, tight and clean. (Emley Rock)	12.5
													13.0
												MUDSTONE	13.5
													14.0

Continued on next page

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement; water was lost at approximately 15 m bgl and did not recover.
 5. On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
 CD

Checked By: CD Approved By: BB



Rotary Core Log

RB1
Sheet 3 of 6

Hole Type RC	Easting 420799.00	Northing 425732.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-20	End Date 2026-01-22	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		14.62-14.72	C 15		14.00 15.50	100	82	42	12		14.20 (0.53) 14.73	 horizontal, very closely spaced, undulating smooth, very tight to tight and clean. (Emley Rock) SANDSTONE [Pennine Lower Coal Measures Formation] Very weak to weak thinly bedded sandstone. Fractures are horizontal, very closely spaced, planar rough, very tight to tight, and clean with orange staining.(Emley Rock)	14.5	
		15.60-15.75	C 16						18			 MUDSTONE [Pennine Lower Coal Measures Formation] Extremely weak to very weak black MUDSTONE. Fractures are horizontal, very closely spaced, undulating smooth, very tight and infilled with black clay.(Emley Rock)	15.0 15.5	
		16.10	D 17		15.50 17.00	86	67	15	11		(2.27)			16.0 16.5
		17.60	D 18		17.00 18.50	56	17	16	NR		17.00 (0.60) 17.60	 Void (Former Flockton Thin Coal) [Pennine Lower Coal Measures Formation]	17.0 17.5	
		18.02-18.15	C 19						3		17.60 (0.23) 17.83	 COAL [Pennine Lower Coal Measures Formation] COAL recovered as black angular gravel. (Flockton Thin Coal)	18.0	
											(0.67)	 MUDSTONE [Pennine Lower Coal Measures Formation] Extremely weak to very weak MUDSTONE. (17.83 - 18.50m)	18.5	
											18.50 (0.23) 18.73	 Void (Flockton Thin Coal) [Pennine Lower Coal Measures Formation]	18.5	
											(0.20) 18.73 (0.20) 18.93	 COAL (Flockton Thin Coal) [Pennine Lower Coal Measures Formation] COAL recovered as black angular gravel. (18.73 - 18.93m)	19.0	
					18.50 20.00	80	33	21	7			 MUDSTONE [Pennine Lower Coal Measures Formation]	19.5	
		20.07-20.15	C 20		20.00 21.50	93	60	47	NR		(3.37)			20.0 20.5
												Continued on next page		

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement; water was lost at approximately 15 m bgl and did not recover.
 5. On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
 CD

Checked By: CD Approved By: BB



Rotary Core Log

RB1
Sheet 4 of 6

Hole Type RC	Easting 420799.00	Northing 425732.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-20	End Date 2026-01-22	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		21.10-21.35	C 21											
									7					21.5
			22.00	D 22										22.0
						21.50	90	7	0		22.30		Fracture with clay infill. (22.10m)	
						23.00							Extremely weak to weak grey MUDSTONE. Fractures are horizontal, very closely to closely spaced, planar smooth, very tight to tight and clean. (18.93 - 22.30m)	
										5			MUDSTONE [Pennine Lower Coal Measures Formation]	
											(1.33)		Extremely weak black carbonaceous MUDSTONE recovered as angular to subangular gravel. (22.30 - 23.63m)	
														23.0
						23.00	100	23	0		23.63		SANDSTONE [Pennine Lower Coal Measures Formation]	
						24.50							Medium strong greyish black SANDSTONE. Fractures are horizontal, very closely spaced, undulating rough, very tight to tight and infilled with grey clayey gravel. (Birstall Rock)	
													24.0	
													24.5	
		24.90-25.00	C 23										25.0	
					24.50	100	65	20		25.30		MUDSTONE [Pennine Lower Coal Measures Formation]		
					26.00							Extremely weak to very weak greyish black MUDSTONE. Fractures are horizontal, very closely spaced, undulating smooth and clean. (25.30 - 26.00m)		
													25.5	
													26.0	
												No Recovery [Pennine Lower Coal Measures Formation]		
													26.5	
													27.0	
		26.75	D 24		26.00	73	23	0		26.70		Extremely weak MUDSTONE recovered as black angular gravel. (26.30 - 26.70m)		
					27.50									27.5
					29.00	66	34	28						28.0

Continued on next page

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement; water was lost at approximately 15 m bgl and did not recover.
 5. On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
 CD

Checked By: CD Approved By: BB



Rotary Core Log

RB1
SUPPLEMENTARY INFO

Hole Type RC	Easting 420799.00	Northing 425732.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-20	End Date 2026-01-22	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Top Depth (m)	Base Depth (m)	Type	Return (min %)	Return (max %)	Remarks
0.00	40.00	Water			

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)					N=20 (2,2/4,6,6,4)
2.00 (S)					N=50 for 285mm (3,4/6,13,19,18 for 60mm)

Sample ID	Type	Water Level (m)	Remarks
	D		
	D		
	C		
	C		
	C		
	C		
	C		
	D		
	C		
	C		
	D		
	C		
	C		
	C		
	C		
	D		
	D		
	C		
	C		
	C		
	D		
	C		
	D		
	C		
	D		
	C		

Remarks 1. Boreholes were logged in general accordance with BS 5930 + A1:2020. 2. Utilities were identified and cleared prior to the commencement of drilling. 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%. 4. Water flush drilling was used during advancement; water was lost at approximately 15 m bgl and did not recover. 5. On completion, the borehole was backfilled with hydrated bentonite ...	Method, Plant, Stability, Dimensions 0.00 - 40.00m RC Comocchio GEO 602	Logger CD
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Rotary Core Log

RB2
Sheet 1 of 6

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
												MADE GROUND	
											(1.20)	Grass over dark brown to blackish gravelly silty clayey TOPSOIL. Gravel is fine to coarse of subangular to subrounded sandstone and coal. (Reworked Natural)	0.5
			1.20	SPT	N=50 for 290mm (1,2,2,14,14,22 for 65mm)							Soft grey gravelly CLAY. Gravel is fine to coarse of angular coal. (Reworked Natural)	1.0
			1.45	D 1						0		SANDSTONE [Pennine Lower Coal Measures]	1.5
												Weak to very weak interbedded grey and orange coarse grained SANDSTONE. Fractures are horizontal undulating smooth closely spaced and clean. (Emley Rock)	2.0
						1.20 2.70	92	74	51	8		No Recovery - Inferred Sandstone. (3.00 - 3.50m)	2.5
			3.07-3.15	C 2								Very weak thinly bedded orange coarse grained SANDSTONE. Fractures are horizontal undulating smooth closely spaced and clean. (Emley Rock)	3.0
						2.70 3.50	64	62	48	2		Very weak to weak thinly bedded orange becoming grey SANDSTONE with interbedded with siltstone. Fractures are horizontal undulating smooth closely spaced and clean. (Emley Rock)	3.5
												SANDSTONE [Pennine Lower Coal Measures]	4.0
												Extremely weak to very weak thinly layered grey fine grained SANDSTONE. Fractures are horizontal closely spaced planer smooth very tight to tight and clean. (Emley Rock)	4.5
											Very weak to weak thinly layered grey fine grained SANDSTONE with interbedded mudstone. Fractures are horizontal closely spaced planer smooth very tight to partially open and clean. (Emley Rock)	5.0	
											SANDSTONE [Pennine Lower Coal Measures]	5.5	
					5.00 6.50	100	80	15			Weak thinly bedded grey medium to coarse grained SANDSTONE. (Emley Rock)	6.0	
											MUDSTONE [Pennine Lower Coal Measures]	6.5	
		6.50-7.00	C 3								Weak to very weak thinly bedded grey MUDSTONE. Fractures are horizontal very closely to closely spaced planer smooth very tight to tight and clean. At 5.1m one fracture is infilled with shale recovered as fine black angular gravel. (Emley Rock)	7.0	
					6.50 8.00	100	96	94	5		Continued on next page		

Remarks

- Boreholes were logged in general accordance with BS 5930 + A1:2020.
- Utilities were identified and cleared prior to the commencement of drilling.
- Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
- Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover.
- On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
0.00 - 40.00m RC Comocchio GEO 602

Logger
CD

Checked By: CD Approved By: BB



Rotary Core Log

RB2
Sheet 3 of 6

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
		14.30-14.42	C 4									As previous page.		
					14.00	62	33	0		8	14.50	NR NR	No Recovery (Fractured rock)	14.5
					15.50						(1.00)	NR NR		15.0
			15.60	D 5						0	15.50		COAL [Pennine Lower Coal Measures] <i>Coal recovered as fine black angular GRAVEL. (Flockton Thin Coal)</i>	15.5
					17.00	73	27	24			(0.90)			16.0
					16.40					2	(0.60)		MUDSTONE [Pennine Lower Coal Measures] <i>Extremely weak thinly bedded grey becoming black fine grained MUDSTONE. (16.40 - 17.00m)</i>	16.5
					17.00						(0.60)	NR NR	No Recovery (assumed mudstone or coal)	17.0
					17.60	42	3	0		2	(0.70)		COAL (Flockton Thin Coal) [Pennine Lower Coal Measures]	18.0
					18.30						(0.20)		MUDSTONE [Pennine Lower Coal Measures]	18.5
			18.65-18.80	C 6						0	(0.30)		<i>Extremely weak thinly bedded grey becoming black fine grained MUDSTONE. (18.30 - 18.50m)</i>	18.5
				18.50	20	8	0			(1.20)	NR NR	MUDSTONE [Pennine Lower Coal Measures] <i>Extremely weak to weak thily bedded black becoming grey very fine grained MUDSTONE. Fractures are horizontal undulating rough close to very closey spaced tight and clean. (18.50 - 18.80m)</i>	19.0	
				20.00					4		NR NR	No Recovery (Fractured Rock)	19.5	
				20.00						(0.60)		SILTSTONE [Pennine Lower Coal Measures] <i>Extremely weak to weak thinly bedded grey fine grained SILTSTONE. Fractures are horizontal undulating rough closely spaced fractures are tight and clean. (20.00 - 20.40m)</i>	20.0	
				20.60	100	96	76		4	(2.00)		<i>Weathered Siltstone recovered as grey GRAVEL. Gravel is</i>	20.5	
													21.0	

Continued on next page

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover.
 5. On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
 CD

Checked By: CD Approved By: BB



Rotary Core Log

RB2
Sheet 4 of 6

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata									
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description								
Hatched		21.30	D 7						8			Extremely weak thinly bedded grey becoming black MUDSTONE. Fractures are horizontal undulating rough closely spaced fractures are tight and clean. (20.60 - 21.50m)	21.5								
														21.50 23.00	80	44	13			Moderately strong thinly bedded black carboniferous MUDSTONE. Fractures are horizontal planer smooth very closely spaced tight and clean. (21.50 - 22.00m)	22.0
														22.60 (0.70)	NR NR NR NR NR NR NR NR NR NR NR NR NR NR NR NR NR NR	No Recovery				23.0	
		23.30 (1.20)	MUDSTONE [Pennine Lower Coal Measures]	Very weak to weak thinly bedded grey fine grained MUDSTONE. Fractures are horizontal planer smooth very closely spaced tight and clean. (23.30 - 24.50m)			23.5														
								24.50 (0.40)	NR NR NR NR NR NR NR NR NR NR NR NR	No Recovery (Fractured Rock)				24.5							
		24.90 (0.20)	Sandy CLAY [Pennine Lower Coal Measures]	Weathered mudstone recovered as soft grey sandy CLAY. Sand is coarse. (24.90 - 25.10m)											25.0						
								25.10 (0.40)	COAL (Thin Coal Seam) [Pennine Lower Coal Measures]	SILTSTONE [Pennine Lower Coal Measures]	Extremely weak to weak thinly bedded grey medium grained SILTSTONE. Fractures are horizontal undulating smooth very closely spaced very tight to tight and clean. (25.50 - 27.50m)			25.5							
		25.50 (2.00)	94	72	20										26.0						
								26.00 27.50	MUDSTONE [Pennine Lower Coal Measures]	Weak thinly bedded grey MUDSTONE. Fractures are				27.0							
27.50 (1.90)	100	74	43	14		27.5															
							27.25-27.35	C 8						28.0							

Continued on next page

- Remarks**
- Boreholes were logged in general accordance with BS 5930 + A1:2020.
 - Utilities were identified and cleared prior to the commencement of drilling.
 - Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 - Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover.
 - On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
0.00 - 40.00m RC Comocchio GEO 602

Logger
CD

Checked By: CD Approved By: BB



Rotary Core Log

RB2
Sheet 5 of 6

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac Fl	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
													As previous page.
									6				
					29.00 30.50	42	17	13			29.40 (0.35)	NR NR NR NR NR NR NR NR NR NR NR NR	No Recovery
									2		29.75 (0.40)		MUDSTONE [Pennine Lower Coal Measures] Weak thinly bedded grey MUDSTONE. Fractures are horizontal and vertical planer smooth closely spaced tight and clean. (29.75 - 30.15m)
											30.15 (1.05)	VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID	Void (Former First Brown Metal Coal)
		31.25	D 9		30.50 32.00	53	38	24			31.20 (0.80)		MUDSTONE [Pennine Lower Coal Measures] Weak thinly bedded grey MUDSTONE. (31.20 - 31.60m) Weak thinly bedded grey carboniferous MUDSTONE. Fractures are horizontal and vertical planer smooth closely spaced tight and clean. (31.60 - 32.00m)
											32.00 (0.10)	NR NR NR	No Recovery (Fractured Rock)
		32.85-32.95	C 10		32.00 33.50	80	72	70			32.10 (1.00)		MUDSTONE [Pennine Lower Coal Measures] Extremely weak to very weak thinly bedded grey very fine grained MUDSTONE. Fractures are horizontal undulating rough and smooth closely spaced tight and clean. (32.10 - 33.10m)
											33.10 (0.40)	VOID VOID VOID VOID VOID VOID VOID VOID VOID VOID	Void (Former Second Brown Metal Coal)
		33.80-34.15	C 11		33.50 35.00	100	76	67			33.50 (1.50)		MUDSTONE [Pennine Lower Coal Measures] Very weak to weak thinly bedded grey with some orange stains MUDSTONE. Fractures are horizontal underulating smooth very close to closely spaced very tight to tight and clean. (33.50 - 35.00m)
									7				
											35.00		Continued on next page

Remarks 1. Boreholes were logged in general accordance with BS 5930 + A1:2020. 2. Utilities were identified and cleared prior to the commencement of drilling. 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%. 4. Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover. 5. On completion, the borehole was backfilled with hydrated bentonite ...	Method, Plant, Stability, Dimensions 0.00 - 40.00m RC Comocchio GEO 602	Logger CD
	Checked By: CD Approved By: BB	



Rotary Core Log

RB2
Sheet 6 of 6

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal	Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac FI	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
												(0.45)	COAL [Pennine Lower Coal Measures]	
												35.45	Coal recovered as fine black angular GRAVEL. (Second Brown Metal Coal)	35.5
					35.00 36.50	84	52	14					MUDSTONE [Pennine Lower Coal Measures]	
													Extremely weak thinly bedded black carboniferous MUDSTONE. Fractures are horizontal undulating rough very closely spaced very tight filled with fragments of coal. (35.45 - 36.08m)	36.0
													Very weak to weak thinly bedded grey MUDSTONE. Fractures are horizontal planer smooth to undulating smooth closely spaced tight to very tight and clean. (36.08 - 37.30m)	36.5
												(2.95)	No Recovery - Inferred Mudstone. (37.30 - 37.52m)	37.0
					36.50 38.00	82	36	30					Very weak to weak thinly bedded grey MUDSTONE. Fractures are horizontal planer smooth to undulating smooth closely spaced tight to very tight and clean. (37.52 - 38.40m)	37.5
														38.0
														38.40
					38.00 39.50	86	69	15				(0.40)	SILTSTONE [Pennine Lower Coal Measures]	38.5
													Very weak to weak thinly bedded grey fine grained SILTSTONE. Fractures are horizontal planer smooth closely spaced tight and clean. (38.40 - 38.80m)	39.0
												(0.50)	No Recovery	
														39.30
													SILTSTONE [Pennine Lower Coal Measures]	39.5
													Very weak to weak thinly bedded grey fine grained SILTSTONE. Fractures are horizontal planer smooth closely spaced tight and clean. (39.30 - 40.00m)	40.0
					39.50 40.00	32	32	32	0			(0.70)		40.00
													End of Borehole at 40.00m	40.0

Remarks 1. Boreholes were logged in general accordance with BS 5930 + A1:2020. 2. Utilities were identified and cleared prior to the commencement of drilling. 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%. 4. Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover. 5. On completion, the borehole was backfilled with hydrated bentonite ...	Method, Plant, Stability, Dimensions 0.00 - 40.00m RC Comocchio GEO 602	Logger CD
	Checked By: CD Approved By: BB	



Rotary Core Log

RB2

SUPPLEMENTARY INFO

Hole Type RC	Easting 420791.00	Northing 425705.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirely Avenue, Gomersal		Project No. 251009	Start Date 2026-01-23	End Date 2026-01-28

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	1.20	0.9	G5	63	N=50 for 290mm (1,2,2,14,14,22 for 65mm)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
	D		
	C		
	C		
	C		
	D		
	C		
	D		
	C		
	D		
	C		
	C		
	C		

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement; water was lost at approximately 12.5 m bgl and did not recover.
 5. On completion, the borehole was backfilled with hydrated bentonite ...

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
 CD

Checked By: CD Approved By: BB



Rotary Core Log

RB3
Sheet 1 of 6

Hole Type RC	Easting 420787.00	Northing 425668.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirley Avenue, Gomersal	Project No. 251009	Start Date 2026-01-28	End Date 2026-02-02	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
											(0.30)	MADE GROUND		
											0.30	Dark brown to blackish gravelly silty clayey TOPSOIL. Overlain by grass. Gravel is subangular to subrounded fine to coarse of sandstone and coal. (Reworked Natural)		
													Sandy CLAY	0.5
			1.20	SPT	N=50 for 265mm (4,4/9,12,17,12 for 40mm)							(0.90)	Stiff, brown, sandy gravelly CLAY, sand is fine to coarse, angular to subangular, gravel is angular of weathered sandstone. (0.30 - 1.20m)	1.0
			1.20	D 1		1.20 2.00	3	0	0			1.20	No Recovery (Fractured rock)	1.5
												(1.25)		2.0
														2.5
						2.00 3.50	9	90	39			2.45	SANDSTONE [Pennine Lower Coal Measures]	2.5
												(0.80)	Extremely weak to weak thinly bedded fine grained orange to grey SANDSTONE. Fractures are horizontal very closely spaced undulating rough very tight to tight. (Emley Rock)	3.0
												3.25	SANDSTONE [Pennine Lower Coal Measures]	3.5
												Very weak to medium strong thinly bedded SANDSTONE. Some orange banding at 3.65m. Fractures are horizontal very closely spaced, undulating, rough tight. (Emley Rock)	4.0	
											(1.75)	Weak weathered SANDSTONE some orange but mostly grey. Fractures are horizontal very weathered. Gravelly, small fractures are undulating rough clean (Emley Rock)	4.5	
		4.65-4.80	C 2								5.00	MUDSTONE [Pennine Lower Coal Measures]	5.0	
											(0.60)	Very weak to weak, very thinly bedded, very finely grained black MUDSTONE. Fractures are horizontal, very close spacing, undulating smooth, very tight. (Emley Rock)	5.5	
		5.60-5.70	C 3		5.00 6.50	100	89	32			5.60	SANDSTONE [Pennine Lower Coal Measures]	6.0	
												Medium Strong thinly bedded grained SANDSTONE. Fractures are horizontal very close to medium space and are undulating rough very tight to tight. (Emley Rock)	6.5	
					6.50 8.00	100	76	63			(2.70)		7.0	

Continued on next page

Remarks 1. Boreholes were logged in general accordance with BS 5930 + A1:2020. 2. Utilities were identified and cleared prior to the commencement of drilling. 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%. 4. Water flush drilling was used during advancement 5. On completion, the borehole was backfilled and sealed with hydrated bentonite	Method, Plant, Stability, Dimensions 0.00 - 40.00m RC Comocchio GEO 602	Logger CD
	Checked By: CD Approved By: BB	



Rotary Core Log

RB3
Sheet 3 of 6

Hole Type RC	Easting 420787.00	Northing 425668.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirley Avenue, Gomersal	Project No. 251009	Start Date 2026-01-28	End Date 2026-02-02	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
Backfilled		14.29-14.67	C 7		14.00 15.50	100	52	57			14.20 (0.58) 14.78	<p>As previous page.</p> <p>SANDSTONE [Pennine Lower Coal Measures]</p> <p><i>Medium strong thinly bedded grey finely grained SANDSTONE. Fractures are very close to closely spaced, undulating smooth, very tight to partly open. (Emley Rock)</i></p>	14.5
		15.85-15.95	C 8		15.50 17.00	100	36	6			(1.92)	<p>MUDSTONE [Pennine Lower Coal Measures]</p> <p><i>Very weak to weak thinly grained black MUDSTONE. Horizontal fractures, very closely spaced, very tight to tight. (Emley Rock)</i></p>	15.0
		17.75-17.95	D 9		17.00 18.50	57	24	9			16.70 (1.10)	<p>COAL [Pennine Lower Coal Measures]</p> <p><i>COAL recovered as angular gravel. (Flockton Thin Coal)</i></p>	17.0
					18.50 20.00	95	92	78			17.80 (0.14) 17.94 (0.36) 18.30	<p>MUDSTONE [Pennine Lower Coal Measures]</p> <p><i>Very weak to weak weathered MUDSTONE, recovered as soft black gravelly clay. Gravel is angular to subangular, fine to coarse of coal. (17.80 - 17.94m)</i></p> <p>COAL [Pennine Lower Coal Measures]</p> <p><i>COAL, recovered as black angular gravel. (Flockton Thin Coal)</i></p> <p>MUDSTONE [Pennine Lower Coal Measures]</p> <p><i>Very weak to weak weathered MUDSTONE recovered as soft black gravelly clay. Gravel is angular to subangular, fine to coarse of coal. (18.30 - 21.50m)</i></p>	18.0
				20.00 21.50	100	96	88			(3.20)			19.0
													19.5
													20.0
													20.5
													21.0

Continued on next page

Remarks

- Boreholes were logged in general accordance with BS 5930 + A1:2020.
- Utilities were identified and cleared prior to the commencement of drilling.
- Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
- Water flush drilling was used during advancement
- On completion, the borehole was backfilled and sealed with hydrated bentonite

Method, Plant, Stability, Dimensions
0.00 - 40.00m RC Comocchio GEO 602

Logger
CD

Checked By: CD Approved By: BB



Rotary Core Log

RB3
Sheet 4 of 6

Hole Type RC	Easting 420787.00	Northing 425668.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirley Avenue, Gomersal	Project No. 251009	Start Date 2026-01-28	End Date 2026-02-02	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level m	Depth (thickness) m	Strata		
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description	
												As previous page.		
										21.50		MUDSTONE [Pennine Lower Coal Measures] <i>Very weak to weak, very thinly bedded, black MUDSTONE. Fractures are horizontal, very close spacing, undulating smooth, very tight. (21.50 - 27.50m)</i>	21.5	
						21.50 23.00	100	66	53					22.0
			23.90-24.05	D 10										22.5
						23.00 24.50	100	54	26					23.0
										(6.00)			23.5	
													24.0	
													24.5	
													25.0	
													25.5	
													26.0	
													26.5	
													27.0	
													27.5	
										27.50		Very weak to weak , very thinly bedded, very fine black mudstone. [Pennine Lower Coal Measures]	27.5	
										(4.40)			28.0	
Continued on next page														

Remarks 1. Boreholes were logged in general accordance with BS 5930 + A1:2020. 2. Utilities were identified and cleared prior to the commencement of drilling. 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%. 4. Water flush drilling was used during advancement 5. On completion, the borehole was backfilled and sealed with hydrated bentonite	Method, Plant, Stability, Dimensions 0.00 - 40.00m RC Comocchio GEO 602	Logger CD

Checked By: CD Approved By: BB



Rotary Core Log

RB3
Sheet 6 of 6

Hole Type RC	Easting 420787.00	Northing 425668.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirley Avenue, Gomersal	Project No. 251009	Start Date 2026-01-28	End Date 2026-02-02	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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Inst/ Backfill	Water Levels	Samples and Tests			Coring				Frac	Level m	Depth (thickness) m	Strata	
		Depth (m)	Type/ Ref	Results	Core Run	TCR (%)	SCR (%)	RQD (%)				Legend	Description
													As previous page.
					35.00 36.50	100	43	9					
											36.30 (0.20)	COAL [Pennine Lower Coal Measures]	
											36.50 (0.40)	NR NR NR NR NR NR NR NR NR NR NR NR NR NR NR	COAL is recovered as an angular black gravel. (Second Brown Metal Coal)
											36.90	NR NR NR	No Recovery (Former Second Brown Metal Coal)
					36.50 38.00	75	36	18			(1.10)	MUDSTONE [Pennine Lower Coal]	Very weak to weak thinly bedded, black MUDSTONE. Fractures are horizontal, very closely spaced, very tight to tight. (36.90 - 38.00m)
											38.00	NR NR	No Recovery (Fractured Rock)
					38.00 39.50	18	14	12			(1.30)		
											39.30	SILTSTONE [Pennine Lower Coal Measures]	Very weak to weak, thinly bedded, grey SILTSTONE. Fractures are planer smooth. (39.30 - 40.00m)
					39.50 40.00	100	82	0			(0.70)		
											40.00		End of Borehole at 40.00m

Remarks
 1. Boreholes were logged in general accordance with BS 5930 + A1:2020.
 2. Utilities were identified and cleared prior to the commencement of drilling.
 3. Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
 4. Water flush drilling was used during advancement
 5. On completion, the borehole was backfilled and sealed with hydrated bentonite

Method, Plant, Stability, Dimensions
 0.00 - 40.00m RC Comocchio GEO 602

Logger
CD

Checked By: CD Approved By: BB



Rotary Core Log

RB3

SUPPLEMENTARY INFO

Hole Type RC	Easting 420787.00	Northing 425668.00	Ground Level (m)	Scale 1:35
Project Name St Mary's Primary School, Shirley Avenue, Gomersal	Project No. 251009	Start Date 2026-01-28	End Date 2026-02-02	

Client KPS Ltd	Consultant C. Dean	Contractor Geocore Site Investigation Ltd
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SPT - Details

Top Depth (m) (Type)	Casing Depth (m)	Water Depth (m)	Hammer Serial No.	Energy Ratio (%)	Results
1.20 (S)	1.20	1.1	G5	63	N=50 for 265mm (4,4/9,12,17,12 for 40mm)

Sample Details

Sample ID	Type	Water Level (m)	Remarks
D1	D		
C2	C		
C3	C		
C4	C		
D5	D		
C6	C		
C7	C		
C8	C		
D9	D		
C10	D		

Remarks

- Boreholes were logged in general accordance with BS 5930 + A1:2020.
- Utilities were identified and cleared prior to the commencement of drilling.
- Standard Penetration Testing (SPT) was undertaken using Hammer ID GS with an energy ratio (ER) of 63%.
- Water flush drilling was used during advancement
- On completion, the borehole was backfilled and sealed with hydrated bentonite

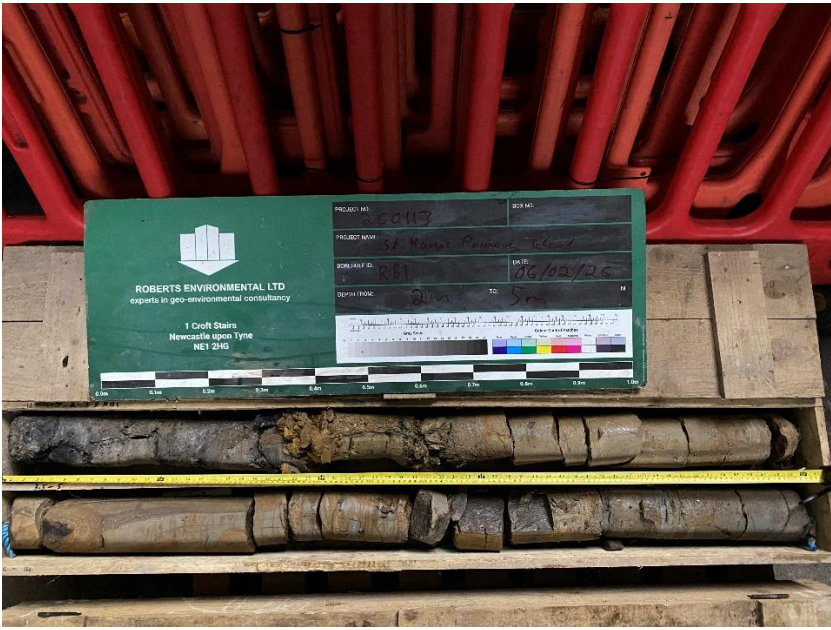
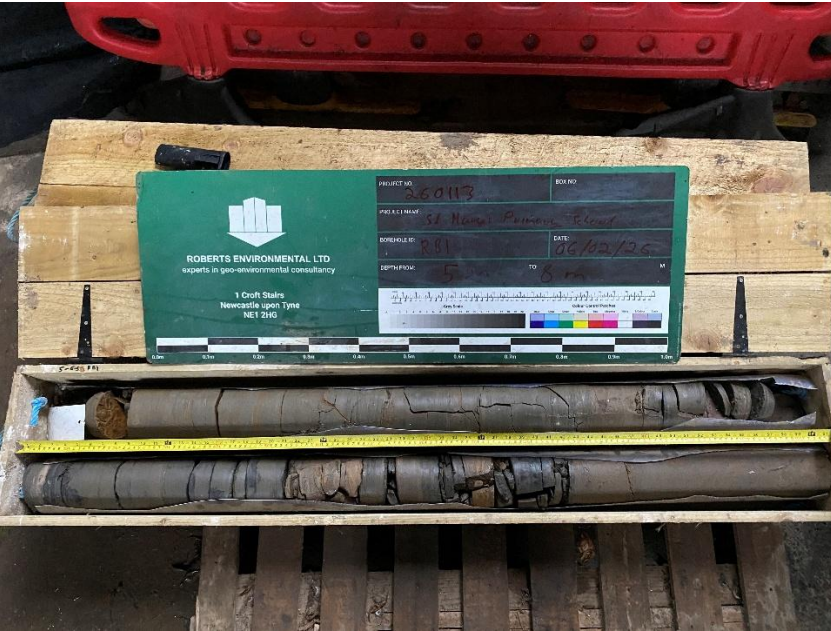
Method, Plant, Stability, Dimensions

0.00 - 40.00m RC Comocchio GEO 602

Logger

CD

Checked By: CD Approved By: BB

Photograph Number & Description	Photograph
<p>1.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 2 – 5m</p>	
<p>2.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 5 – 8m</p>	

Photograph Number & Description	Photograph
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3.
Gomersal St. Mary's Primary School
 RB1 8 – 11m



4.
Gomersal St. Mary's Primary School
 RB1 11 – 14m



Photograph Number & Description	Photograph
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5.
Gomersal St. Mary's Primary School
 RB1 14 – 17m



6.
Gomersal St. Mary's Primary School
 RB1 17 – 20m .



Photograph Number & Description	Photograph																
<p>7.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 20 – 23m</p>	 <p>A photograph showing a soil core sample from borehole RB1, depths 20m to 23m. The core is contained in a blue bag and is placed on a wooden pallet. A yellow measuring tape is stretched across the core. A green data sheet is placed on top of the core. The data sheet contains the following information:</p> <table border="1"> <tr> <td>PROJECT NO.</td> <td>260113</td> <td>BOR NO.</td> <td></td> </tr> <tr> <td>PROJECT NAME</td> <td colspan="3">St. Mary's Primary School</td> </tr> <tr> <td>BOREHOLE NO.</td> <td>RB1</td> <td>DATE</td> <td>06/02/26</td> </tr> <tr> <td>DEPTH FROM</td> <td>20</td> <td>TO</td> <td>23</td> </tr> </table> <p>The data sheet also features the Roberts Environmental Ltd logo, contact information (1 Croft Stairs, Newcastle upon Tyne, NE1 2HG), and a color calibration chart.</p>	PROJECT NO.	260113	BOR NO.		PROJECT NAME	St. Mary's Primary School			BOREHOLE NO.	RB1	DATE	06/02/26	DEPTH FROM	20	TO	23
PROJECT NO.	260113	BOR NO.															
PROJECT NAME	St. Mary's Primary School																
BOREHOLE NO.	RB1	DATE	06/02/26														
DEPTH FROM	20	TO	23														
<p>8.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 23 – 26m</p>	 <p>A photograph showing a soil core sample from borehole RB1, depths 23m to 26m. The core is contained in a blue bag and is placed on a wooden pallet. A yellow measuring tape is stretched across the core. A green data sheet is placed on top of the core. The data sheet contains the following information:</p> <table border="1"> <tr> <td>PROJECT NO.</td> <td>260113</td> <td>BOR NO.</td> <td></td> </tr> <tr> <td>PROJECT NAME</td> <td colspan="3">St. Mary's Primary School</td> </tr> <tr> <td>BOREHOLE NO.</td> <td>RB1</td> <td>DATE</td> <td>06/02/26</td> </tr> <tr> <td>DEPTH FROM</td> <td>23</td> <td>TO</td> <td>26</td> </tr> </table> <p>The data sheet also features the Roberts Environmental Ltd logo, contact information (1 Croft Stairs, Newcastle upon Tyne, NE1 2HG), and a color calibration chart.</p>	PROJECT NO.	260113	BOR NO.		PROJECT NAME	St. Mary's Primary School			BOREHOLE NO.	RB1	DATE	06/02/26	DEPTH FROM	23	TO	26
PROJECT NO.	260113	BOR NO.															
PROJECT NAME	St. Mary's Primary School																
BOREHOLE NO.	RB1	DATE	06/02/26														
DEPTH FROM	23	TO	26														

Photograph Number & Description	Photograph
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9.
Gomersal St. Mary's Primary School
 RB1 26– 29m



10.
Gomersal St. Mary's Primary School
 RB1 29– 32m



Photograph Number & Description	Photograph
<p>11.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 32 – 35m</p>	
<p>12.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 35 – 38m</p>	

Photograph Number & Description	Photograph
<p>13.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB1 38- 40m</p>	


Photograph Number & Description	Photograph
---------------------------------	------------



1.
Gomersal St. Mary's Primary School
 RB2 1.2 – 3.5m



2.
Gomersal St. Mary's Primary School
 RB2 3.5 – 6.5m





Photograph Number & Description	Photograph
<p>3.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 6.5– 9.5m</p>	
<p>4.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 9.5 – 12.5m</p>	

Photograph Number & Description	Photograph
<p>5.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 12.5 – 15.5m</p>	
<p>6.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 15.5 – 18.5m</p>	

Photograph Number & Description	Photograph
<p>7.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 18.5 – 21.5m</p>	 <p>A photograph showing a soil core sample in a wooden crate. The core is dark and appears to be a mix of soil and rock fragments. A green label is placed on top of the core, providing project details. The label includes the project name 'St Mary's Primary School', borehole ID 'RB2', and depth range '18.5 TO 21.5 M'. A yellow measuring tape is visible below the core, and a white scale bar is at the bottom of the label.</p>
<p>8.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 21.5 – 24.5m</p>	 <p>A photograph showing a soil core sample in a wooden crate. The core is dark and appears to be a mix of soil and rock fragments. A green label is placed on top of the core, providing project details. The label includes the project name 'St Mary's Primary School', borehole ID 'RB2', and depth range '21.5 TO 24.5 M'. A yellow measuring tape is visible below the core, and a white scale bar is at the bottom of the label.</p>

Photograph Number & Description	Photograph
<p>9.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 24.5 – 27.5m</p>	
<p>10.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB2 27.5– 30.5m</p>	

Photograph Number & Description	Photograph
<p>11. Gomersal St. Mary's Primary School RB2 30.5– 33.5m</p>	
<p>12. Gomersal St. Mary's Primary School RB2 33.5 – 36.5m</p>	

Photograph Number & Description	Photograph
<p>13. Gomersal St. Mary's Primary School RB2 36.5 – 39.5m</p>	
<p>14. Gomersal St. Mary's Primary School RB2 39.5 - 40</p>	

Photograph Number & Description	Photograph
---------------------------------	------------

1.
Gomersal St. Mary's Primary School
 RB3 1.2 – 3.5m



2.
Gomersal St. Mary's Primary School
 RB3 3.5 – 6.5m




Photograph Number & Description	Photograph
---------------------------------	------------



3.
Gomersal St. Mary's Primary School
 RB3 6.5 – 9.5m



4.
Gomersal St. Mary's Primary School
 RB3 9.5– 12.5m



Photograph Number & Description	Photograph
<p>5.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 12.5 – 15.5m</p>	
<p>6.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 15.5 – 18.5m</p>	

Photograph Number & Description	Photograph
<p>7.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 18.5 – 21.5m</p>	 <p>A photograph showing a soil core sample in a wooden box. A yellow measuring tape is placed over the core. A green data sheet is visible, with handwritten information: PROJECT NO. 260113, BOX NO., PROJECT NAME St. Mary's Primary School, BORING NO. RB3, DATE 06/02/26, DEPTH 18.5 TO 21.5 M. The data sheet also includes a color calibration chart and a scale bar.</p>
<p>8.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 21.5 – 24.5m</p>	 <p>A photograph showing a soil core sample in a wooden box. A yellow measuring tape is placed over the core. A green data sheet is visible, with handwritten information: PROJECT NO. 260113, BOX NO., PROJECT NAME St. Mary's Primary School, BORING NO. RB3, DATE 06/02/26, DEPTH 21.5 TO 24.5 M. The data sheet also includes a color calibration chart and a scale bar. A person's hands are visible at the top of the frame, holding the data sheet.</p>

Photograph Number & Description	Photograph
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9.

**Gomersal St.
Mary's Primary
School**

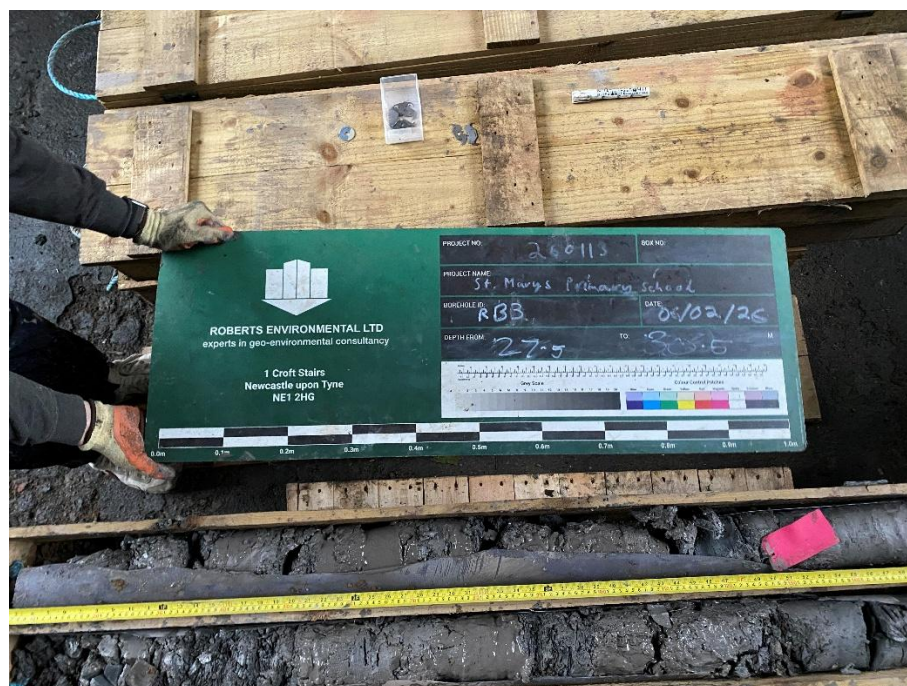
RB3 24.5 – 27.5m





10.

**Gomersal St.
Mary's Primary
School**

RB3 27.5 – 30.5m



Photograph Number & Description	Photograph
<p>11. Gomersal St. Mary's Primary School RB3 30.5– 33.5m</p>	
<p>12. Gomersal St. Mary's Primary School RB3 33.5– 36.5m</p>	

Photograph Number & Description	Photograph
<p>13.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 36.5 – 39.5m</p>	
<p>14.</p> <p>Gomersal St. Mary's Primary School</p> <p>RB3 39.5 – 40m</p>	

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: G5
Test Date: 24/06/2025
Report Date: 24/06/2025
File Name: G5.spt
Test Operator: MT



Instrumented Rod Data

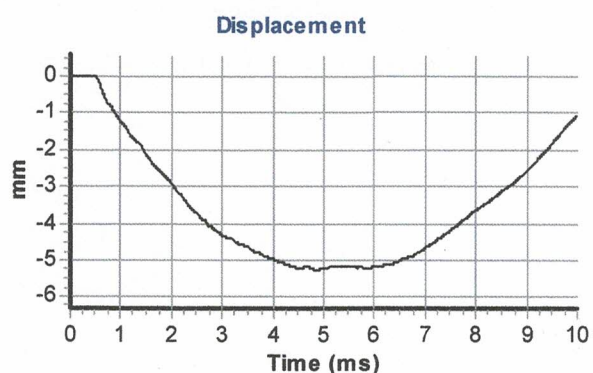
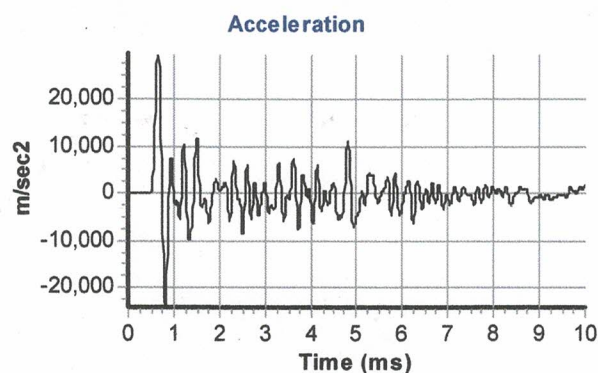
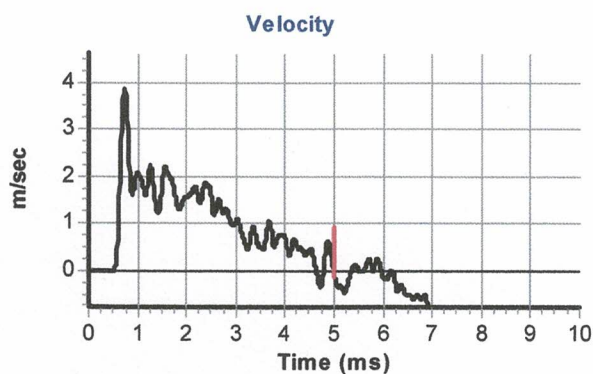
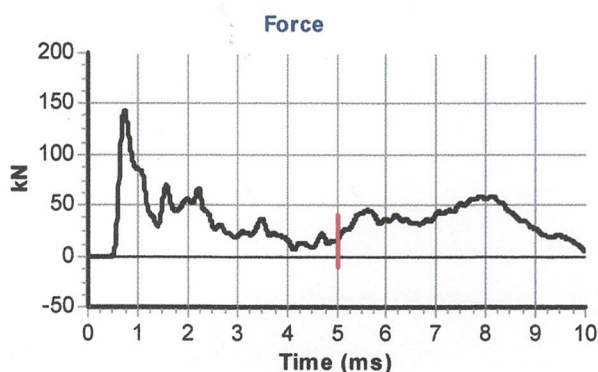
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Rod Length l_r (m): 1.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOCORE SITE INVESTIGATIONS LTD-94820



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 297

Energy Ratio E_r (%): **63**

Signed: M.TONER
Title: FITTER



ROBERTS
ENVIRONMENTAL LTD

RB1-RB3 Section

Project Name
St Mary's Primary School, Shirley Avenue, Gomersal

Project No.
251009

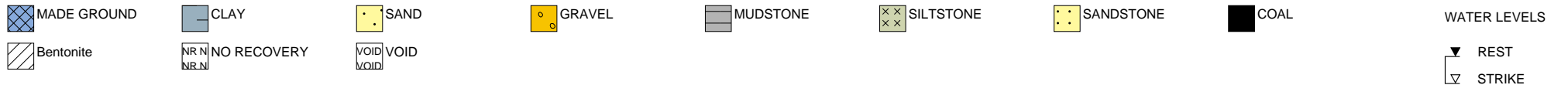
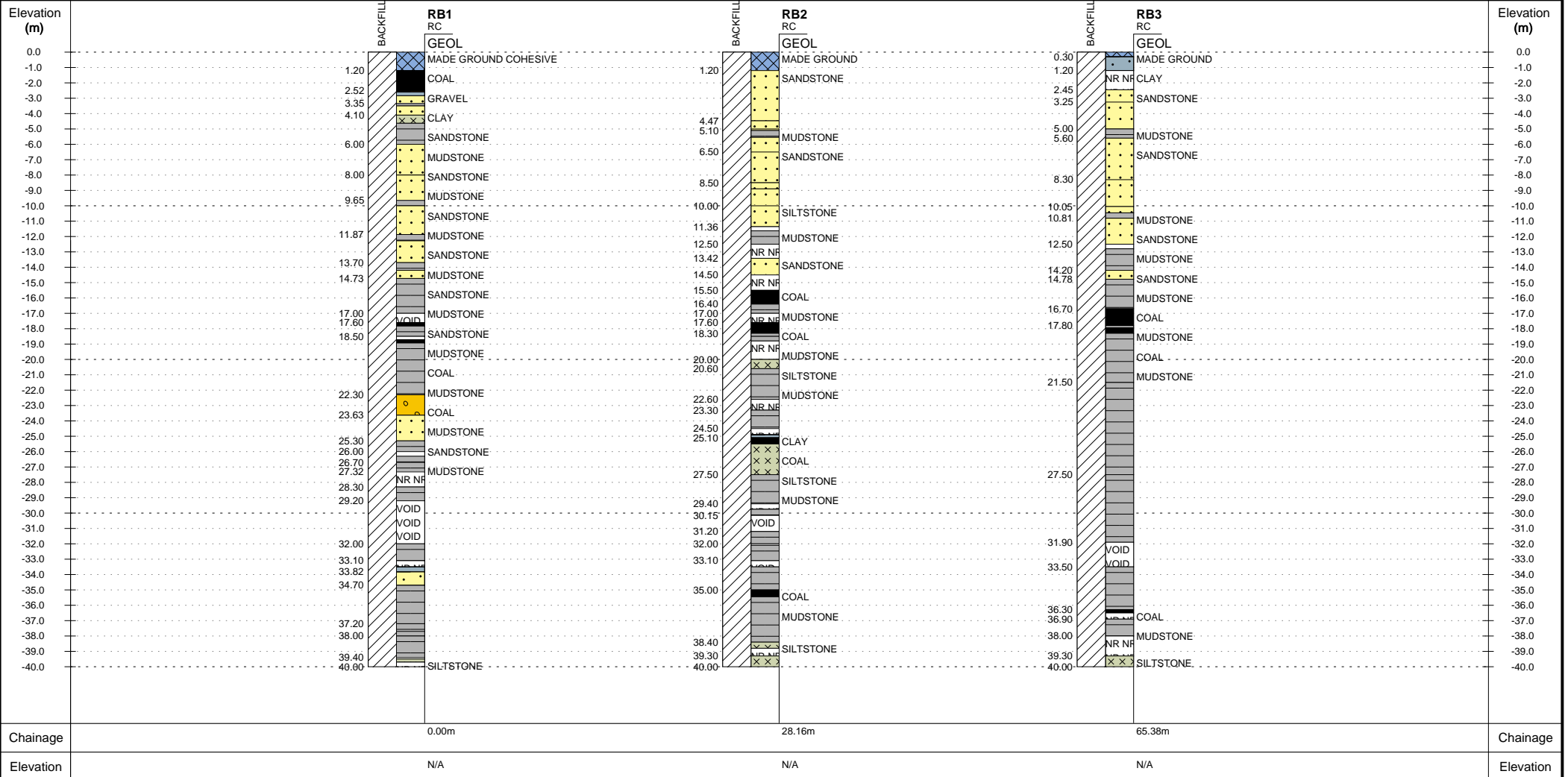
Vertical Scale
1:367

Horizontal Scale
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Client
KPS Ltd

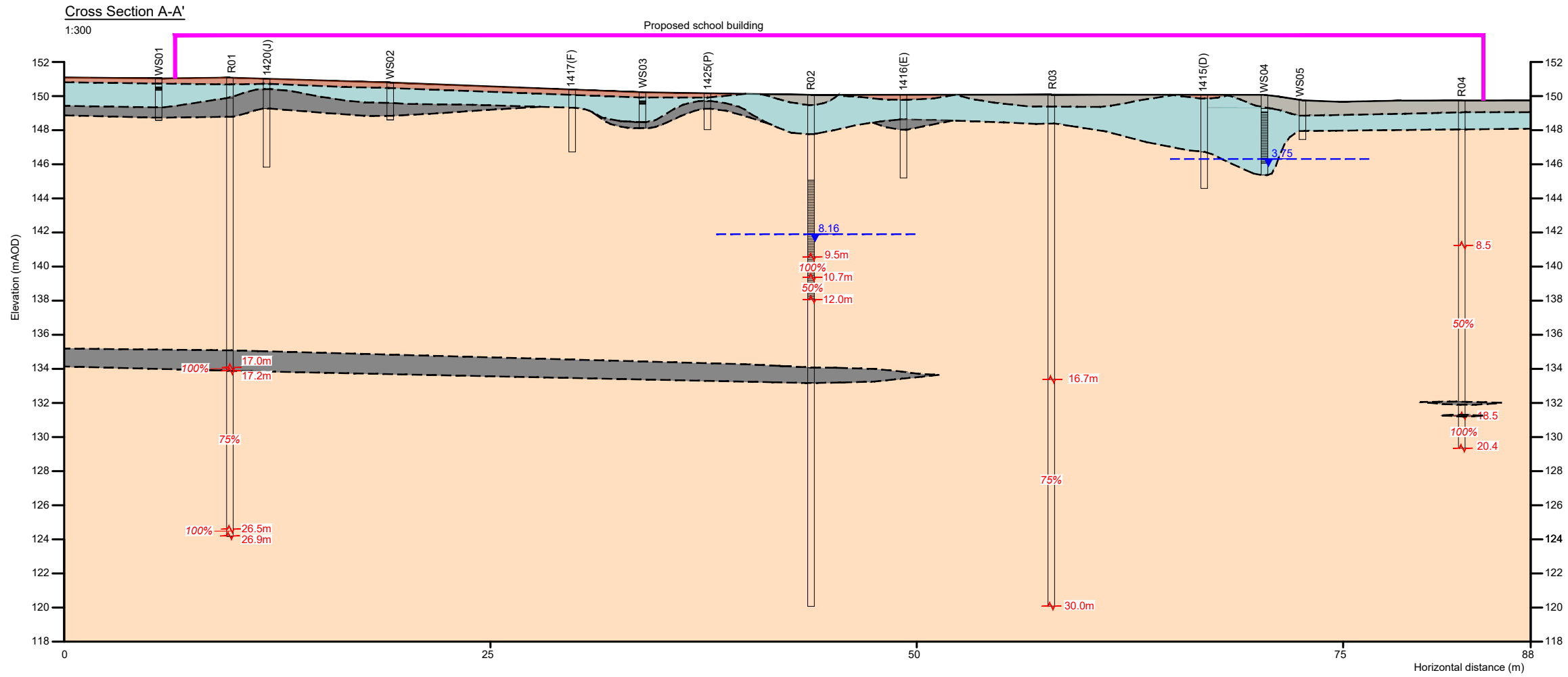
Consultant
C. Dean

Contractor
Geocore Site Investigation Ltd



Checked By: BB Approved By: BB

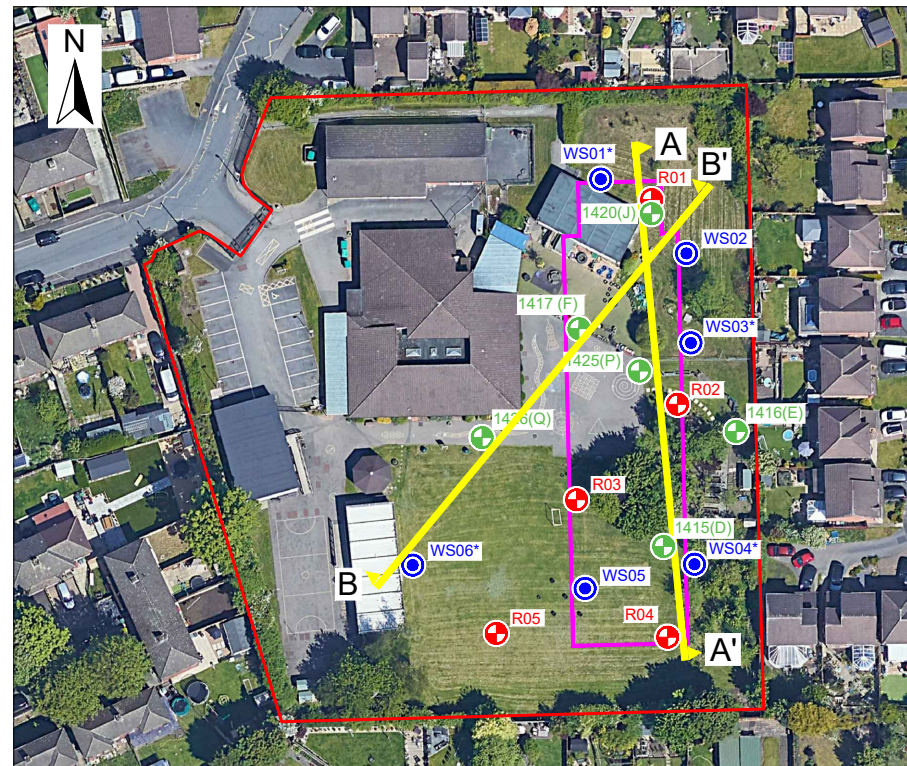
DO NOT SCALE FROM THIS DRAWING



LEGEND

- Current school building boundary
- Proposed school building boundary
- Borehole location
- Window sample location
- BSG borehole location
- MG: Made ground
- TPS: Topsoil
- C: Cohesives (Pennine Lower Coal Measures)
- CO: Coal (Pennine Lower Coal Measures)
- PLC: Pennine Lower Coal Measures
- Response zone
- Groundwater level
- ↕ Start and end of loss of flush
- 15.5m Depth at which loss of flush was recorded
- 100% Percentage loss of flush recorded between marked depth

Base Plan
NTS



C01	23.02.24	First Issue	AS	MF	MF
Rev	Date	Amendment	Drawn	Chkd	Appd

**RSK
GEOSCIENCES**

Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: +44(0)1794 329276
Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Turner and Townsend

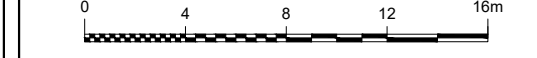
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Gomersal St Marys

Description
Schematic Geological Cross Section A-A'

Project ID	Drawing no.	Revision
323198	43101	C01

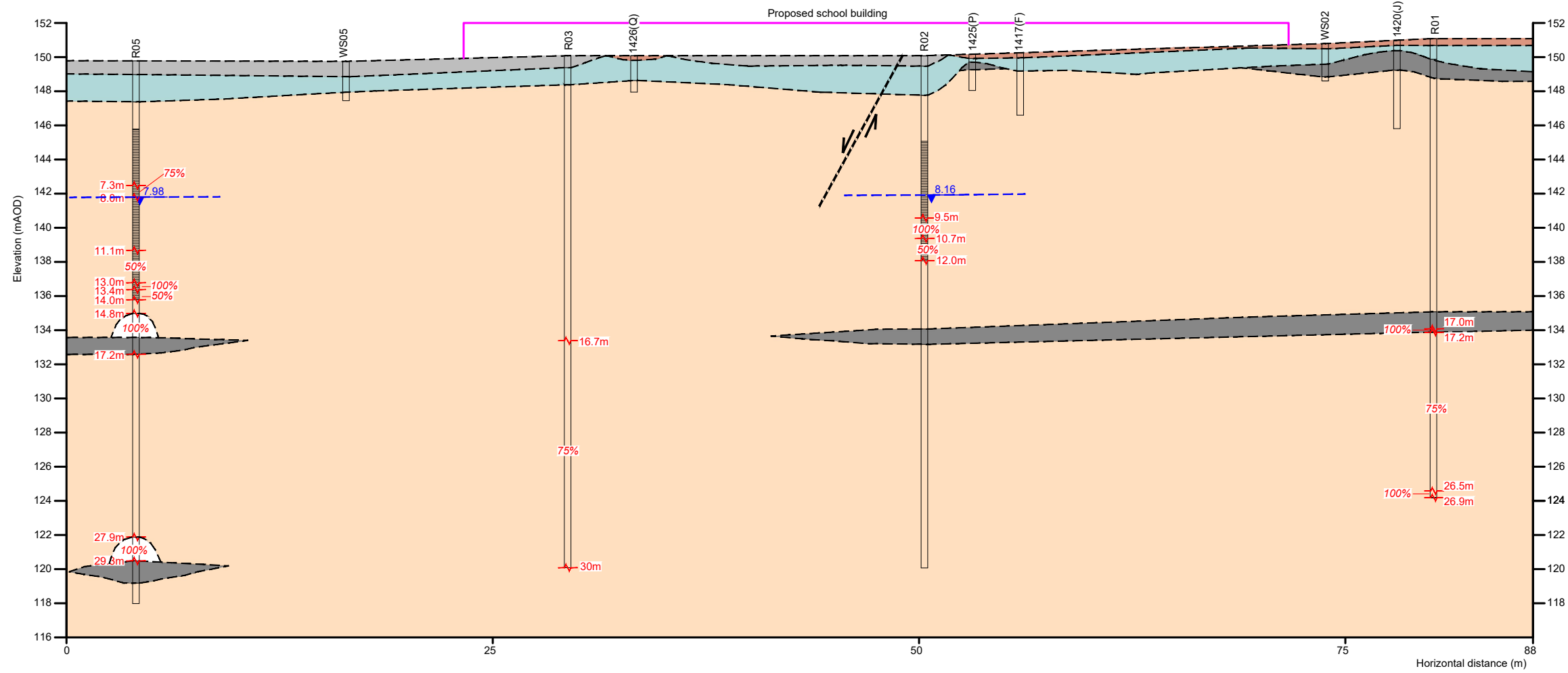
File name
323198-HE-431-SS-D-C-43101-C01

Dimensions	Scale	Size
m	1:300	A3



DO NOT SCALE FROM THIS DRAWING

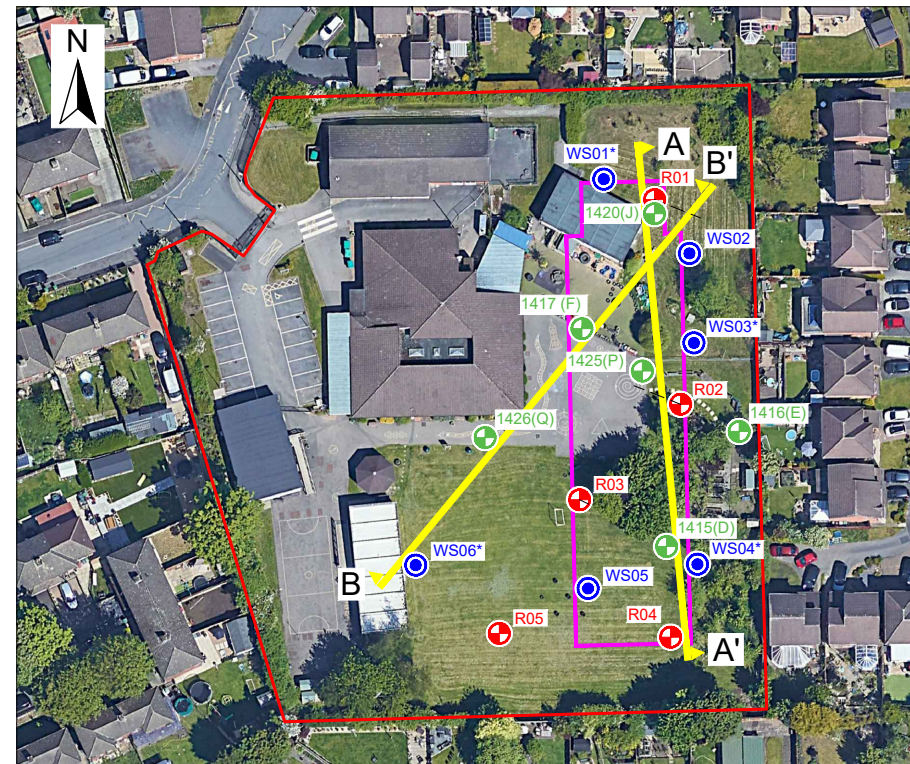
Cross Section B-B'
1:300



LEGEND

- Current school building boundary
- Proposed school building boundary
- Borehole location
- Window sample location
- BSG borehole location
- MG: Made ground
- TPS: Topsoil
- C: Cohesives (Pennine Lower Coal Measures)
- CO: Coal (Pennine Lower Coal Measures)
- PLC: Pennine Lower Coal Measures
- Response zone
- Groundwater level
- Start and end of loss of flush
- 15.5m Depth at which loss of flush was recorded
- 100% Percentage loss of flush recorded between marked depth
- Conjectured fault with tick denoting downthrown side

Base Plan
NTS



C01	23.02.24	First Issue	AS	MF	MF
Rev	Date	Amendment	Drawn	Chkd	Appd

RSK GEOSCIENCES

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172 Chester Road
Helsby
WA6 0AR

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Email: info@rsk.co.uk
Web: www.rsk.co.uk

Client
Turner and Townsend

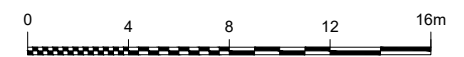
Project Name
Gomersal St Marys

Description
Schematic Geological Cross Section B-B'

Project ID	Drawing no.	Revision
323198	43102	C01

File name
323198-HE-431-SS-D-C-43102-C01

Dimensions	Scale	Size
m	1:300	A3



APPENDIX IV GEOTECHNICAL LABORATORY TEST DATA

Roberts Environmental Ltd
 1 Croft Stairs,
 Newcastle upon Tyne
 NE1 2HG
 Tel 0191 230 4521

F.A.O.

Final Test Report - 2282839 / 1

Site: St Mary's, Gomersal
 Job Number: 2282839
 Originating Client: Roberts Environmental Ltd
 Originating Reference: 251009
 Date Sampled: 12/02/2026
 Date Scheduled: 13/02/2026
 Date Testing Started: 24/02/2026
 Date Testing Finished: 27/02/2026

Previous Reports	Amendments	Date Issued

Amendments:

Authorised By: 

Tim Robinson
 Quality Supervisor

Report Issue Date: 27/02/2026

Site: St Mary's, Gomersal

Job Number: 2282839

Client: Roberts Environmental Ltd

Page: 2

**Determination of Water Content, Liquid Limit and Plastic Limit
and Derivation of Plasticity and Liquidity Index**

Borehole / Trial Pit	Depth (m)	Sample	Natural Water Content %	Sample Preparation			Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Class	One-point PI Only		Description / Remarks
				Natural = Hand picked Sieved = Washed on 425µm								Cone Penetration (mm)	Correction Factor	
				Natural / Sieved	Passing %	Calc. WC %								
RB1	18.02	C	13	Sieved	46	28	40	24	16	0.26	Cl	19.6 19.5	1.0095	Grey silty, gravelly CLAY

Method of Preparation: BS EN ISO 17892-1 : 2014 + A1 : 2022 : Clause 5.1 Water content test preparation
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.2 Specimen preparation for liquid and plastic limits

Method of Test: BS EN ISO 17892-1 : 2014 + A1 : 2022 : Clause 5.2 Water content test execution
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.3 Determination of liquid limit by the fall cone method. 80g / 30° Cone
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.5 Determination of plastic limit

General Remarks: All samples tested with increasing water content, unless otherwise stated.
All samples tested to four-point method, unless the extra 'One-point PI Only' data is reported.



1464

Results reported relate only to the samples tested.

Site: St Mary's, Gomersal

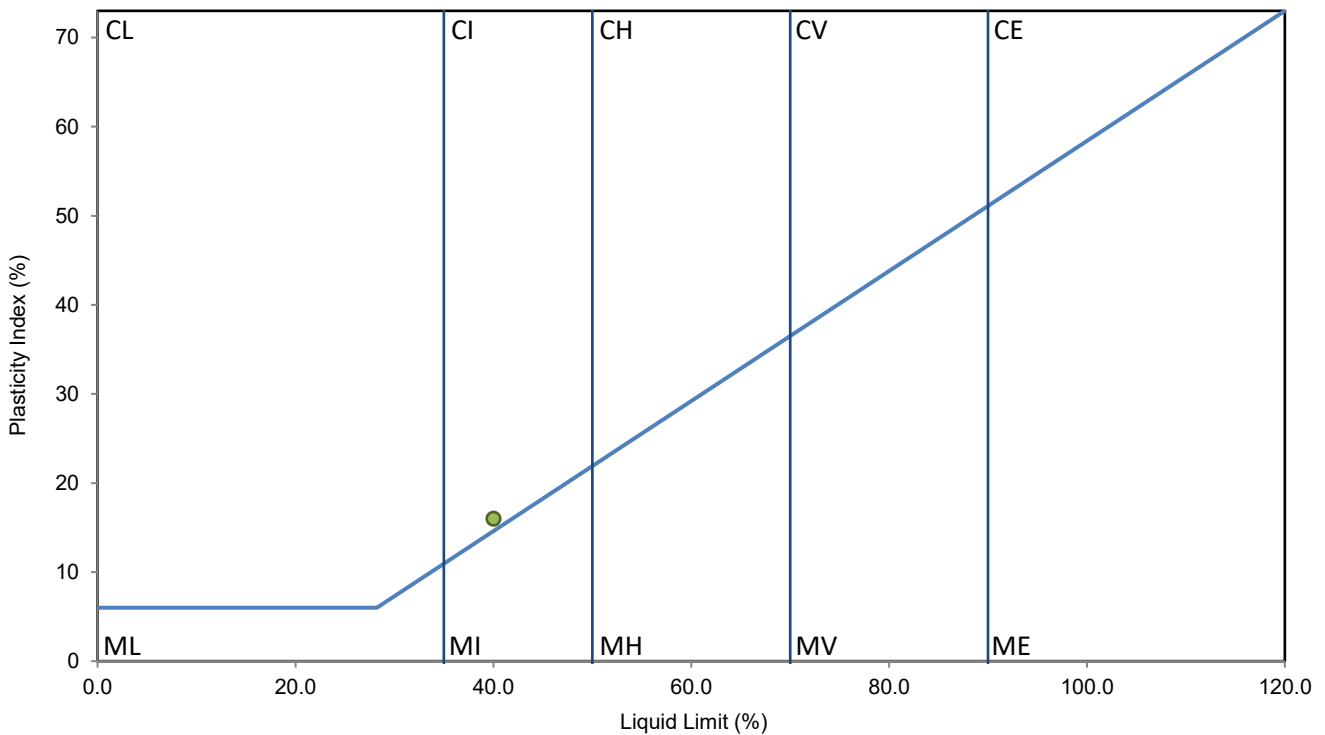
Job Number: 2282839

Client: Roberts Environmental Ltd

Page: 3

Determination of Water Content, Liquid Limit and Plastic Limit and Derivation of Plasticity and Liquidity Index: A-Line Plasticity Chart

A-Line Plasticity Chart for Casagrande Classification



A-line Plasticity Chart from K H Head, Soil Laboratory Testing, vol. 1, chapter 2, figure 2.6 (Plasticity Chart)

Method of Preparation: BS EN ISO 17892-1 : 2014 + A1 : 2022 : Clause 5.1 Water content test preparation
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.2 Specimen preparation for liquid and plastic limits

Method of Test: BS EN ISO 17892-1 : 2014 + A1 : 2022 : Clause 5.2 Water content test execution
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.3 Determination of liquid limit by the fall cone method. 80g / 30° Cone
BS EN ISO 17892-12 : 2018 + A2 : 2022 : Clause 5.5 Determination of plastic limit

General Remarks: All samples tested with increasing water content, unless otherwise stated.
All samples tested to four-point method, unless the extra 'One-point PI Only' data is reported.

Results reported relate only to the samples tested.

Site: St Mary's, Gomersal

Job Number: 2282839

Client: Roberts Environmental Ltd

Page: 4

UNIAXIAL COMPRESSION TEST ON ROCK - SUMMARY OF RESULTS

Hole No.	Depth m	Sample	Rock Type	Specimen Dimensions ²			Bulk Density ² Mg/m ³	Water Content 1 %	Uniaxial Compression ³				Remarks
				Dia. mm	Length mm	H/D			Condition	Stress Rate MPa/s	Mode of failure	UCS MPa	
RB1	3.60 - 3.90	C	Orange/Grey SAND/SILTSTONE	101.3	291.7	2.9	2.44	5.5	as received	0.5072	AC	30.9	
RB1	9.00 - 9.30	C	Grey SILTSTONE	99.9	248.8	2.5	2.53	4.7	as received	0.5009	AC	37.0	
RB1	21.10 - 21.35	C	Grey MUD/SILTSTONE	101.0	140.8	*1.4	2.52	6.5	as received	0.4909	S	0.7	
RB2	33.80 - 34.15	C	Grey SILTSTONE	100.4	204.2	*2	2.68	2.9	as received	0.4967	AC	10.2	
RB3	14.29 - 14.67	C	Grey SILTSTONE	98.9	284.0	2.9	2.72	2.5	as received	0.4905	AC	49.9	

Notes 1 ISRM p87 test 1, water content at 105 ± 3 °C, specimen as tested for UCS

*Denotes length diameter ratio outside ISRM specification

2 ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density

Mode of failure :

3 ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials

S - Single shear MS - multiple shear

above notes apply unless annotated otherwise in the remarks

AC - Axial cleavage F - Fragmented

Method of Preparation: International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007

Method of Test: International Society for Rock Mechanics, The complete ISRM suggested methods for Rock Characterization Testing and Monitoring, 2007

Results reported relate only to the samples tested.

Site: St Mary's, Gomersal

Job Number: 2282839

Client: Roberts Environmental Ltd

Page: 5

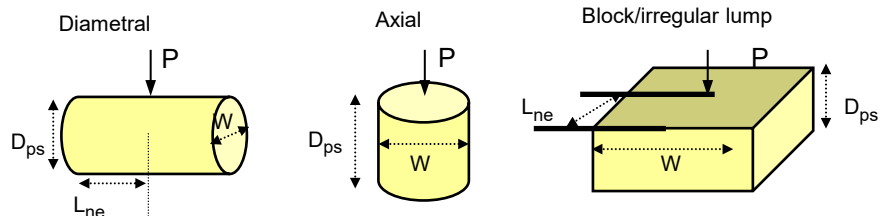
**Point Load Strength Index Tests
Summary of Results**

Borehole No.	Depth m	Sample	Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index		Remarks (including water content if measured)
				Type (D, A, I, B)	Direction (PL, PD or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is (50) MPa	
RB1	3.15 - 3.25	C	Orange/Brown/Grey MUD/ SANDSTONE As received	A	U	YES		99.0	34.1	30.1	4.2	65.6	0.97	1.10	
RB1	4.70 - 4.80	C	Orange/Brown/Grey MUD/ SANDSTONE As received	A	U	YES		101.3	44.5	32.5	0.2	75.8	0.03	0.04	
RB1	6.20 - 6.27	C	Grey SILTSTONE As received	I	PD	YES	52.8	102.11 84.60	36.3	21.3	5.4	65.7	1.26	1.42	
RB1	11.60 - 11.90	C	Brown SANDSTONE As received	I	PL	YES	150.6	100.80 93.47	86.3	81.3	9.4	103.3	0.88	1.22	
RB1	11.60 - 11.90	C	Brown SANDSTONE As received	I	PL	YES	74.5	101.15 85.78	92.5	82.5	12.1	104.9	1.10	1.54	
RB1	12.95 - 13.10	C	Grey SANDSTONE As received	I	PD	YES	45.0	94.48 58.62	42.6	36.6	10.9	64.5	2.61	2.93	
RB1	15.60 - 15.75	C	Grey MUD/SILTSTONE As received	A	PD	YES		93.8	59.8	57.8	1.2	84.5	0.17	0.21	
RB1	18.02 - 18.15	C	Grey MUDSTONE As received	A	U	YES		113.8	58.3	44.3	0.1	91.9	0.01	0.02	
RB1	20.07 - 20.15	C	Grey MUD/SILTSTONE As received	A	U	YES		100.1	51.7	39.7	1.9	81.2	0.28	0.35	
RB1	24.90 - 25.00	C	Grey SILTSTONE As received	A	PD	YES		100.9	30.4	18.4	15.1	62.5	3.85	4.26	
RB1	28.95 - 29.00	C	Grey SILTSTONE As received	I	U	YES	52.8	100.96 100.42	44.1	42.1	1.1	75.2	0.19	0.23	
RB1	35.10 - 35.22	C	Grey SILTSTONE As received	A	PD	YES		101.1	61.4	44.4	3.0	88.9	0.38	0.49	
RB2	3.07 - 3.15	C	Yellow/Brown/Grey SANDSTONE As received	A	PD	YES		100.8	48.4	24.4	1.9	78.8	0.30	0.37	
RB2	14.30 - 14.42	C	Grey SILTSTONE As received	A	U	YES		96.2	43.8	29.8	11.8	73.2	2.20	2.61	
RB2	18.65 - 18.80	C	Grey SILTSTONE As received	A	U	YES		99.4	58.4	50.4	4.1	85.9	0.55	0.71	
RB2	27.25 - 27.35	C	Grey MUD/SILTSTONE As received	A	U	YES		93.9	50.8	33.8	1.8	77.9	0.29	0.35	
RB2	32.85 - 32.95	C	Grey MUD/SILTSTONE As received	A	U	YES		100.4	38.7	20.7	1.1	70.3	0.23	0.27	
RB3	4.65 - 4.80	C	Grey SILTSTONE As received	A	PD	YES		99.6	48.1	38.1	7.4	78.1	1.22	1.49	
RB3	5.60 - 5.70	C	Orange/Brown/Grey SANDSTONE As received	A	U	YES		100.3	46.6	36.6	11.5	77.2	1.94	2.36	
RB3	13.35 - 13.45	C	Grey SILTSTONE As received	A	U	YES		101.1	52.7	48.7	3.6	82.4	0.54	0.67	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block
Direction
PL - Parallel to planes of weakness
PD - Perpendicular to planes of weakness
U - Unknown or random

Detailed legend for test and dimensions, based on ISRM

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
Size factor, F = (De/50)0.45 for all tests.



Method of Preparation: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

Method of Test: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

Results reported relate only to the samples tested.

Site: St Mary's, Gomersal

Job Number: 2282839

Client: Roberts Environmental Ltd

Page: 6

**Point Load Strength Index Tests
Summary of Results**

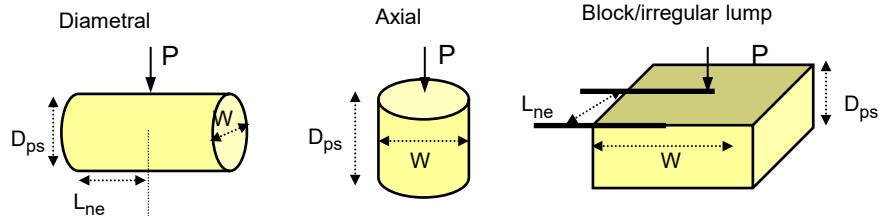
Borehole No.	Depth m	Sample	Rock Type and Test condition	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index		Remarks (including water content if measured)
				Type (D, A, I, B)	Direction (PL, PD or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is (50) MPa	
RB3	15.85 - 15.95	C	Grey SILTSTONE As received	A	U	YES		99.2	35.0	20.0	1.4	66.5	0.31	0.36	
RB3	23.90 - 24.05	C	Grey SILTSTONE As received	A	PD	YES		90.0	38.5	23.5	2.1	66.4	0.49	0.55	

Test Type
D - Diametral, A - Axial, I - Irregular Lump, B - Block

Direction
PL - Parallel to planes of weakness
PD - 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
Size factor, F = (De/50)^{0.45} for all tests.

Detailed legend for test and dimensions, based on ISRM



Method of Preparation: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

Method of Test: ISRM 2007 Suggested method for point load strength index (pages 125 - 132)

Results reported relate only to the samples tested.



Final Test Report - 2282839 / 1

Site: St Mary's, Gomersal
Job Number: 2282839
Originating Client: Roberts Environmental Ltd

All opinions and interpretations contained within this report are outside of our Scope of Accreditation.

This test report shall not be reproduced, except in full and only with the written permission of Ian Farmer Associates Ltd.

Samples will be retained for 28 days from date of issue of the final test report before being disposed of, unless we receive written instruction to the contrary.

Report End

Report Issue Date: 27/02/2026



Final Report

Report No.: 26-04442-1

Initial Date of Issue: 09-Mar-2026

Re-Issue Details:

Client *Roberts Environmental Limited*

Client Address: *1 Croft Stairs
Newcastle Upon Tyne
Tyne & Wear
NE1 2HG*

Contact(s): *Ben Bradford*

Project *251009 St Mary's School, Gomersal*

Quotation No.: Q26-40235 **Date Received:** 16-Feb-2026

Order No.: 251009.CHEM **Date Instructed:** 17-Feb-2026

No. of Samples: 11

Turnaround (Wkdays): 10 **Results Due:** 02-Mar-2026

Date Approved: 09-Mar-2026

Approved By:

Details: David Smith, Technical Director

For details about application of accreditation to specific matrix types, please refer to the Table at the back of this report

Results - Soil

Project: 251009 St Mary's School, Gomersal

Client: Roberts Environmental Limited		Chemtest Job No.:		26-04442	26-04442	26-04442	26-04442	26-04442	26-04442	26-04442	26-04442	
Quotation No.: Q26-40235		Chemtest Sample ID.:		2085015	2085016	2085017	2085018	2085019	2085020	2085021		
Order No.: 251009.CHEM		Client Sample Ref.:		2	8	11	17	22	26	7		
		Client Reference:		RB1	RB1	RB1	RB1	RB1	RB1	RB2		
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
		Top Depth (m):		2.30	7.25	9.70	16.10	22.00	34.4	21.30		
		Bottom Depth (m):		2.42		9.90						
		Date Sampled:		12-Feb-2026	12-Feb-2026	12-Feb-2026	12-Feb-2026	12-Feb-2026	12-Feb-2026	12-Feb-2026		
Determinand	HWOL Code	Accred.	SOP	Units	LOD							
Moisture		N	2030	%	0.020	22	6.7	7.0	14	7.5	11	9.2
Soil Colour		N	2030		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material		N	2030		N/A	Stones and Roots	None	None	Stones	cobbles	Stones	Stones
Soil Texture		N	2030		N/A	Clay	cobbles	cobbles	Clay	Clay	Clay	Clay
pH at 20C		M	2010		4.0	5.8	6.9	7.5	7.6	7.6	7.5	8.5
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.017	0.018	0.023	0.043	0.056	0.056	0.026
Total Sulphur		U	2175	%	0.010	0.31	0.051	0.062	0.13	0.21	1.6	0.16
Sulphate (Total)		U	2430	%	0.010	0.72	0.082	0.024	0.19	0.44	1.6	0.37

Results - Soil

Project: 251009 St Mary's School, Gomersal

Client: Roberts Environmental Limited		Chemtest Job No.:				26-04442	26-04442	26-04442	26-04442
<i>Quotation No.: Q26-40235</i>		Chemtest Sample ID.:				2085022	2085023	2085024	2085030
<i>Order No.: 251009.CHEM</i>		<i>Client Sample Ref.:</i>				9	5	9	5
		<i>Client Reference:</i>				RB2	RB3	RB3	RB2
		<i>Sample Type:</i>				SOIL	SOIL	SOIL	SOIL
		<i>Top Depth (m):</i>				31.25	12.30	17.75	15.60
		<i>Bottom Depth (m):</i>						17.95	
		<i>Date Sampled:</i>				12-Feb-2026	12-Feb-2026	12-Feb-2026	12-Feb-2026
Determinand	HWOL Code	Accred.	SOP	Units	LOD				
Moisture		N	2030	%	0.020	11	6.6	12	< 0.020
Soil Colour		N	2030		N/A	Brown	Brown	Brown	Black
Other Material		N	2030		N/A	Stones and cobbles	None	None	None
Soil Texture		N	2030		N/A	Clay	cobbles	Clay	coal
pH at 20C		M	2010		4.0	7.5	8.5	7.6	6.3
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.029	0.017	0.072	0.038
Total Sulphur		U	2175	%	0.010	0.040	0.056	0.36	0.71
Sulphate (Total)		U	2430	%	0.010	0.097	0.070	0.43	3.2

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Text example All items indicated in italic font represent customer-supplied information that may not be independently verified by the laboratory

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.

Any comments or interpretations are outside the scope of UKAS accreditation.

The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.

Uncertainty of measurement for the determinands tested are available upon request .

None of the results in this report have been recovery corrected.

All results are expressed on a dry weight basis.

The following tests were analysed on samples 'as received' and the results subsequently corrected to a dry weight basis EPH, VPH, TPH, BTEX, VOCs, SVOCs, PCBs, Phenols.

For all other tests the samples were dried at $\leq 30^{\circ}\text{C}$ prior to analysis.

All Asbestos testing is performed at the indicated laboratory .

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Where analysis is performed on a dried and crushed sample, it has been prepared by crushing all of the sample. If material has been removed prior to crushing, or by request of the client, this will be stated on the report.

NEW_ASB Eurofins Chemtest Limited, 11 Depot Road, Newmarket, CB8 0AL

DURHAM Eurofins Chemtest Limited, Unit A North Wing, Prospect Business Park, Crookhall Lane, Consett, Co Durham, DH8 7PW

Sample Deviation Codes

As a result of any of the below deviations applying, the test results may be unreliable

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - The required amount of sample for analysis was not received

H - Appropriate cooling measures were not taken for sample transportation

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.

All water samples will be retained for 14 days from the date of receipt.

Charges may apply to extended sample storage.

Report Information

Water Sample Category Key for Accreditation

DW - Drinking Water (Non-Regulatory)
GW - Ground Water
LE - Land Leachate
NA - Not Applicable
PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

NC - No Clean Up
MC - Mathematical Clean Up
FC - Florisil Clean Up

HWOL Acronym System

HS - Headspace analysis
EH - Extractable hydrocarbons – i.e. everything extracted by the solvent
CU - Clean-up – e.g. by Florisil, silica gel
1D - GC – Single coil gas chromatography
Total - Aliphatics & Aromatics
AL - Aliphatics only
AR - Aromatic only
2D - GC-GC – Double coil gas chromatography
#1 - EH_2D_Total but with humics mathematically subtracted
#2 - EH_2D_Total but with fatty acids mathematically subtracted
+ - Operator to indicate cumulative e.g. EH+EH_Total or EH_CU+HS_Total

Asbestos Tests LOD = LOQ

Limit of Detection = Limit of Quantification for asbestos results only

If you require extended retention of samples, please email your requirements to:
cs@etuki.euofins.com