

Trueform Ltd

Phase 2 Ground Investigation

**Begelly Park Gardens
Kilgetty
Pembrokeshire
SA68 0YH**

**Report No: 13.10.028b
July 2023**

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For and on behalf of ListersGeo, trading name of Listers Geotechnical Consultants Ltd

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EXECUTIVE SUMMARY

Project Reference	13.10.028b.
Site Location	Begelly Park Gardens Kilgetty, Pembrokeshire, SA68 0YH.
OS Grid Reference	Approximate centre of the site – 211909, 207520.
Development Proposals	It is proposed to develop the site to accommodate a mixture of two storey houses across the southern part of the site and holiday lodges across the rest of the site.
Current Site Use and Existing Buildings	The site is currently undeveloped, however there are the remnants of an old steel framed building in the southern area of the site.
Topography	The site is located on an eastern facing valley slope and, therefore, mainly slopes downwards towards the east, at an angle of approximately 5°. However, there are steeper slopes close to the western boundary and a north facing slope in the central area of the site.
Vegetation	There are many trees across the site and around the site's boundaries.
Published Geology	Bedrock of the Carboniferous age Middle Coal Measures.
Unexploded Ordnance	The site is located in an area classified as being at low risk of UXO.
Ground Conditions Encountered	The site and laboratory works have shown the southern half of the site to comprise Made Ground, locally overlain by Topsoil, over bedrock of the Middle Coal Measures, and the northern half to comprise Topsoil over Middle Coal Measures.
Groundwater Encountered	Groundwater strikes and standing water levels were recorded at approximately 1.2m depth in the northern half close to the pond, and deeper elsewhere.
Risks to Human Health	The site is not considered to pose a significant risk to the human health receptors.
Ground Gas Risks	The monitoring carried out to date indicates Characteristic Situation CS-1, however further monitoring and assessment is recommended.
Risks to Controlled Waters	The site is not considered to pose a significant risk to the controlled waters receptors.
Remediation Required	None required.
Chemical Attack on Buried Concrete	Design Sulphate Class DS – 1. ACEC Class AC – 2z.
Geotechnical Hazards	The geophysics carried out as part of this investigation indicates possible vertical mine entries in the central western area of the site. The area considered to be at risk is highlighted on the Potential Vertical Features drawing, which is provided in Appendix A, with further works required. The recommendations below only relate to the parts of the site OUTSIDE of the Potential Vertical Features risk zone.
Foundations	Shallow conventional foundations at least 0.9m depth or 0.2m into the top of the Middle Coal Measures, whichever is deeper.
Allowable Bearing Pressure	For foundations up to 1.0m in width – 125kPa.
Floor Slabs	Due to the presence of medium volume potential soils and trees, suspended floor slabs are recommended.
Roads and Hardstanding Design	For formation at 0.5m to 0.7m depth in the Middle Coal Measures soils, a preliminary design CBR value of 2% is recommended. For formation in the Made Ground strata, soil reinforcement will be required to allow a preliminary CBR value of 2%.
Infiltration Measures	Site observations and testing indicates soakaway drainage in the Middle Coal Measures is unlikely to be suitable. Shallow soakaways, such as permeable paving, may be possible in the coarse-grained Made Ground strata across the southern half of the site, however, to allow a more detailed assessment, further targeted testing is recommended.
Waste Soil Classification	Topsoil – Non-hazardous. Made Ground – Non-hazardous. Middle Coal Measures – At this stage Non-hazardous, however further sampling, testing and assessment may allow a relaxation on this classification.

Limitations and Recommendations	The ground is seldom homogeneous and variations, which affect our conclusions, may inevitably occur between and beyond the test locations. The risk of significant variations to our Ground Model is considered to be low however should ground conditions vary noticeably from our Ground Model, then we recommend further assessment by a suitably qualified person. Potential vertical features which are considered likely to be mine entries have been identified in the central western area of the site. No development should take place in this area of the site until they have been located and remediated, if required. Further works are recommended to allow a more detailed assessment of the risks posed by Ground Gases and the WAC classification for the Middle Coal Measures.
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This executive summary should be read in conjunction with the main report.

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- Coal Authority Report
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- Locations of Geophysics Lines
- Vertical Features Potential
- Site Photographs

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- Legends and Abbreviations Log Key
- Continuous Tube Sampler Borehole Logs
- Machine Excavated Trial Pit Logs
- Dynamic Plate Loading Test Results
- Soil Infiltration Test Results
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- Geotechnical Laboratory Test Report
- Chemical Laboratory Test Report

APPENDIX D – WASTE CLASSIFICATION

- HazWasteOnline Report
- WAC Testing Results

PHASE 2 GROUND INVESTIGATION REPORT

INTRODUCTION

A Phase 2 Ground Investigation has been undertaken for a proposed development comprising a mixture of residential and holiday lodges at Begelly Park Gardens, Kilgetty, Pembrokeshire, SA68 0YH. A Site Location Plan is provided in Appendix A. The Ordnance Survey National Grid reference for the approximate centre of the site is 211909, 207520.

Instructions to undertake the investigation were received from the client's structural engineer, Roger Casey Associates Ltd, in their email dated the 15th February 2023.

This report describes the work carried out by ListersGeo, the ground conditions encountered and discusses their implications with regard to the proposed development.

This report supplements a previous Phase 1 desk study prepared by ListersGeo, reference 13.10.028 and dated November 2013. This desk study included neighbouring land to the south, and a Phase 2 Ground Investigation was carried out for this neighbouring land in May 2014, reference 13.10.028a. As part of the previous investigation samples for logging, testing and analysis were taken from two mounds of soil located in the western area of this latest site and the results of these works was included in the previous Phase 2 report. This current report should be read in conjunction with the previous report for full details of the investigations undertaken at the site.

This report has been prepared for the sole use of the client and their professional advisors. This report shall not be relied upon by third parties without the express written authority of ListersGeo. If an unauthorised third-party comes into possession of this report, they must not rely on it and the authors owe them no duty of care and skill.

SCOPE OF THE INVESTIGATION

The scope of the investigation was to undertake an updated walkover survey, provide an assessment of the geotechnical engineering properties of the ground and the extent of any soil, gas or groundwater contamination on the site. A contaminated land risk assessment was undertaken based on the Contaminated Land Exposure Assessment (CLEA) and Environment Agency (EA) Remedial Targets Methodology (RTM) guidelines.

The investigation included a geophysical survey as part of a mining risk assessment and parameters to aid pavement and drainage design.

PROPOSALS

The development proposals discussed in the previous Phase I Desk Study Report included two discrete areas, i.e., a southern area and a northern area. This Phase II Ground Investigation Report deals with the northern area only.

It is proposed to redevelop this site to accommodate a mixture of two storey houses, across the southern area of the site, and holiday lodges across the rest of the site. The development includes an access road, areas for parking, gardens and soft landscaped areas.

A Proposed Development Plan is provided in Appendix A.

SITE INFORMATION AND RECONNAISSANCE

The site is formed from an irregular shaped parcel of land, with overall dimensions of approximately 330m by 130m and covers an area of approximately 3.0 hectares. It is located on an eastern facing valley slope of a south flowing stream, which is located approximately 20m east. A walkover survey of the site and its immediate surrounds was undertaken as part of the Phase I Desk Study Report, referred to earlier. This revealed the site to be undeveloped, with much of the northern and central areas formed from one large and several smaller ponds. The rest of the site generally sloped at an angle of approximately 5° towards the east with some steeper slopes in the western area. No obvious signs of instability associated with these slopes was noted during the walkover.

The site was bordered by fields to the north, wooded land to the east, an area for parking to the south and houses and gardens to the west. There was much vegetation across the site, including many mature trees and some of the ground surface to the east of the large pond was waterlogged.

Two vegetated mounds were noted close to the western site boundary and anecdotal evidence suggested these were formed by arisings from mining in the area.

No obvious signs or sources of contamination were observed during the site walkover.

As part of this latest investigation an updated walkover was carried out on the 13th March 2023. Between the two walkovers much of the lower vegetation had been cleared, leaving the site more accessible and a grassed area aligned roughly south to north through the central area. This central area generally sloped downwards towards a large pond that formed the northeastern area of the site. To the west of the grassed area the slope became steeper, and parts of the western boundary were formed by a sub-vertical slope. No obvious evidence of slope instability was noted. The two vegetated mounds were still present in the western area of the site. The southeastern area of the site was formed by dense vegetation, and, as a consequence, it was not possible to access the whole of this area.

The area to the south of the site had been developed with a housing estate and an access road connected this estate with a track on the site via the the southern boundary of the site. However, access to the site was gained through a gate in the southwestern area. This led into an area with a steel container and the remnants of an old steel framed building. Just beyond this, in the central area of the site, a fairly steep north facing slope led down to the northern area of the site, including the large pond. The ground adjacent to the pond was noted to be waterlogged.

No obvious signs of contamination were noted during the walkover.

PREVIOUS WORK

As noted above, this site formed part of a previous desk study report, reference 13.10.028 and dated November 2013. The salient points from the previous report relevant to this latest report are included here, but the full report should be referred to for more detail.

The local geology comprises bedrock of the Carboniferous age Middle Coal Measures, however due to its locality close to a stream some overlying Alluvium was considered possible. The Middle Coal Measures were described to generally comprise grey, blue and black mudstone and shale but also containing significant deposits of coal, carbonaceous shale and sandstone. Due to the potential for coal bearing strata under the site a Coal Authority report was acquired and this stated, 'The property is in the likely zone of influence from workings in one seam of coal at 250m to 270m depth, last worked in 1898. Any ground movement from these coal workings should have stopped by now. In addition, the property is in an area where the Coal Authority believe there is coal at or close to the surface, this coal may have been worked at some time in the past... There are two known mine entries within, or within 20m of, the site's boundaries. There are no records of what steps, if any, have been taken to treat these mine entries.'

The local Building Control officer indicated they are unaware of any former mine entries on, or close to, the site.

A copy of the Coal Authority Report, including a figure showing the approximate positions of the mine entries is provided in Appendix A of this report. The locations for the mine entries shown on the Coal Authority report were noted to coincide with the vegetated mounds noted in the walkover. The Mining Risk Assessment, carried out for the site at the desk study stage, classified the risks of unrecorded mine workings under the site as high.

The earliest map reviewed shows the site as part of five undeveloped fields. In addition, there are two inactive pits shown in the western area coinciding with the vegetated mounds noted in the Walkover and the mine entries. At some time in the mid to late twentieth century the large pond present in the northeastern area was created.

The nearest surface watercourse was noted to be the south flowing stream close to the eastern boundary. There were no surface water abstraction licenses within 250m.

The site was underlain by a Secondary A Aquifer, the Middle Coal Measures. However, it was not within a Source Protection Zone and there were no groundwater abstraction licenses within 250m.

No waste transfer or treatment sites, waste management facilities or current or historic landfill sites were identified within 250m of the site. Two contemporary trade entries, a fuel filling station and a builder's merchants, were identified within 250m.

The underlying Middle Coal Measures are potentially coal bearing and these were identified as a potential source of methane ground gases. No significant source of carbon dioxide ground gases was identified, and no requirement for special radon precautions was identified.

The Hazard Potential for collapsible ground, compressible ground, running sand and shrinking and swelling clay was classified as very low or no hazard. The Hazard Potential for landslide in the western area of the site was classified as low, and as very low for the rest of the site.

The Initial Conceptual Model identified Made Ground associated with the site's previous history, migration of contaminants from local current and historical commercial/industrial land uses and soils gases from the underlying geology as potential sources of contamination. Future visitors and workers at the site and construction and maintenance workers were identified as potential human health receptors, with the underlying Secondary A Aquifer, Middle Coal Measures, and stream close to the eastern boundary as potential controlled waters receptors. Pathways for the human health receptors included ingestion, dermal contact and inhalation and for the controlled waters receptors as migration of contaminants through drains or service runs, the unsaturated zone and groundwater and run-off to the stream.

The main potential geotechnical hazard for the site was considered to be related to former coal workings at the site. Two historical mine entries were identified in the Coal Authority report, and, in addition, unrecorded shallow workings may also be present. Other potential geotechnical hazards included shrinking and swelling from soils with a volume change potential and vegetation influence and slope instability, particularly in the western area.

As noted above, sampling, testing and analysis of the two mounds located in the western area of this site was included in the previous Phase 2 Ground Investigation for the neighbouring residential development, reference 13.10.028b and dated May 2014. The salient points from the previous report relevant to this latest report are included here, but the full report should be referred to for more detail.

Two machine excavated trial pits and two hand excavated trial pits were formed into the mounds and revealed the were comprised of grey brown sandy clayey gravel of mudstone. Samples from each of the mounds were included in the chemical testing and no elevated concentrations of potential contaminants were recorded.

To allow a more detailed assessment of the identified potential geoenvironmental and geotechnical hazards, a Phase 2 Ground Investigation was recommended.

EXPLORATION AND TESTING

The intrusive investigation was carried out over two phases, with five continuous tube boreholes (CT01 to CT05) and fourteen machine excavated trial pits (TP01 to TP14) carried out during the first phase of works and five days of geophysical works comprising twelve electrical resistivity test lines (Lines 1-1 to 12-12) targeted at the vegetated mounds in the western area where the mine entries are shown on the Coal Authority report, forming the second phase. The first phase of intrusive works was carried out over the 13th and 14th March 2023, with the second phase carried out between 27th and 31st March 2023.

Ground levels and co-ordinates of the boreholes, trial pits and geophysics lines were approximated on the basis of the drawing, 'Topographic Site Plan,' reference PWA40-07 Rev?, prepared by Williams Architecture and issued 15/12/2022, field measurements and freely available georeferenced on-line information/aerial imagery.

The positions of the exploratory holes and geophysics lines undertaken at the site as part of this investigation can be seen on the Exploratory Hole Location Plans in Appendix A. The logs, geophysics lines and field test and monitoring results are provided in Appendix B and the results of the laboratory testing are provided in Appendix C.

Engineering conclusions given in this report are based on data obtained from these sources, but it should be noted that variations, which affect these conclusions, may inevitably occur between and beyond the test locations. Also, water levels may vary seasonally and with other factors.

SAMPLING STRATEGY

The investigation was undertaken in accordance with the scope of works agreed with our client's structural engineer, Roger Casey Associates Ltd. The positions of the exploratory holes were selected by ListersGeo to provide a wide coverage of information across the site area, with the geophysics lines targeted in the western area where the vegetated mounds are located and mine entries are shown on the Coal Authority report.

METHODOLOGY - PHASE ONE (INTRUSIVE WORKS)

Health and Safety

In order to minimise the dangers from/to buried services, prior to commencement of testing the proposed locations were scanned using a Cable Avoidance Tool. At the borehole locations a service avoidance pit was dug, using hand tools, to a depth of around 1.2m below ground level (bgl). No buried services were encountered in the locations of the exploratory holes.

Exploratory Holes

Trial pits TP01 to TP14 were excavated with an 8-tonne rubber-tyred backhoe excavator to depths of between 0.6m and 3.0m, under the supervision of an engineer, who made a record of the arisings. Disturbed samples were taken at selected depths down to the base of the holes for subsequent laboratory testing and inspection. In-situ measurements of shear strength were taken using a hand shear vane. On completion, the trial pits were

backfilled with arisings in thin layers, ensuring that excavated material was replaced in the same order as it had been removed.

Continuous tube sample boreholes CT01 to CT05 were put down using an Archway Competitor Dart rig to depths between 3.5m and 5.5m. The boreholes were advanced using a plastic lined steel tube sampling system, driven into the ground by a top drive percussive hammer. A near continuous 85mm to 55mm diameter core sample was recovered for subsequent examination, sub-sampling and laboratory testing. Standard Penetration Tests (SPTs) were taken at 1.0m intervals. Measurements of unconfined compressive strength were made in the tube samples in the field using a pocket penetrometer.

Installations

On completion of the boring, boreholes CT02 and CT05 were utilised for the installation of 50mm diameter slotted uPVC standpipes from 3.0m depth up to 1.0m below existing ground level. From 1.0m depth up to ground level a plain pipe was added. The slotted sections of the standpipes were surrounded with pea gravel, while expansive bentonite clay was added around the plain pipes and below the slotted sections to seal the boreholes. The standpipes were finished with rubber bungs and gas taps and protected with a stopcock covers, which were then concreted flush with ground level.

In-situ Testing

In-situ Dynamic Plate Loading tests were undertaken in nine of the trial pits, TP05 to TP13, using a Light Weight Deflectometer (LWD) at depths of between 0.6m and 0.7m. The tests determine the dynamic deformation modulus (E_{vd}) of the formation soils and have been used to assess the California Bearing Ratio (CBR) of the formation. The 300mm diameter plate was subject to pulse loads applied by a dropped weight and the mean value of three measurements of vertical displacement is recorded.

Infiltration testing was undertaken in five of the trial pits, TP01, TP02, TP05, TP07 and TP09, in general accord with BRE Digest 365, 'Soakaway Design.'

METHODOLOGY - PHASE TWO (GEOPHYSICS)

In view of the anticipated geology and the depth of information required, the Electrical Resistivity Imaging survey was designed to record continuous ground properties from ground level up to a maximum depth of 16m below ground level. This was dependant on the length of profile line available on the site. A total of twelve electrical resistivity lines were formed across the areas of the site where the mine entries are shown on the Coal Authority report.

When aligned north to south, the survey area was set out to record electrical resistivity data measurements over lines of up to 160m length with electrodes at 5.0m centres, and up to 40m length with electrodes at 1.25m centres when aligned east to west. The north to south aligned lines were positioned to cross the areas of both of the mine shaft entries shown on the Coal Authority report. However, due to the proximity of the western boundary to the northern mine shaft entry, it was only possible to run east to west lines over the area of the southern mine entry.

Measurements of the Electrical Resistivity variations of subsurface soils form a well-established geophysical technique for assessing the depth and thickness of strata, special variations in ground conditions and the geotechnical properties of ground materials.

Electrical Resistivity Imaging is a ground investigation technique that measures the electrical properties of soils and rocks within the target area at multiple discrete points both laterally and vertically along a linear alignment. A current is introduced into the ground sequentially through a series of metal electrodes which are inserted into the sub-soil. The current passing through the ground sets up a distribution of electrical potential within the soils and rocks along the survey alignment and the difference in electrical potential at each remaining electrode along the system length is measured and recorded. Using Ohm's law, the measured voltage at each receiving electrode is converted into a resistance for the ground between each electrode. A specialised computer system controlled each survey line measurement, mainly using varying sets of four electrodes in a Wenner system. A Wenner array formula was used for profiling this electric resistivity investigation.

These readings are then reconstructed in two-dimensions using specialist computer modelling software and complex mathematical algorithms to produce a pseudo-image of electrical contrast analogous to a vertical cross-section.

Limitations

It is important to note that the cross-section produced from the above surveys are not directly showing geological form but rather mapping relative changes and contrasts in ground impedance to current flow, electromagnetism and density. As such, specialist interpretation and engineering judgment is required to infer strata types, boundary positions and geological structures from the data and intrusive methods are recommended to provide further data to inform interpretation of the results.

Whilst the developments in modern Electrical Resistivity Imaging instruments have brought increased reliability and accuracy in measurement acquisition, the survey depth penetration is a direct function of the lateral survey array length and therefore overall imaging depth is typically restricted by usable site area.

Additionally, electrode spacing exerts a fundamental control on data resolution along the survey length and the purpose and needs of the investigation must be carefully assessed when selecting a site-specific survey methodology to yield optimum results. Multiple natural variables can affect the quality of data obtained including degree of saturation of the soils being tested, changes in salinity, void ratio and mineralogical variations as well as anthropogenic interference such as from existing structures and from ground loop-current induced into the soils by overhead high-voltage power lines.

GROUND CONDITIONS

The intrusive investigation revealed that the general succession of strata across the southern half of the site comprised Made Ground, locally overlain by Topsoil, over bedrock of the Middle Coal Measures, with the ground conditions across the northern half of the site generally comprising Topsoil over the Middle Coal Measures. The previous investigation, reference 13.10.028b and dated May 2014, had revealed the mounds in the western area of the site to comprise Made Ground that is considered likely to be re-worked natural soils.

The general succession of strata revealed by the fieldwork is summarised below.

TOPSOIL

Topsoil was encountered across the northern half of the site and locally across the southern half, from ground level down to depths ranging from 0.1m to 0.4m, but typically 0.3m. It generally comprised dark brown slightly sandy organic clay, locally containing gravel that generally consisted of fine to medium sub-angular siltstone.

MADE GROUND

Made Ground was encountered across the southern half of the site, either from ground level or beneath the Topsoil. The base of the Made Ground was penetrated at six of the locations, at depths ranging from 0.5m to 3.3m, but generally no deeper than 1.3m. However, the thickest Made Ground was encountered at CT04, in the central area at 3.3m depth, and TP14, in the southeastern area at 2.5m depth.

It ranged in nature from fine-grained to coarse-grained.

Fine-Grained Made Ground

The fine-grained Made Ground generally comprised grey brown slightly gravelly slightly sandy clay, with the gravel generally consisting of fine to coarse sub-angular to angular siltstone and some brick, concrete and plastic, including occasional cobble and/or boulder sized brick and concrete. At one location, TP14, the Made Ground was slightly organic.

The results of the field strength tests are summarised below:

Parameter	Range	Comments
Undrained Shear Strength (kPa)	7 to 53	Converted from Pocket Penetrometer (using conversion factor of 30). Extremely low to medium strength (BS 5930-2015, Table 9)
SPT 'N' values	1 to 8	Approximately equivalent to undrained shear strengths of between 5kPa and 36kPa (using Stroud, f_1 , conversion factor = 4.5). Extremely low to low strength (BS 5930-2015, Table 9)

Laboratory testing revealed the following:

Parameter	Range	Comments
Water Content (%)	11 to 53	-

Parameter	Range	Comments
Liquid Limit (%)	37 to 72	Clay or silt of intermediate to very high Plasticity (BS5930 Casagrande)
Plastic Limit (%)	24 to 36	
Plasticity Index (%)	13 to 36	
Modified Plasticity Index (%)	6 to 35	Non-shrinkable and Shrinkable soil of low and medium Volume-Change Potential (NHBC Standards)
Retained on 425µm sieve (%)	2 to 54	BS1377 'coarse soil' fraction
Passing 63µm sieve (%)	32 to 89	Fines fraction
Loss-on-ignition (%)	7 to 11	CT04 and TP14

Coarse-Grained Made Ground

The coarse-grained Made Ground was encountered at six locations close to the track in the southern area and generally comprised grey brown clayey sandy fine to coarse sub-angular to angular gravel of siltstone and occasional concrete and clinker.

Locally the Made Ground included some cobble and boulder sized concrete.

MIDDLE COAL MEASURES

Encountered beneath the Topsoil or Made Ground down to the base of the test locations at depths down to 5.5m. It generally comprised firm medium strength grey brown slightly sandy clay, which contained abundant gravel sized siltstone and mudstone lithorelicts. With increasing depth the strata became less weathered, which was reflected in an increase in consistency and strength to stiff high strength typically between 1.0m and 1.6m depth. Below approximately 2.5m the Middle Coal Measures became very weak highly fractured grey brown mudstone, which was recovered as clayey sandy gravel. Locally some coal was encountered, mainly as fragments within the gravel portion of the strata, however, at TP05, which was located in the northern area of the site, below 1.5m depth down to its base at 2.3m depth, the strata comprised coal that was recovered as silty very sandy gravel.

The results of the field strength tests, and other relevant data, are summarised below:

Parameter	Range	Comments
Undrained Shear Strength (kPa)	53	Converted from Pocket Penetrometer (using conversion factor of 30). Medium strength (BS 5930-2015, Table 9)
Undrained Shear Strength (kPa)	60 to 85	From Hand Shear Vane tests Medium and High strength (BS 5930-2015, Table 9)
SPT 'N' values	6 to 17	Typically, 1.0m to 2.0m depth - Approximately equivalent to undrained shear strengths of between 27kPa and 77 kPa (using Stroud, f_1 , conversion factor = 4.5). Low to High strength (BS 5930-2015, Table 9) and increasing with depth.

Parameter	Range	Comments
	25 to 101	Typically, below 3.0m depth – Less weathered mudstone and increasing with depth.

Laboratory testing on clay samples, typically taken between 0.5m and 2.5m depth, revealed the following:

Parameter	Range	Comments
Water Content (%)	13 to 65	Typically, less than 36%.
Liquid Limit (%)	18 to 59	Mainly clay of low and intermediate Plasticity (BS5930 Casagrande)
Plastic Limit (%)	20 to 36	
Plasticity Index (%)	10 to 26	
Modified Plasticity Index (%)	3 to 26	Non-shrinkable and shrinkable soil of low and medium Volume-Change Potential (NHBC Standards)
Retained on 425µm sieve (%)	1 to 69	BS1377 'coarse soil' fraction
Passing 63µm sieve (%)	22 to 88	Fines fraction
Loss-on-ignition (%)	0 to 32	Reflects the coal content.

Laboratory testing on mudstone samples, typically taken below 2.5m depth, revealed the following:

Parameter	Range	Comments
Portion <63mm and >2mm (%)	48 to 87	Gravel fraction
Portion <2mm and >63µm (%)	5 to 36	Sand fraction
Passing 63µm sieve (%)	8 to 17	Fines fraction

GROUNDWATER

Groundwater strikes and seepages were encountered at eight of the test locations, at depths between 1.2m and 2.3m. These generally occurred in the relatively lower northern area of the site, and at the test locations closest to the pond, CT02, CT03 and TP03, standing water levels of between 0.8m and 1.2m depth were recorded on completion.

At the subsequent monitoring visit, a standing water level of 1.1m depth was recorded at CT02 and 2.4m depth at CT04.

OBSERVED SOIL CONTAMINATION

Made Ground soils, some of which were fairly deep, were recorded at ten locations, however no obvious signs of contamination were observed during the investigation.

CALIFORNIA BEARING RATIO (CBR) ASSESSMENTS

In-situ Dynamic Plate Loading tests were undertaken in ten of the trial pits using a Light Weight Deflectometer (LWD) at depths of between 0.5m and 0.7m. The results of the testing are provided in Appendix B and summarised in the table below.

Location	Stratum	Depth (m)	E _{vd} (MN/m ²)	Equivalent CBR (%)
TP05	Middle Coal Measures	0.6	4.15	2.0
TP06	Middle Coal Measures	0.6	6.37	2.3
TP07	Made Ground	0.5	6.37	2.3
TP08	Made Ground	0.7	26.11	14
TP09	Made Ground	0.6	11.82	4.6
TP10	Made Ground	0.6	7.07	2.5
TP11	Middle Coal Measures	0.6	9.34	3.3
TP12	Middle Coal Measures	0.6	4.19	2.0
TP13	Middle Coal Measures	0.5m	4.57	2.1

ROOTS

Roots were noted in eight of the trial pits, mainly down to 0.6m depth, however at two locations, TP02 and TP14, they were recorded down to 1.8m and 2.5m depth respectively.

INFILTRATION TESTING

To assess the infiltration capacity of the soils, infiltration testing was carried out at the site in accord with BRE Digest 365, Soakaway Design.

Testing was undertaken in the Middle Coal Measures strata at three locations, TP01, TP02 and TP05, at depths between 0.8m and 2.3m depth. It was also undertaken in the Made Ground at two locations, TP07 and TP09, at depths between 0.2m and 0.7m.

In the Middle Coal Measures strata, the results varied significantly between the three locations, with the standing water level rising over the four hours and twelve minutes that the test was run at TP01 to one complete test being possible at TP02 and an infiltration rate of 1.3×10^{-5} m/s being calculated for this test.

In the Made Ground soils, three tests were completed at TP07 giving an infiltration rate of 2.6×10^{-4} m/s, and two tests were completed at TP09, with an infiltration rate of 2.2×10^{-5} m/s being calculated for the second test.

The results of the testing are provided in Appendix B and summarised in the table below.

Location	Depth of trial pit (m)	Strata	Soil Infiltration Rate f (m/s)		
			Test 1	Test 2	Test 3
TP01	2.1	Middle Coal Measures	Water level rose	-	-
TP02	2.1	Middle Coal Measures	1.3×10^{-5}	-	-
TP05	2.3	Middle Coal Measures	Water level fell by 7cm	-	-
TP07	0.6	Made Ground	1.0×10^{-3}	3.4×10^{-4}	2.6×10^{-4}
TP09	0.7	Made Ground	3.6×10^{-5}	2.2×10^{-5}	-

GROUND GAS MONITORING

Ground gas monitoring was carried out in the monitoring wells installed in CT02 and CT04 on one occasion, using a calibrated Geotech GA 5000 gas analyser.

The results are provided in Appendix B and summarised in the table below.

Parameter	Range
Oxygen (%v/v)	15.9 to 20.5
Carbon Dioxide (%v/v)	0.3 and 1.2
Methane (%v/v)	<0.1
Flow rate (l/h)	0.0 and 0.2

CONCRETE AGGRESSION TESTS

The results of laboratory aggression tests on selected samples of soil are summarised below:

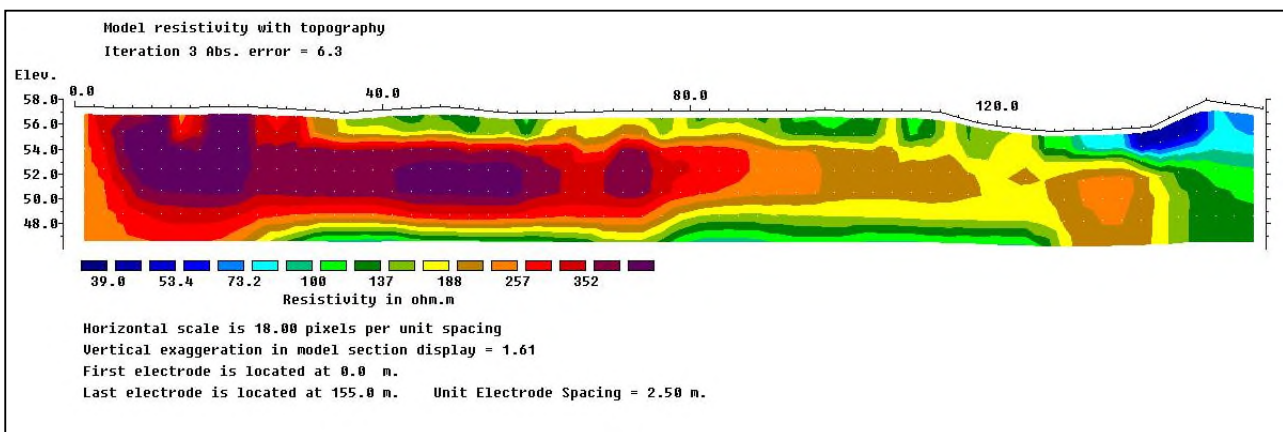
Stratum	Water-soluble Sulphate SO_4 (mg/l)	pH (pH units)	Number tested
Made Ground	170 and 250	7.1 and 7.2	2
Middle Coal Measures	130 to 210	4.5 to 6.6	7

GEOFYSICAL RESULTS

Lines 1-1 to 8-8 were orientated roughly north to south, with lines 5-5 to 7-7 being located closest to the more northern of the mine entries shown on the Coal Authority report. Lines 9-9 to 12-12 were orientated roughly east to west in the area around the more southern of the mine entries shown on the Coal Authority report. Due to its proximity to the western boundary, it was not possible to carry out ERT lines east to west across the northern mine entry.

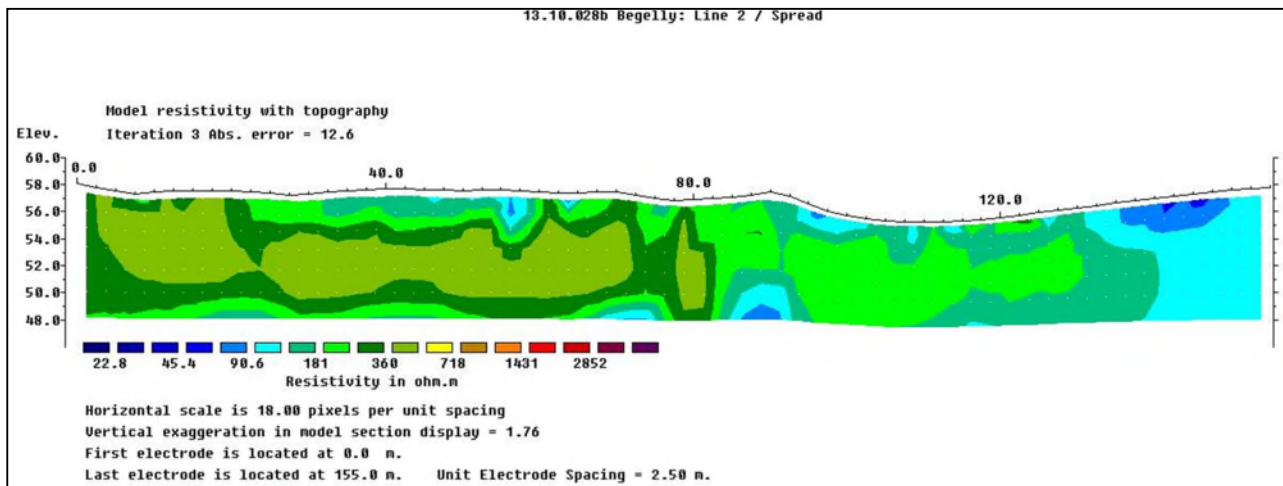
Line 1-1

Line 1-1 was the furthest east of the longer roughly north to south orientated lines across the central and northern areas of the site. The results, which are shown below, record resistivity results below approximately 500ohm.m, with the highest resistivity being recorded in the northern area and shallower than approximately 7m depth. There is a vertical feature of relatively higher resistivity compared to adjacent ground close to the southern end of the line, which extends from approximately 3.0m depth down to below the base of the line, at approximately 10.0m depth.



Line 2-2

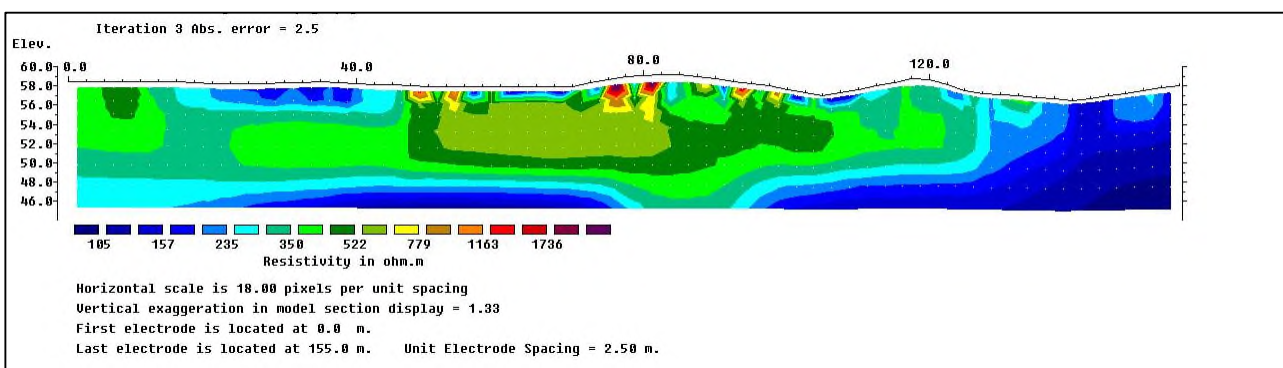
Line 2-2 was orientated roughly north to south and located a few metres to the west of Line 1-1. All the results were below 500ohm.m, with the highest resistivity being recorded in the northern area and shallower than approximately 7.0m. There is a possible vertical feature of relatively higher resistivity compared to adjacent ground in the central southern area of the line, which extends below the base of the line at approximately 8.0m depth.



Line 3-3'

Line 3-3' was orientated roughly north to south and located just to the east of centre of the longer lines formed across the northern and central areas of the site. The results were generally below 500ohm.m, however slightly higher result were recorded between approximately 2m and 8m depth across the central area of the line. A possible vertical feature of higher resistivity compared to adjacent ground is present from approximately 9.0m depth down to below the base of the line at approximately 12.0m depth, in the central area. The lowest results were recorded in the southern area of the line, with a marked drop in resistivity laterally in the central southern area.

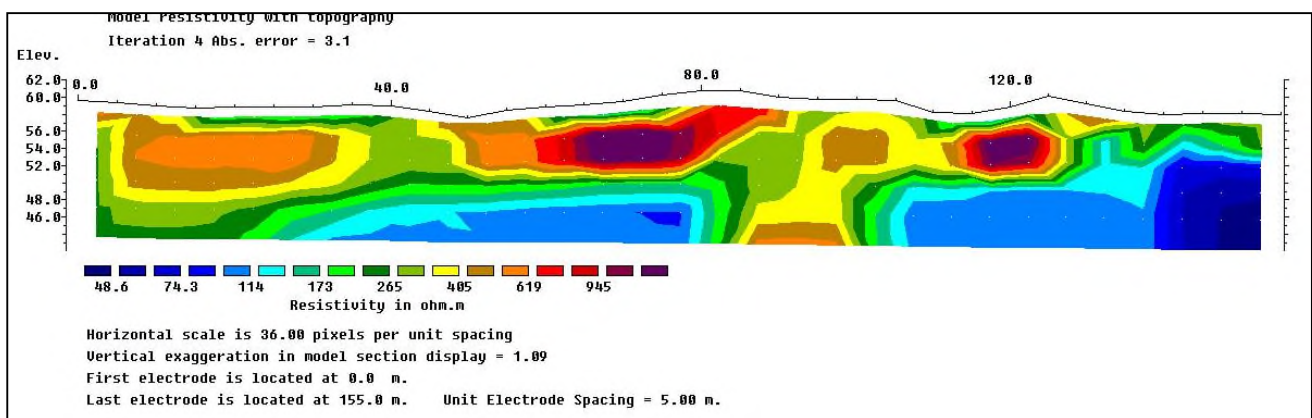
In addition, there were several small and shallow higher resistivity features across the central area of the line.



Line 4-4'

Line 4-4' was orientated roughly north to south and was located just to the west of the centre of the longer lines formed across the northern and central areas of the site. The results were generally between approximately 250ohm.m to 600ohm.m down to approximately 10m depth and reducing below that. With the lowest results recorded in the southern area.

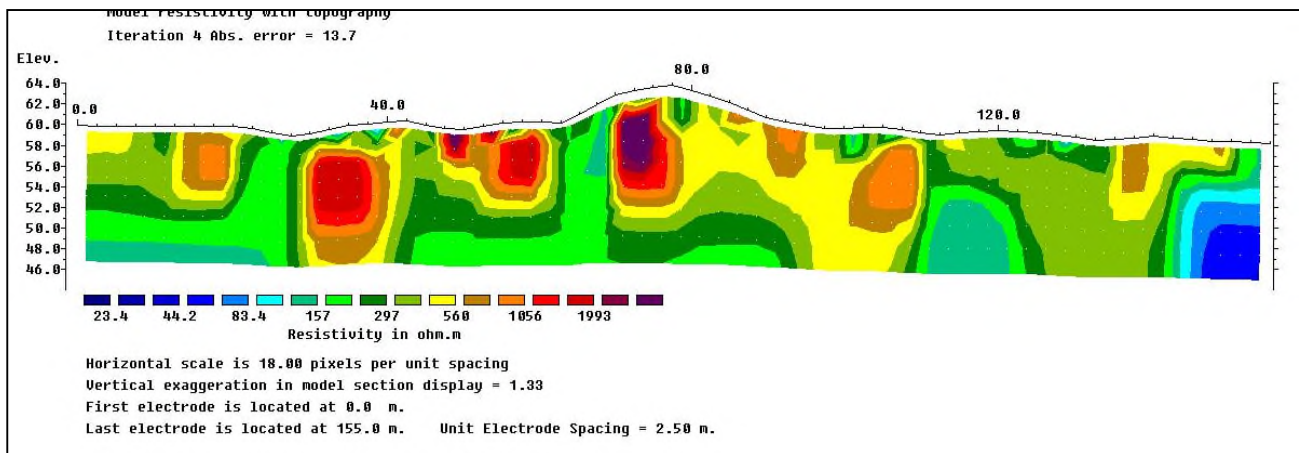
Resistivity values in excess of 1,000ohm.m were recorded in two separate areas in the central and central southern areas, down to approximately 6.0m depth. In between these two higher resistivity areas a vertical zone of deeper relatively high resistivity compared to adjacent ground was recorded from approximately 7.0m depth down to below the base of the line at approximately 14.0m depth.



Line 5-5'

Line 5-5' was orientated roughly north to south in the western area of the longer lines formed across the northern and central areas of the site where the more northern of the mine entries are shown on the Coal Authority report. The shallow results down to approximately 7.0m depth were variable and ranged between approximately 150ohm.m to above 2,000ohm.m.

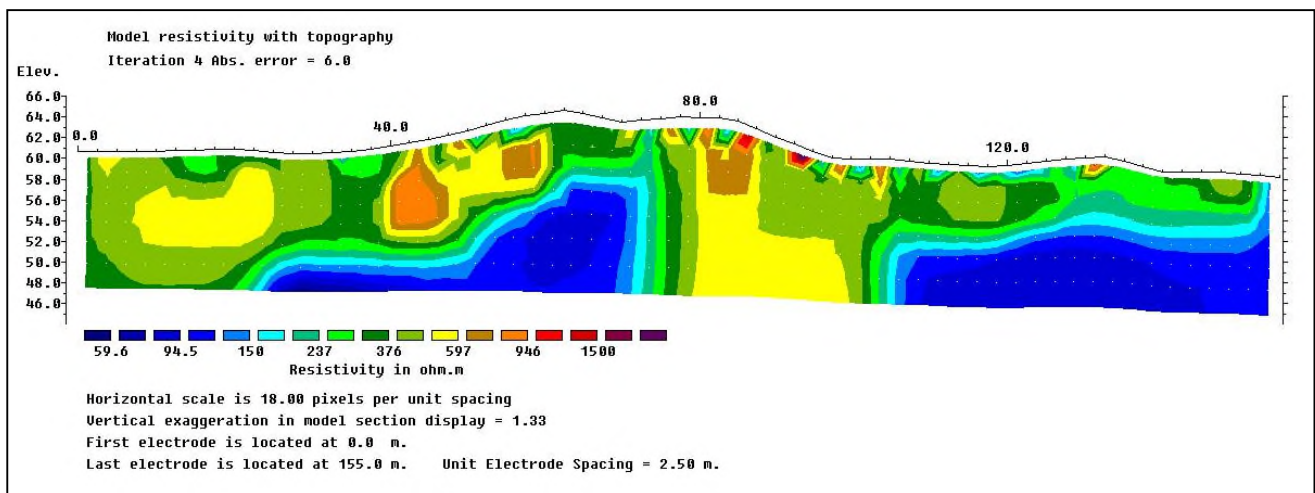
The highest resistivity values were recorded across several separate zones in the central north and central areas, down to depths ranging from approximately 2.0m to 7.0m. There are three vertical zones of deeper relatively high resistivity that extend from between approximately 6.0m to 9.0m depth to below the base of the lines at approximately 14.0m depth, in the northern, central southern and southern areas of the line. In addition, there is a further potential vertical feature of lower resistivity compared to adjacent ground in the central north area and a marked drop in resistivity laterally in the southern area.



Line 6-6'

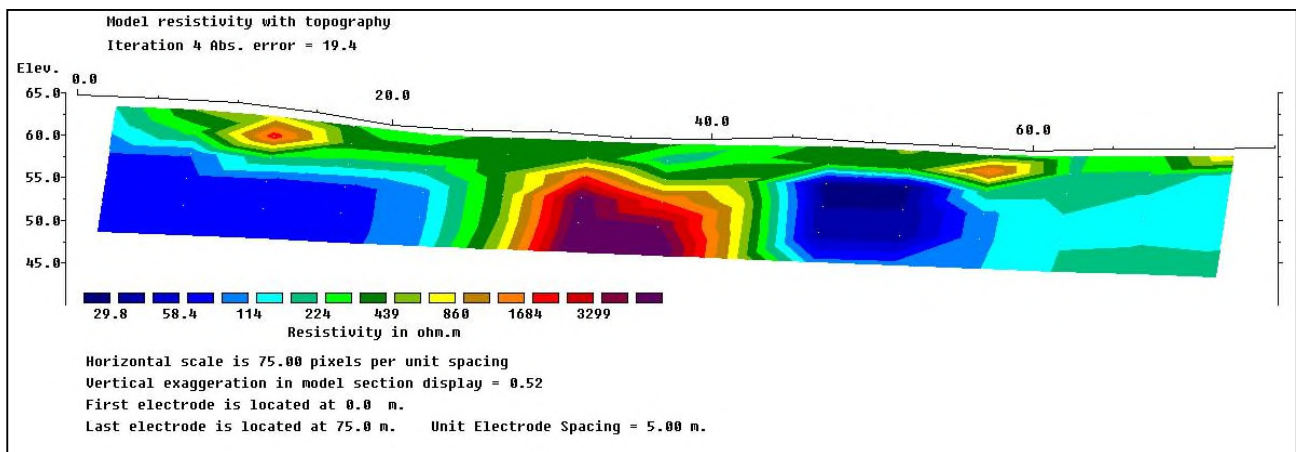
Line 6-6 was the furthest west of the roughly north to south orientated longer lines across the northern and central areas of the site, where the more northern of the mine entries are shown on the Coal Authority report. The results generally ranged between 250ohm.m to 1,000ohm.m, with the highest results being in the central northern area down to approximately 6.0m depth.

There is a vertical zone of relatively high resistivity results compared to adjacent ground in the central area of the line that extends from approximately 4.0m depth down to below the base of the line at approximately 12.0m to 14.0m depth. In addition, there were several small and shallow higher resistivity features across the central area of the site.



Line 7-7'

Line 7-7 was orientated roughly north to south across the central-western area of the site close to the western site boundary, where the more northern of the mine entries are shown on the Coal Authority report. There is a large area of high resistance below approximately 3.0m depth down to below the base of the line in the central area. Along the rest of the line the results are generally below 500ohm.m and reduce with depth. However, there are two other relatively small, isolated features with higher results down to approximately 5.0m depth, one in the northern area and one in the southern area of the line.

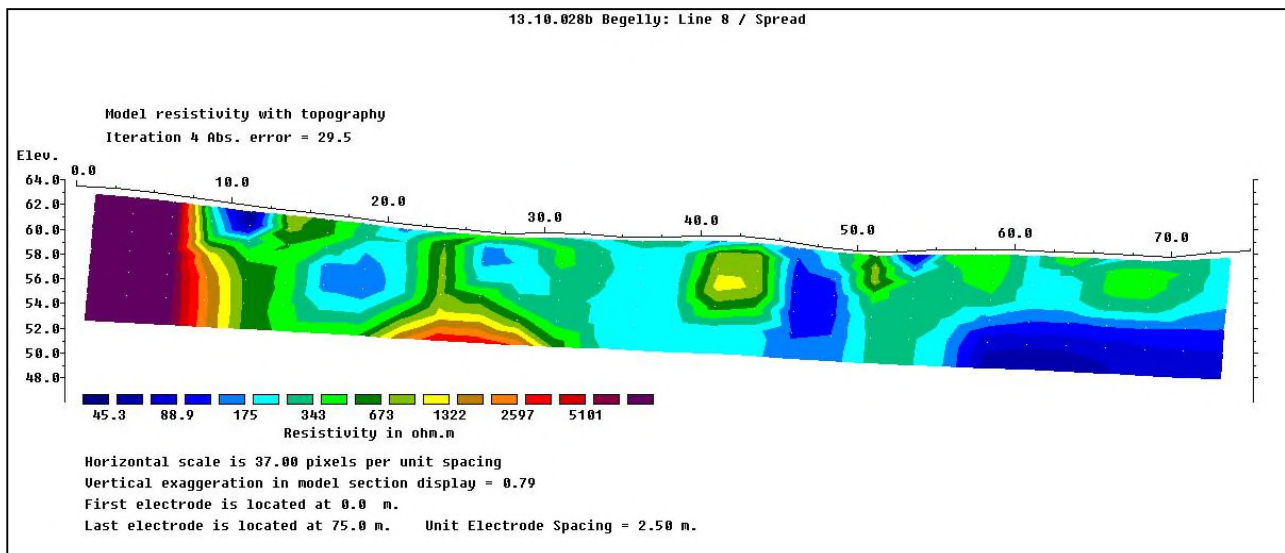


Line 8-8'

Line 8-8' was orientated roughly north to south across the central-western area of the site a few metres from the western site boundary. The results were generally less than 500ohm.m, however there were several features that recorded higher results, including two relatively large features in the northern half of the line.

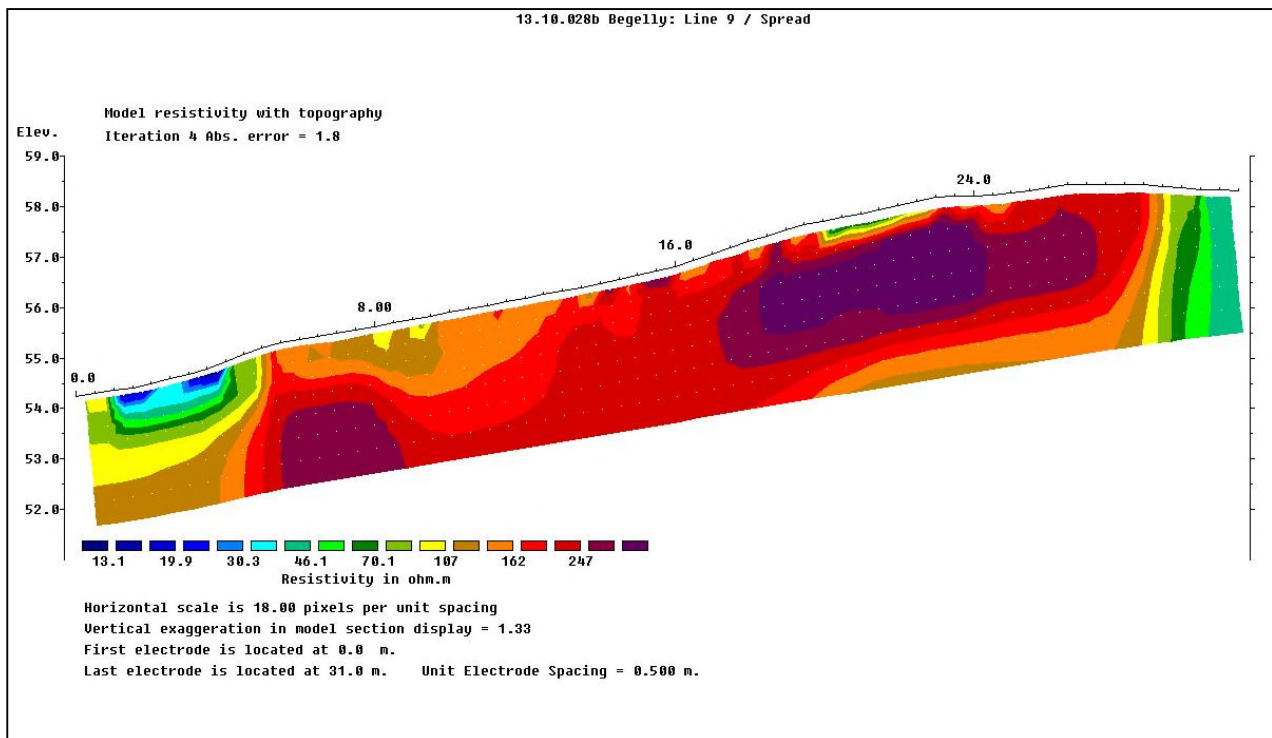
Close to the northern end of the line greater than 5,000ohm.m were recorded from ground level and these continued below the base of the line at approximately 10.0m depth. In the central northern area of the line results above 2,000ohm.m were recorded below approximately 6.0m and continued below the base of the line. A third possible vertical feature, with higher resistivity results than adjacent ground, is present in the central-south area of the line.

The range of results varied laterally over relatively short distances, with one small area close to the centre of the line at approximately 3.0m depth recording lateral changes from approximately 100ohm.m to above 1,000ohm.m over approximately 3.0m.



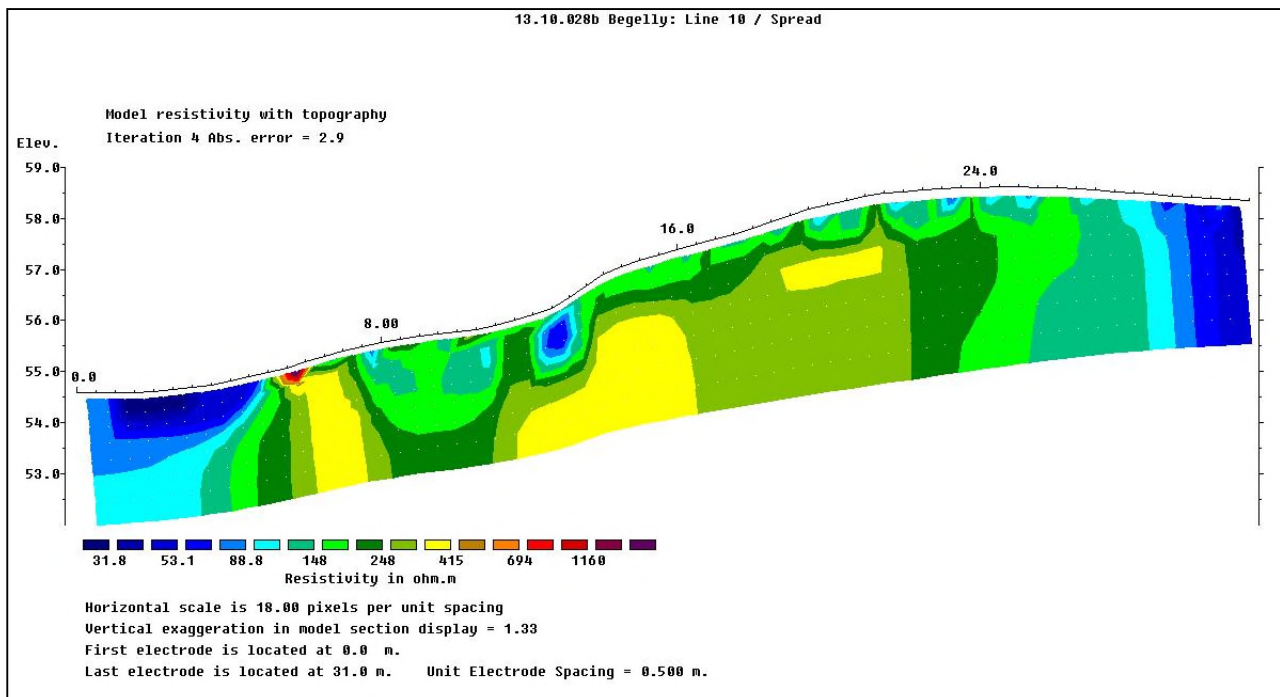
Line 9-9'

Line 9-9 was the furthest south of the roughly east to west orientated lines across the central area of the site where the more southern mine entry was positioned on the Coal Authority report. The recorded results were all below 500ohm.m, with the lowest results close to the western and eastern ends of the line. Possible vertical features are present in the western and central-eastern areas, with lower resistivity results recorded close to the western boundary from ground level down to the base of the line at approximately 3.0m depth, and higher results compared to adjacent ground recorded from approximately 1.0m depth down to below the depth of the line at 3.0m, in the central-eastern area of the line.



Line 10-10'

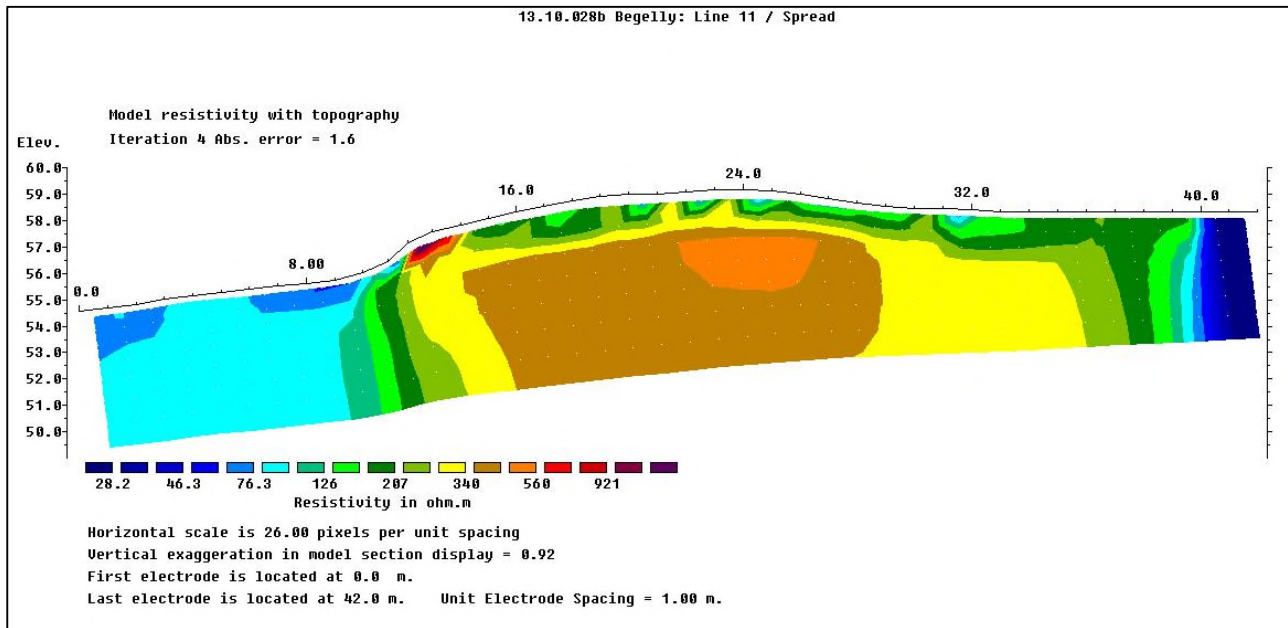
Line 10-10 was orientated roughly east to west across the central area of the site where the more southern of the mine entries was recorded on the Coal Authority report. Similar to the adjacent Line 9-9, most of the results were below 500ohm.m, with the lowest results close to the western and eastern ends of the line. Also, similar to Line 9-9, is the presence of possible vertical features down to below the base of the line, with relatively lower resistivity ground recorded in the feature in the western area and higher to adjacent ground to the east, recorded close to the western end of the line. In addition, a second possible vertical feature, with higher resistivity relative to adjacent ground recorded at the central-eastern feature.



Line 11-11'

Line 11-11' was orientated roughly east to west across the central area of the site where the more southern of the mine entries is shown on the Coal Authority report. Similar to Lines 9-9 and 10-10, It generally recorded results below 500ohm.m, with possible vertical features down to depths below the base of the line present close to the western boundary and in the eastern half of the line.

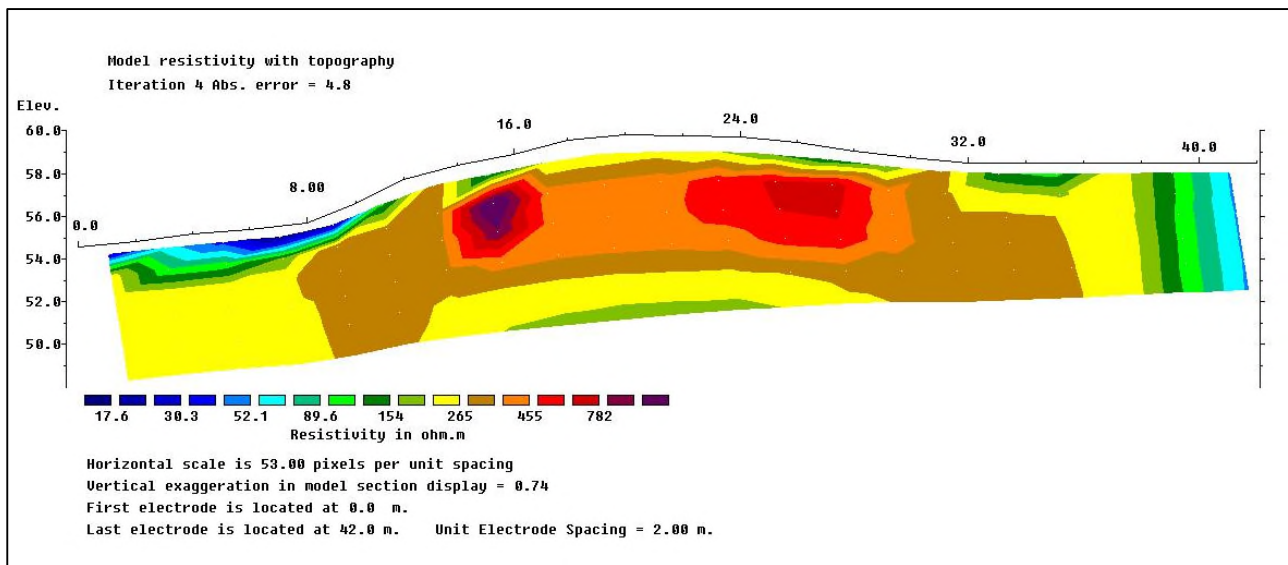
In addition, there is small and shallow higher resistivity feature present in the eastern half of the site.



Line 12-12'

Line 12-12' was the furthest north of the roughly east to west orientated lines across the central area of the site where the more southern of the mine entries is shown on the Coal Authority report. The recorded results were generally below approximately 500ohm.m, except for an area down to approximately 4.0m depth across the central part of the line, which recorded some results above 1,000ohm.m.

Similar to the other east to west orientated lines, the results indicate a possible vertical feature to below the base of the line close to the western end, but unlike Lines 10-10 and 11-11, no obvious vertical feature was present in the eastern half of the line.



ERT Summary

The locations of the ERT lines were selected to provide a more detailed assessment of the risks posed by the mine entries shown on the Coal Authority report. Lines 1-1 to 8-8 were orientated north to south across the northern and central areas of the site where both of the mine entries were shown. With Lines 9-9 to 12-12 orientated east to west across the central area of the site, close to where the southern mine entry is shown.

Vertical Features

Should entries to deep mines be present we would expect to see evidence for vertical shafts being present from the ERT results. The results for each line showed evidence for vertical features and the locations of these vertical features are shown on drawing reference, '13.10.028b Potential Vertical Features,' which is provided in Appendix A. The approximate locations for the mine entries are also shown on this drawing.

Analysis of the locations for the potential vertical features indicates their presence across the mounded areas in the central western part of the site and in the general locality of the approximate locations for the two mine entries.

Shallow High Resistance Features

Small shallow relatively high resistivity features were recorded in the central-north to central-south areas of some lines, such as 3-3 and 6-6. These are considered likely to be the result of shallow disturbance of the soils, potentially by animals.

Laterally Variable Resistance

Lateral variations in resistivity results indicates likely variations in moisture content of the soils, which itself is likely to be a reflection of soil type, tree influence, fracturing etc. Most of the ERT lines record some lateral variation in resistivity in the areas where the mounds are located. It is considered the likely explanation for this is the presence of Made Ground forming these mounds.

ERT Conclusions

Whilst not conclusive, it is considered there is sufficient evidence to indicate the presence of vertical shaft type features in the ground under the mounds and in the areas where the Coal Authority recorded mine entries. In addition, the ERT results indicate potentially between 1.0m and 9.0m of Made Ground cover above the top of the vertical features.

As noted above a drawing, '13.10.028b Potential Vertical Features,' indicates the areas the site where the vertical features/potential mine entry shafts exist. Uncapped mine entries pose significant engineering and health and safety issues, related to gradual or sudden collapse. Therefore, measures to expose and, if necessary, remediate the mine entries should be carried out. Initially this would involve stripping the soils to expose the shaft caps to allow an assessment of remediation requirements, which potentially could include backfilling the shaft and capping the shaft with a reinforced concrete slab.

GROUND CONTAMINATION ASSESSMENT

The following is a description of the testing schedule, the guidelines adopted for assessing the results and a comparison of the test results from this investigation with those adopted guideline values. The implications of these comparisons are provided in the Risk Assessment sections that follow.

The contamination risk assessment has been undertaken in line with the EA's online guidance, 'Land Contamination: Risk Management,' (LCRM) published in October 2020 in order to validate the Preliminary Risk Assessment (PRA) using a Generic Quantitative Risk Assessment (GQRA), followed by a Detailed Quantitative Risk Assessment (DQRA), if required.

SOIL TESTING

Two samples of Topsoil, three samples of Made Ground and three samples of natural soils collected on site during this investigation were tested for a range of constituents of potential concern (CoPC).

The suite of testing carried out on the samples was decided upon following consultation of R&D CLR Publications, published as part of the Contaminated Land Exposure Assessment (CLEA), a joint venture between the Department for Environment, Food and Rural Affairs (DEFRA) and the EA.

The test suite included:

Group	Details
Asbestos	Screening for ACMs and fibres with the naked eye and microscopy
Inorganic substances	Arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc Sulphates
Organic substances	16 (EPA) Speciated Polycyclic Aromatic Hydrocarbons (PAH) Extractable and Volatile Petroleum Hydrocarbons (EPH/VPH) with Aliphatic-Aromatic split
Other	pH

Unless stated on the laboratory report, the soil samples were tested to obtain 'Total' values within the soil.

RISK ASSESSMENT GUIDELINES – HUMAN HEALTH

The human health risk assessment has been undertaken using the guidance provided in the EA's LCRM guidance, published October 2020 and the CLEA guidelines.

This assesses risks associated with the ingestion, dermal contact, and vapour inhalation pathways related to contaminated soils and groundwater. Risks associated with the inhalation of Ground Gas, for example that resulting from landfill, is not addressed by LCRM. The assessment for ground gases has been undertaken separately in the Ground Gas Risk Assessment section of this report.

Human health assessment criteria used are based upon the proposed final land use of the site. The development proposals are for a holiday lodge park, however to allow an initially conservative approach, the Generic Assessment Criteria (GACs) for the land-use 'Residential with homegrown produce' have been used.

Consideration has also been given to potential risks to groundworkers coming into contact with the soil during demolition or construction phases.

The results of the soil samples tested have been compared to the following published assessment criteria:

Category 4 Screening Levels (C4SLs)

Published in March 2014 by DEFRA, a limited number of generic Category 4 Screening Levels (C4SLs) were produced to support the revised Statutory Guidance to support Part 2A of the Environmental Protection Act 1990, which was published in April 2012. This Guidance introduced a new four-category system for classifying land under Part 2A for cases of a Significant Possibility of Significant Harm to human health, where Category 1 includes land where the level of risk is clearly unacceptable and Category 4 includes land where the level of risk posed is acceptably low.

Further C4SLs have been and are being produced by CL:AIRE, with support from SoBRA and SAGTA, for a limited number of volatile organic compounds, as time allows.

Suitable 4 Use Levels (S4ULs)

To supplement the small number of C4SL, a set of Suitable for Use Levels (S4UL) were produced, in 2015, by Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH), using the EA's Contaminated Land Exposure Assessment (CLEA) software, version 1.06 (2009), and the revised assumptions used in deriving the C4SL. The S4UL are more conservative than the C4SL and are derived to represent the minimal levels of risk to human health as described in the EA's SR2 guidance, with the intention of being 'suitable for use' under planning.

RISK ASSESSMENT GUIDELINES – CONTROLLED WATERS

The procedures set out in EA's RTM, 'Hydrogeological Risk Assessment for Contaminated Land,' (2006), have been followed.

RESULTS OF ASBESTOS SCREENING

Screening for the presence of asbestos did not reveal any asbestos containing material (ACM) or fibres in the samples tested.

RESULTS OF TOTAL SOIL TESTS

The results of the total soil testing have been compared to relevant published GAC as discussed above. For S4ULs, a range of values have been published for the organic contaminants based on the soil's organic matter content.

As site-specific soil organic content was not determined for the site, where S4ULs have been adopted for the organic contaminants, analytical results have been compared to the most conservative value, which is that for soils of 1% soil organic matter (SOM) as a preliminary screening tool.

None of the determinands tested for recorded any values higher than their relevant GAC for human health for a residential setting.

HUMAN HEALTH RISK ASSESSMENT

The following quantitative risk assessment has been carried out using the source-pathway-receptor principle. Potential sources of contamination identified in the Conceptual Site Model (CSM) have been assessed using the CLEA Guidelines. This takes into account the fact that a complete pathway must exist between a potential source of contamination and a potential receptor for there to be considered a risk.

The potential human receptors evaluated for their individual risk are:

Long-Term Exposure

- End users of the site – The future residents and workers.

Short-Term Exposure

- Construction and maintenance workers.
- Visitors and holiday makers.

If the proposed site use or layout should alter significantly, then the human health risk assessment may require re-evaluation.

SOIL CONTAMINATION RISK

No evidence of contamination was noted during the fieldworks and none of the chemical testing results recorded any elevated results. On this basis, it is considered there is no evidence for widespread contamination at the site and, therefore, there is no need for remedial measures for the identified potential human health receptors.

REGULATORY APPROVAL

We recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

GROUND GAS RISK ASSESSMENT

Methane and Carbon Dioxide

The preliminary ground gas risk assessment identified the underlying Middle Coal Measures as potentially coal bearing and therefore a potential source of methane ground gases. No significant source of carbon dioxide ground gases were identified.

The intrusive investigation has confirmed the presence of some shallow coal on the site and some fairly deep Made Ground, which is considered another potential source of ground gases. Therefore, two ground gas monitoring wells were installed, one at CT02, which was in the same area of the site that the main area of coal was encountered and the other at CT04, which was located in an area of fairly deep Made Ground.

As part of this investigation one monitoring visit was made, which recorded methane readings below the limit of detection of <0.1%, carbon dioxide levels up to 1.2% and flow rates up to 0.2l/hr.

The recorded results have been evaluated with reference to Code of practice for the, Characterization and Remediation from Ground Gas in Affected Developments,' BS8485.

Using a default methane reading of 0.1% with the highest recorded absolute flow rate of 0.2l/hr gives a maximum gas screening value for methane of 0.0002l/hr. Using the highest recorded carbon dioxide reading of 1.2% with the highest recorded absolute flow rate of 0.2l/hr gives a maximum gas screening value for carbon dioxide of 0.0024l/hr.

There were no carbon dioxide levels above 5% and no methane levels above 1%.

At this stage this classifies the site as Characteristic Gas Situation CS-1 and indicates that methane and carbon dioxide ground gases do not pose a significant risk to the site. However, as potential sources of methane ground gases have been identified, to be in line with the CIRIA guidance C665, further monitoring visits will need to be carried out to allow a full ground gas risk assessment. The further monitoring should include five further visits carried out over ten weeks and should include at least one visit during a period of falling air pressure.

Radon Gas

The BGS advises that no special radon gas protection measures are necessary for this site.

REGULATORY APPROVAL

The above conclusions regarding ground gases should be agreed with the relevant local Regulatory Authority as soon as possible prior to development.

CONTROLLED WATERS RISK ASSESSMENT

The following Controlled Waters risk assessment has been carried out in accordance with the procedures set out in the EA's RTM, 'Hydrogeological Risk Assessment for Contaminated Land,' (2006). Using the source-pathway-receptor principle, this takes into account the fact that a complete pathway must exist between a potential source of contamination and a potential receptor for there to be considered a risk.

The potential Controlled Waters receptors considered during this risk assessment were:

- The underlying Secondary A Aquifer – The Middle Coal Measures
- The stream close to the eastern boundary

DISCUSSION

Potential controlled waters receptors have been identified at the site. However, the site is not underlain by a Principal Aquifer or within a Source Protection Zone and there are no known surface or groundwater abstraction licenses within 250m. Therefore, the site is not considered to be highly sensitive.

No obvious signs of contamination were noted during the investigation and none of the soil testing recorded any elevated concentrations of potential contaminants.

On the basis of the above, it is considered the site does not pose a significant risk to the identified controlled waters receptors and therefore remedial measures for these are not required.

REGULATORY APPROVAL

We recommend that the conclusions of this report are agreed with the relevant Local Authority at the earliest stage, to reduce potential delays to the development.

INFRASTRUCTURE RISK ASSESSMENT

SUBSURFACE CONCRETE

Using the results of the concrete aggression tests, the concrete design mix recommendations for subsurface concrete have been assessed in terms of BRE Special Digest 1.

Taking account of its nature, the site is considered as Natural Ground, and to allow a conservative approach, mobile groundwater conditions have been assumed. Chemical tests have recorded a characteristic soil soluble sulphate concentration of 230mg/l and a characteristic pH of 4.7.

The classification is Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete (ACEC) of AC-2z.

UNDERGROUND SERVICES

Only low levels of heavy metals and hydrocarbons were recorded in the soil testing. It should be noted that the utility companies often have their own local guidelines and standards on levels of shallow soil contamination in the ground that may or may not be acceptable for the installation of below ground services. These standards may be different to those specified for assessing risks to human health and groundwater.

The local requirements should be obtained from the particular service supply company as soon as possible to avoid unexpected delays or additional development costs.

GEOTECHNICAL ENGINEERING CONCLUSIONS

It is our understanding it is proposed to redevelop this site to accommodate a mixture of two storey houses, across the southern area of the site, and a reception building and holiday lodges across the rest of the site. The development includes an access road, areas for parking, gardens and soft landscaped areas.

A Proposed Development Plan is provided in Appendix A.

REVISED GROUND MODEL

The site and laboratory works have shown the ground conditions to generally comprise Topsoil over bedrock of the Middle Coal Measures across the northern half of the site, and Topsoil and/or Made Ground over bedrock of the Middle Coal Measures across the southern half of the site.

The Topsoil was encountered across the northern half of the site, and locally across the southern half, from ground level down to a typical depth of 0.3m. It generally comprised dark brown slightly sandy organic clay.

Made Ground was encountered either from ground level or beneath the Topsoil. The depth of the Made Ground encountered was generally no more than 1.3m, however at two locations it was significantly thicker, 2.5m at TP14 and 3.3m at CT04. In addition to its variable thickness the nature of the Made Ground soils encountered was also variable. At most of the locations the Made Ground was coarse-grained, however where the deeper Made Ground was encountered it was generally fine-grained.

The coarse-grained Made Ground was encountered at six locations in the southern half of the site, and it is considered likely that it was placed to form an access track onto and around this area of the site. It generally comprised grey brown clayey sandy gravel of siltstone and occasional concrete and clinker.

As noted above, where deeper Made Ground was encountered it was generally fine-grained in nature. At these locations it generally comprised grey brown slightly gravelly slightly sandy, locally slightly organic, clay or silt and contained some cobble and boulder sized brick and concrete. Classification testing revealed it to range from non-shrinkable soils to medium volume change potential. To allow a conservative approach we recommend a classification of medium volume change potential.

Bedrock of the Middle Coal Measures was encountered beneath the Topsoil and Made Ground down to the base of the test locations at depths down to 5.5m. It generally comprised firm medium strength grey brown slightly sandy clay, which contained abundant gravel sized siltstone and mudstone lithorelicts. With increasing depth the formation became less weathered, so that it was stiff and high strength below approximately 1.0m to 1.6m depth and below approximately 2.5m depth it became very weak highly fractured mudstone. Locally some coal was encountered, which was particularly noteworthy at TP05, in the northern half of the site.

Classification testing revealed the Middle Coal Measures strata to range from non-shrinkable to medium volume change potential. To allow a conservative approach we recommend a classification of medium volume change potential down to the mudstone.

Groundwater strikes and seepages were encountered at eight locations across the site between 1.2m and 2.4m depth, with the most of them occurring in the relatively lower ground towards the pond in the northern area. At the subsequent monitoring visit a standing water level of 1.1m depth was recorded at CT02, which was located close to the pond in the northern area, and 2.4m depth at CT04, which was located on higher ground in the southern half of the site.

Based on observations made during the siteworks and the subsequent monitoring, it is considered the local groundwater level across the northern area close to the pond is likely to be in the region of 1.1m depth. However, across the rest of the site, which generally was located on higher ground, it is deeper.

OTHER GEOTECHNICAL CONSIDERATIONS

Desiccation

Analysis of the classification testing results does not indicate the presence of widespread desiccation across the site. However, the site is underlain by fine-grained soils with a medium volume change potential and locally roots were noted down to 2.4m depth. Therefore, some localised desiccation should be anticipated.

See the Foundations section below for recommendations regarding foundation depths.

Mine Entries

The Coal Authority report indicates the presence of two mine entries in the northern half of the site, and the historical Ordnance Survey maps indicate 'inactive pits' at the same locations. This area of the site is formed by two fairly large mounds that are well vegetated, including trees.

Due to accessibility issues no boreholes or machine excavated trial pits were formed on the mound, however a geophysical survey using electrical resistivity was carried out across the area. Evidence for vertical sided features that are potentially mine entries was recorded and the area involved has been highlighted on the drawing 'Potential Vertical Features,' which is provided in Appendix A. Due to the presence of the vegetated mounds, at this stage the exact locations and dimensions of these features is not known. In addition, it is not known if they have been made safe, such as with grouting and/or capping with a reinforced slab. Therefore, at this stage it is considered the risks posed by the potential mine entries is high, and prior to any developments in this area, further works should be undertaken to identify the features and determine a suitable remediation scheme, if required.

On the basis of the above, the following recommendations relate only to the area of the site outside of the high-risk area highlighted on the 'Potential vertical Features' drawing in Appendix A.

SITE EXCAVATION

Based on the findings of this investigation conventional hydraulic plant should be satisfactory for excavations down to approximately 2.5m depth. Below this the strata became less weathered and rock teeth may be required.

No excavation instability was encountered during this investigation and therefore it is considered excavations should remain stable in the short-term. However, where excavations extend below the local groundwater level the risk is increased and, therefore, side supports are recommended. In line with HSE guidelines, all excavations requiring personnel access should be adequately supported to avoid the risk of collapse. Consideration should also be given to the stability of open trenches where personnel are working in close proximity.

In the lower ground level area close to the existing pond the local groundwater level is considered likely to be in the region of 1.1m depth. With the groundwater level deeper across the rest of the site, reflecting the relatively higher ground level. Where minor seepages are encountered at levels above the local groundwater level then the use of conventional pumping from a sump should be sufficient to maintain a dry excavation. However, for excavations that extend below the local groundwater level then the advice of a specialist dewatering contractor should be obtained.

There are many trees and other vegetation across the site and consideration should be given to the effects of trees and shrubs on service runs that cross the site. Soil movements brought on by the influence of vegetation can severely disrupt the drain runs and mains services, and measures should be incorporated into the excavations to allow for future ground movements.

Should any trees be removed from site, care should be taken to ensure the root ball of each tree is completely removed from the ground. Given time, any remnant root fragments may weather down to produce localised areas of soft organic soils which may induce local differential settlements.

Where new foundations are placed over a felled tree, consideration should be given to spanning these features to ensure no soft spots result in localised settlement.

FOUNDATION SOLUTIONS

Shallow Foundations

The Middle Coal Measures is considered to be a suitable bearing stratum for traditional spread foundations.

A minimum foundation depth of 0.9m below existing ground level is recommended, or 0.20m into the top of the formation, whichever is the deeper. Locally, Made Ground soils were encountered down to 2.4m depth, therefore it is possible some foundations will require deepening to below 2.5m to take account of Made Ground soils.

The allowable bearing pressure recommended below is made on the assumption of an acceptable total settlement for the proposed structures of 25mm. Should the building design require a significantly different serviceability limit state (tolerance to settlement) then it is recommended that these recommendations be revised accordingly.

At the minimum founding depth provided above, an allowable bearing pressure (or net loading intensity increase) of 125kPa may be adopted for foundations up to 1.0m in width. This allows for a suitable factor of

safety against shear failure and should result in acceptable levels of differential and total vertical settlement generally that are likely to take place over a number of years.

There are many trees across the site and around the site's boundaries. Where foundations are to be constructed within the vicinity of trees or shrubs on this site then they will require deepening in accord with guidelines given in NHBC Building Standards Chapter 4.2. For trees that are not to be removed, mature tree heights should be assumed when determining the foundation depths. The soils should be considered as being of medium volume change potential.

Where this requires that foundations are constructed deeper than 2.50m further ground investigation may be required in order to establish the full depth of any localized soil desiccation beneath the footprint of the proposed structure.

Where shrinkable soils are present, reference should be made to the NHBC guidelines for the specific requirements for compressible layers, such as Claymaster or Clayshield, to be placed along the sides of foundation excavations or beneath ground beams, in order to accommodate heave forces in the ground where any trees and shrubs are removed in the vicinity of the proposed foundations or if the existing vegetation should die.

Care should be taken to ensure that any new planting in the development will not affect the new foundations.

GROUND FLOOR SLABS

Due to the presence of medium volume change potential soils and trees across the site, it is considered suspended floor slabs should be used at this site.

SLOPE STABILITY AND RETAINING WALLS

The site generally slopes downwards towards the east at an approximate angle of 5°. However, there are steeper slopes across the central area of the site and close to the western boundary. No obvious evidence of instability associated with these slopes was noted in the walkover or fieldworks and it is assumed that in their present state the slopes are at stable angles. However, it is possible that the proposed development at the site may impact on their stability. Therefore, prior to development it is advised that an analysis be undertaken on the impact of proposed site work on the slope.

As a guide the following activities may cause problems:

- Increasing water flow through the slopes
- Placing temporary or permanent load at the tops of the slopes
- Increased vibration adjacent to the slopes
- Open excavations parallel with slope contours

Should any retaining walls be required as part of this development then the following table of coefficients may be used for the design.

Stratum	Weight density, γ_k (kN/m ³)	Undrained shear strength, S_u (kPa)	Effective angle of shearing resistance, ϕ' (degrees)
Made Ground – Coarse-grained	16	-	25
Made Ground – Fine-grained	17	20	23
Weathered Middle Coal Measures – Down to approximately 2.5m depth	19	60	27
Unweathered Middle Coal Measures – Below approximately 2.5m depth	20	150	30

The wall designer can use these parameters to derive the active and passive earth pressure coefficients, K_a and K_p . The determination of appropriate earth pressure coefficients, together with factors such as the pattern of earth pressure distribution, will depend upon the type/geometry of the wall and the overall design approach.

ACCESS ROADS AND PARKING

The structural design of a road or hard standing is based on the strength of the subgrade, which is assessed on the California Bearing Ratio (CBR) scale. With reference to Transport and Road Research Laboratory, Report LR1132, in-situ testing and site observations it is recommended that for formation at 0.5m to 0.7m depth prepared in the Middle Coal Measures strata, a subgrade CBR value of 2% is adopted for preliminary design purposes based on equilibrium soil conditions, a thin pavement construction, low water table and average construction conditions.

Site conditions should be reassessed at the time of construction and the CBR/pavement design updated accordingly if considered necessary. If pavement construction is undertaken during wetter parts of the year, then a greater pavement thickness or geogrid reinforcement may be required.

Any areas of soft or deleterious material should be excavated and replaced with a properly compacted coarse-grained fill.

Access Roads on Made Ground

Fairly deep Made Ground was encountered across the southern half of the site. Pavement construction may be considered on this existing Made Ground by employing appropriate mitigation measures. Where Made Ground is encountered beneath the area of proposed pavement it is recommended that geogrids, or similar soil reinforcement techniques, be employed to provide a subgrade with a known CBR value. Reinforcement measures will also mitigate lateral and vertical displacement from traffic loadings and differential settlement over variable ground. Discussions should be held with a soil reinforcement company (such as Tensar) who would design a subgrade to a specified CBR value.

The following should also be taken into consideration:

- Inspection of the formation and removal of any surface areas of soft, organic or other unsuitable materials.
- 'Heavy' proof rolling of the resultant formation, to compact loose coarse materials and locate any soft spots at shallow depth beneath the formation for subsequent removal.
- Removal of intact or loose obstructions where noted at surface, or known based on the investigation, to a depth of at least 600mm beneath the formation to prevent the creation of hard spots or voiding.
- Backfilling of any excavation with well-compacted inert coarse material.
- Adopt a pavement design based upon an equilibrium CBR of less than 2%.

Frost Susceptibility

Laboratory testing indicates some of the Middle Coal Measures and Made Ground soils are likely to be frost susceptible. Therefore, a suitable minimum pavement thickness will need to be specified depending upon the proposed pavement usage.

INFILTRATION MEASURES

Appropriately designed sustainable drainage systems (SuDS) are more sustainable than using piped drainage to local sewer systems. However, infiltration measures close to buildings may result in undermining of foundations and softening of soils leading to instability. Attenuation measures should be located at suitable distances from foundations and infrastructure and consideration given to the effects on slopes, flooding and mobilisation of contaminants.

Infiltration rates generally reduce as the soil becomes saturated and the worse-case infiltration rate for each test should be used for design.

Test Results

Testing was undertaken in the Middle Coal Measures at depths between 0.8m and 2.3m at three locations. At two of the locations, TP01 and TP05, the water level either rose or fell by such a small amount that it was not possible to calculate a meaningful result. However, at the other location, TP02, one complete test was possible, with an infiltration rate of 1.3×10^{-5} m/s being calculated.

Testing was also undertaken in the Made Ground soils in the southern half of the site at two locations, TP07 and TP09, at depths between 0.2m and 0.7m. Three complete tests were possible at TP07, with an infiltration rate of 2.6×10^{-4} m/s being recorded at the third test. Two complete tests were possible at TP09, with an infiltration result of 2.2×10^{-5} m/s being recorded at the second test.

Taking account of the fine-grained nature of the soils and the shallow ground water it is considered soakaway drainage is unlikely to be suitable across the northern half of the site. The test carried out at TP02 and in the shallow Made Ground soils indicates there is a possibility it may be suitable in the southern half of the site. However, taking account of the fine-grained nature of the Middle Coal Measures soils, it is considered deeper soakaway is unlikely to be suitable in this area as well. The testing indicates it may be possible in the shallower

Made Ground soils, such as for permeable paving. To confirm this, we would recommend further testing at targeted locations and depths where such drainage may be considered.

DISPOSAL OF ARISING

Site excavations, such as for foundations and services trenches are likely to produce arisings, some of which may be able to be re-used on-site and some of which will be surplus to requirements. The options for disposal of these arisings are discussed below:

RE-USE OF MATERIAL ON SITE

Currently, if surplus arisings are 'fit for re-use' on the site and have not been treated, their re-use is allowed within the planning law.

A recent voluntary code of practice published by CL:AIRE, in conjunction with the EA, (the Definition of Waste: Development Industry Code of Practice, Version 2) endorses the re-use of arisings on and off the site of origin without the need for exemptions from the EA, dependent on whether it is "fit for purpose". It also supports the use of "Hub and Cluster" sites (to enable surplus soil to be used on agreed sites in the local vicinity, dependent on the soil being 'fit for purpose').

Based upon the human health and groundwater risk assessments, the soils on this site are considered to be suitable to be re-used on site for landscaping purposes, dependent on the agreement of the Local Authority.

WASTE CLASSIFICATION

Under current waste management legislation, arisings that are surplus to requirements will be classified as waste and need disposing off-site. Records must be kept of where the waste is taken upon leaving site and its final destination.

The classification is a twofold process using the soil chemical testing results and the European Waste Catalogue for off-site disposal, followed by testing under the Waste Acceptance Criteria (WAC) specifically for landfill disposal.

EUROPEAN WASTE CATALOGUE DETERMINATION

Any soil classified as waste requires classification of the chemical constituents prior to leaving site in accordance with the European Waste Catalogue. Soils containing asbestos fragments or fibres will be classified as a mixed waste unless the asbestos can be separated.

Soils

The 'Total' soil contamination test results from this investigation, excluding asbestos, have been used in conjunction with the HazWasteOnline spreadsheets and the Technical Guidance WM3 published by the EA.

All of the soil samples tested were classified as Non-hazardous waste.

The assessment report is provided in Appendix D. This assessment does not take into account the presence of asbestos.

WASTE ACCEPTANCE CRITERIA (WAC) TESTING RESULTS

If it is decided that the surplus arisings will be disposed of at a landfill facility, the implementation of the Landfill Directive means that the waste soil requires additional classification under the Waste Acceptance Criteria (WAC) to determine whether it should be destined for an Inert, Non-hazardous, Stable non-reactive hazardous, or Hazardous landfill, or whether an alternative disposal method must be sought.

WAC testing has been carried out on representative samples of the Made Ground, TP02 and TP14 from 0.5m to 1.0m, and the natural soils, TP03 to TP05 from 0.5m to 1.0m.

Made Ground samples from TP02 and TP14 were initially classified as non-hazardous and the WAC testing indicates the soils fail the inert criteria due to levels of total organic carbon and selenium.

Natural soil samples from TP03 to TP05 were also initially classified as non-hazardous and again the WAC testing indicates the soils fail the inert criteria, this time due to levels of selenium.

OVERALL WASTE CLASSIFICATION

From the results of the HazWasteOnline spreadsheets and the WAC testing, currently, the waste soil on this site is classified as follows:

Waste Stream	EWC Classification	WAC for Landfill Disposal	Comments
Topsoil	Non-hazardous	Not tested	Although no WAC testing, due to organic content, Non-hazardous is likely.
Made Ground	Non-hazardous	Non-hazardous	Elevated concentrations of total organic content and selenium
Middle Coal Measures	Non-hazardous	Non-hazardous	Elevated concentrations of selenium were recorded in the testing. It is considered further testing and analysis may allow a relaxation of this classification.

Different categories of waste soils must not be mixed. The action of mixing hazardous waste with non-hazardous waste to dilute hazardous concentrations or to dispose of one waste type as/with another is illegal.

Analytical results relevant to the materials being disposed of should be provided to the waste management contractors and landfill operators to confirm whether it meets their license agreements and to confirm tipping costs.

Should any soils be encountered that differ from those encountered during this investigation, further testing and waste classification of those soils will be required.

Waste Treatment

The Landfill Regulations dictate that all non-Inert waste must be treated before going to landfill. This treatment should include the following criteria, where they are likely to be effective:

- Physical, thermal, chemical or biological process including sorting.
- Change the characteristics of the waste.
- Reduce the volume, reduce the hazardous nature, facilitate its handling or enhance its recovery.

The most basic method of pre-treatment is sorting of the waste and re-cycling of any possible component materials and many waste disposals companies will have on-site recycling facilities.

The Environment Agency expect all landfill operators to obtain written evidence that the waste they accept has been pre-treated. We recommend that a signed certificate describing the treatment should be obtained to give to the receiving landfill. Further testing may be required after the treatment and before the soil is accepted by the relevant landfill.

LIMITATIONS AND RECOMMENDATIONS FOR FURTHER WORK

The ground is seldom homogeneous and variations, which affect our conclusions, may inevitably occur between and beyond the test locations. The risk of significant variations to our Ground Model is considered to be low however should ground conditions vary noticeably from our Ground Model, then we recommend further assessment by a suitably qualified person.

Environmental

A potential source of methane ground gas has been identified, coal. To allow a Ground Gas Risk Assessment in line with the requirements in CIRIA C665, five further monitoring visits over ten weeks will be required.

Geotechnical

Mine entries are shown on the Coal Authority report and the locations for these are coincident with former pits shown on the historical Ordnance Survey maps and vegetated mounds on the site. Prior to any development within the area shown on the 'Potential Vertical Features' drawing, which is provided in appendix A, further works should be carried out to more accurately identify these features, allow a more detailed assessment of the risks posed and remedial measures, if required.

WAC testing and analysis initially indicates the natural Middle Coal Measures soils are classified as Non-hazardous, however it is considered further sampling, testing and analysis will allow a more detailed assessment which may lead to a relaxation of this classification.

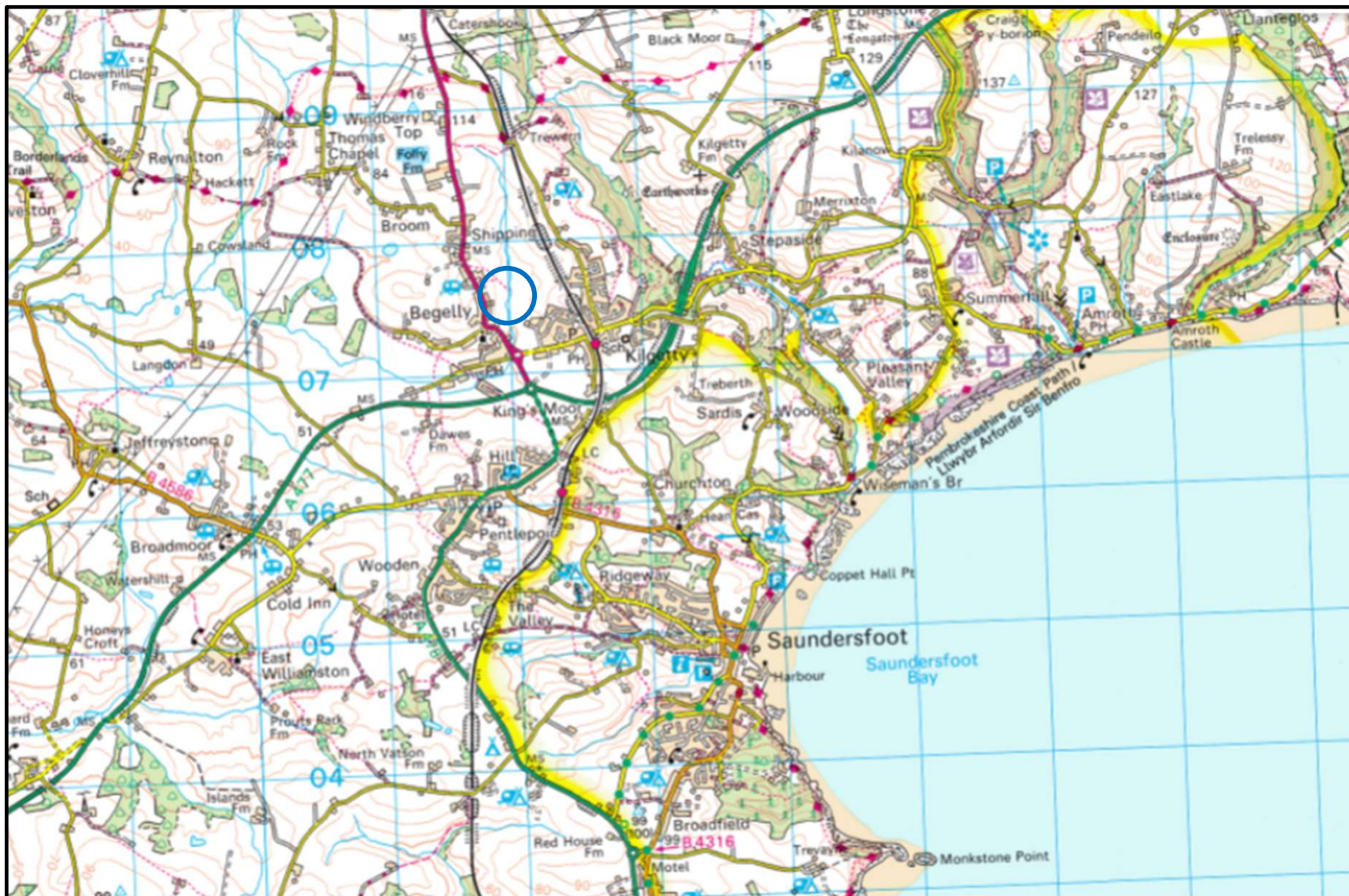
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APPENDIX A PLANS & PHOTOGRAPHS



Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Site Location Plan

Key:

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Site: : Begelly Park Gardens, Kilgetty, Pembrokeshire,
SA68 0YH

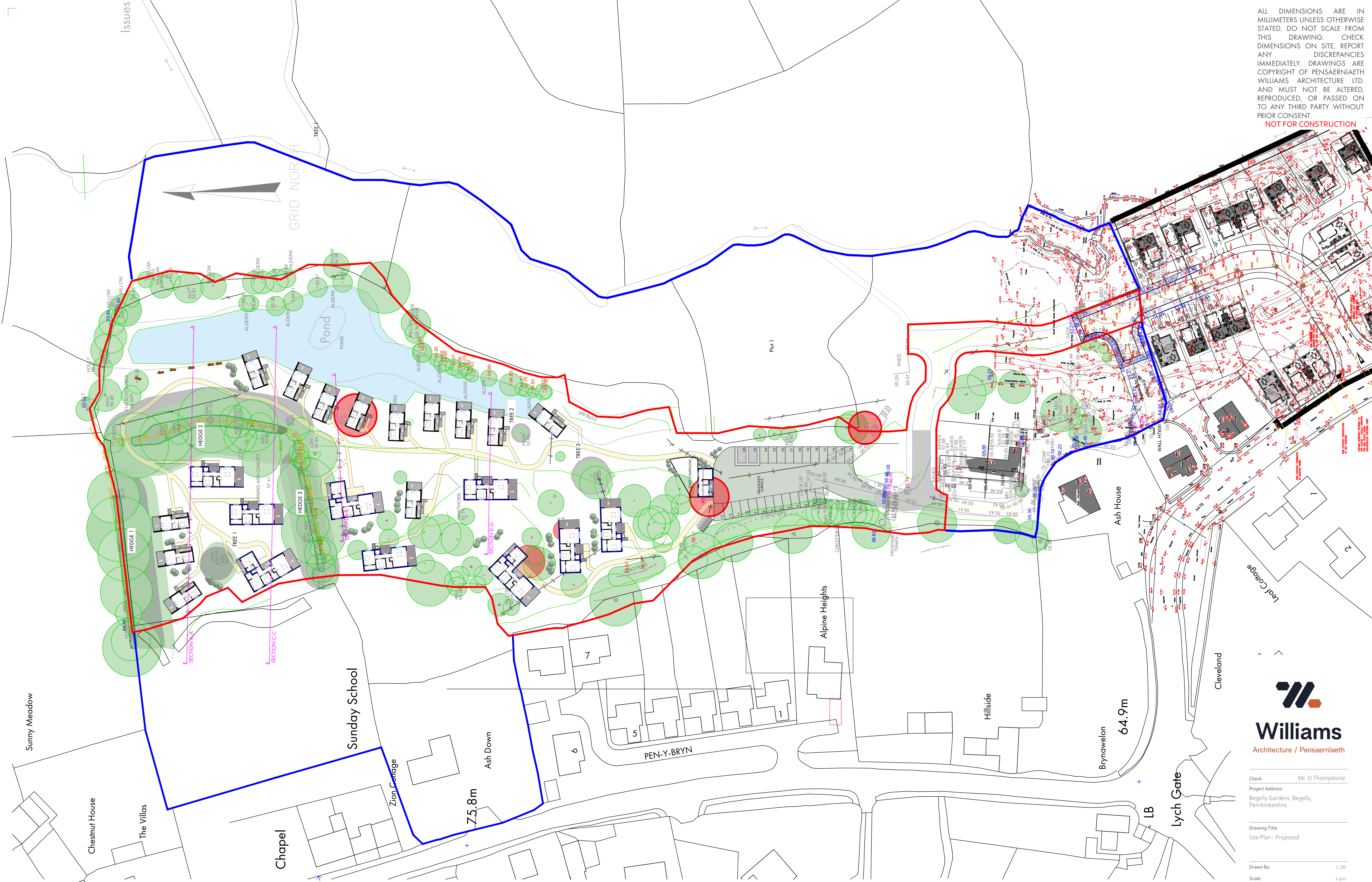
Scale: NTS

Job Number: 13.10.028b

Drawn By: LC

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NOT FOR CONSTRUCTION



NOT FOR CONSTRUCTION



Client: Mr. D Thompstone
Project Address: Begelly Gardens, Begelly, Pembrokeshire.

Drawing Title: Site Plan - Proposed

Drawn By: L JW
Scale: 1:500
Paper Size: A3
Job Reference: PW/A4.0
Drawing Number: 10
Project Stage: RIBA Stage 3
Issue Date: 05/12/2022
Revision: 7



The Coal
Authority

CON29M

coal mining report

1 PARK GARDENS, BEGELLY, KILGETTY, PEMBROKESHIRE, SA68 0YH



Known or potential coal mining risks

Past underground coal mining	Page 5
Future underground coal mining	Page 5
Mine entries	Page 6



Further action

These additional reports can give further detail on the risks identified:

- Mine entry interpretive report
- Mine entry plan and data sheets

For more information please see our [Further action reports](#) on page 11



Professional opinion

According to the official mining information records held by the Coal Authority at the time of this search, evidence of, or the potential for, coal mining related features have been identified. In view of the coal mining circumstances we would recommend that any planned or future development should follow detailed technical advice before beginning work on site. Please see [page 3](#) for further details on [Future development](#).

Your reference: [308930625_2](#)
Our reference: [51003345652001](#)
Date: [22 March 2023](#)

Client name:
[NLIS Hub](#)

If you require any further assistance please
contact our experts on:
[0345 762 6848](#)
groundstability@coal.gov.uk



The Law
Society

Enquiry boundary

Key

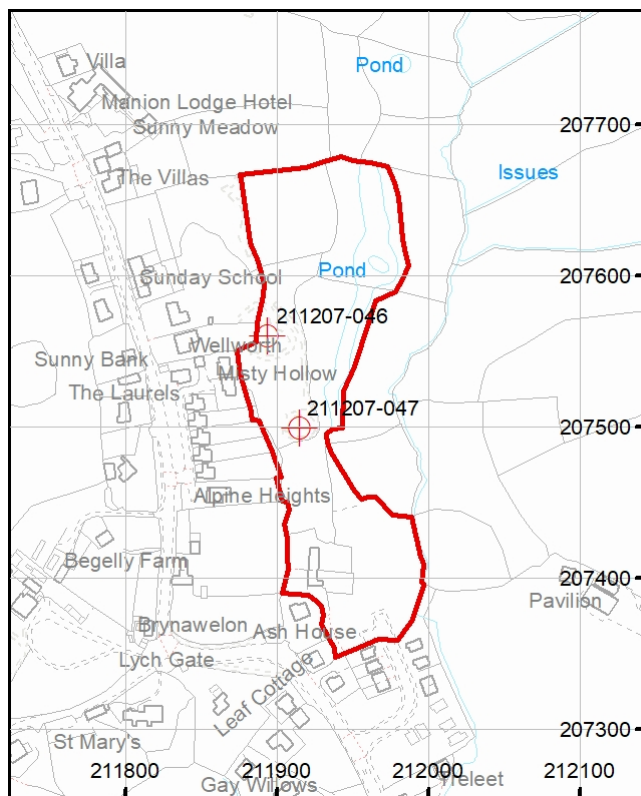
Approximate position of enquiry boundary shown



Disused mineshaft



We can confirm that the location is
on the coalfield



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This report is prepared in accordance with the latest Law Society's Guidance Notes 2018, the User Guide 2018 and the Coal Authority's Terms and Conditions applicable at the time the report was produced.



Accessibility

If you would like this information in an alternative format, please contact our communications team on 0345 762 6848 or email communications@coal.gov.uk.

Professional opinion



Mine entries

The enquiry boundary shows the approximate location of the disused mine entry/entries referred to in this report. Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage caused by disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.coal.gov.uk. Please note this Act is not valid where coal was worked or extracted by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wishes to examine the source plans from which the information has been taken, these are available to view, at our Coal Authority head office in Mansfield. To book an appointment please call **01623 637 225**. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission must be sought from the owner. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency, 24 hour call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). To report an emergency you can call **0800 288 4242**.



Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

If you are looking to develop, or undertake works, within a coal mining development high risk area your Local Authority planning department may require a Coal Mining Risk Assessment to be undertaken by a qualified mining geologist or engineer. Should you require any additional information then please contact the Coal Authority on **0345 762 6848** or email **cmra@coal.gov.uk**.



Site investigations

The following site investigation(s) took place in the location area:

A site investigation was carried out in April 2014 by Listers Geotechnical Consultants., Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northamptonshire NN12 8QD on behalf of Trueform Limited acting for Roger Casey Associates, Ty Mansel, 6 Mansel Street, Carmarthen SA31 1PX.

Additional information regarding these investigations may be available from the company or companies listed above.

Detailed findings

Information provided by the Coal Authority in this report is compiled in response to the Law Society's CON29M Coal Mining enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL.

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1 Past underground coal mining

The property is in a surface area that could be affected by underground mining in 1 seam of coal at 250m to 270m depth, and last worked in 1898.

Any movement in the ground due to coal mining activity associated with these workings should have stopped by now.

In addition the property is in an area where the Coal Authority believes there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered, particularly prior to any site works or future development activity, as ground movement could still be a risk. Your attention is drawn to the Professional opinion sections of the report.

2 Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3 Future underground coal mining

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant a licence to remove or work coal by underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

4 Mine entries

Within, or within 20 metres of, the boundary of the property there are 2 mine entries, the approximate positions of which are shown on the enquiry boundary plot. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

There is no record of what steps, if any, have been taken to treat the mine entries.

This information is based on the information that the Coal Authority has at the time of this enquiry.

Based on the Coal Authority's knowledge of the mining circumstances at the time of this enquiry, there may be unrecorded mine entries in the local area that do not appear on Coal Authority records.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

5 Coal mining geology

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that have been affected by coal mining.

6 Past opencast coal mining

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

7 Present opencast coal mining

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

8 Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

9 Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

10 Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11 Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Coal Authority, under its Emergency Surface Hazard Call Out procedures.

12 Withdrawal of support

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

13 Working facilities order

The property is not in an area where an order has been made, under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

14**Payments to owners of former copyhold land**

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Statutory cover



Coal mining subsidence

In the unlikely event of any coal mining related subsidence damage, the Coal Authority or the mine operator has a duty to take remedial action in respect of subsidence caused by the withdrawal of support from land or property in connection with lawful coal mining operations.

When the works are the responsibility of the Coal Authority, our dedicated public safety and subsidence team will manage the claim. The house or land owner ("the owner") is covered for these works under the terms of the Coal Mining Subsidence Act 1991 (as amended by the Coal Industry Act 1994). Please note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

If you believe your land or property is suffering from coal mining subsidence damage and you need more information on what to do next, please use the following link to our website which sets out what your rights are and what you need to consider before making a claim.

www.gov.uk/government/publications/coal-mining-subsidence-damage-notice-form



Coal mining hazards

Our public safety and subsidence team provide a 24 hour a day, 7 days a week hazard reporting service, to help protect the public from hazards caused by past coal workings, such as a mine shaft or shallow working collapse. To report any hazards please call **0800 288 4242**. Further information can be found on our website: www.gov.uk/coalauthority.

Glossary



Key terms

adit - horizontal or sloped entrance to a mine

coal mining subsidence - ground movement caused by the removal of coal by underground mining

Coal Mining Subsidence Act 1991 - the Act setting out the duties of the Coal Authority to repair damage caused by coal mining subsidence

coal mining subsidence damage - damage to land, buildings or structures caused by the removal of coal by underground mining

coal seams - bed of coal of varying thickness

future opencast coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal from the surface

future underground coal mining - a licence granted, or licence application received, by the Coal Authority to excavate coal underground. Although it is unlikely, remaining coal reserves could create a possibility for future mining, which would be licensed by the Coal Authority

mine entries - collective name for shafts and adits

mine gas - reports of alleged mine gas emissions received by the Coal Authority within the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded

payments to owners of former copyhold land - historically, copyhold land gave rights to coal to the copyholder. Legislation was set up to allow others to work this coal, but they had to issue a notice and pay compensation if a copyholder came forward

shaft - vertical entry into a mine

site investigation - investigations of coal mining risks carried out with the Coal Authority's permission

stop notice - a delay to repairs because further coal mining subsidence damage may occur and it would be unwise to carry out permanent repairs

subsidence claim - a formal notice of subsidence damage to the Coal Authority since it was established on 31 October 1994

withdrawal of support - a historic notice informing landowners that the coal beneath their property was going to be worked

working facilities orders - a court order which gave permission, restricted or prevented coal mine workings



Further action reports

Mine entry interpretive report - assesses the risk of ground movement from mine entries in, or within 20 metres of, the property boundary. To order this report, use the same boundary as the CON29M report, then draw the building on the additional map screen.

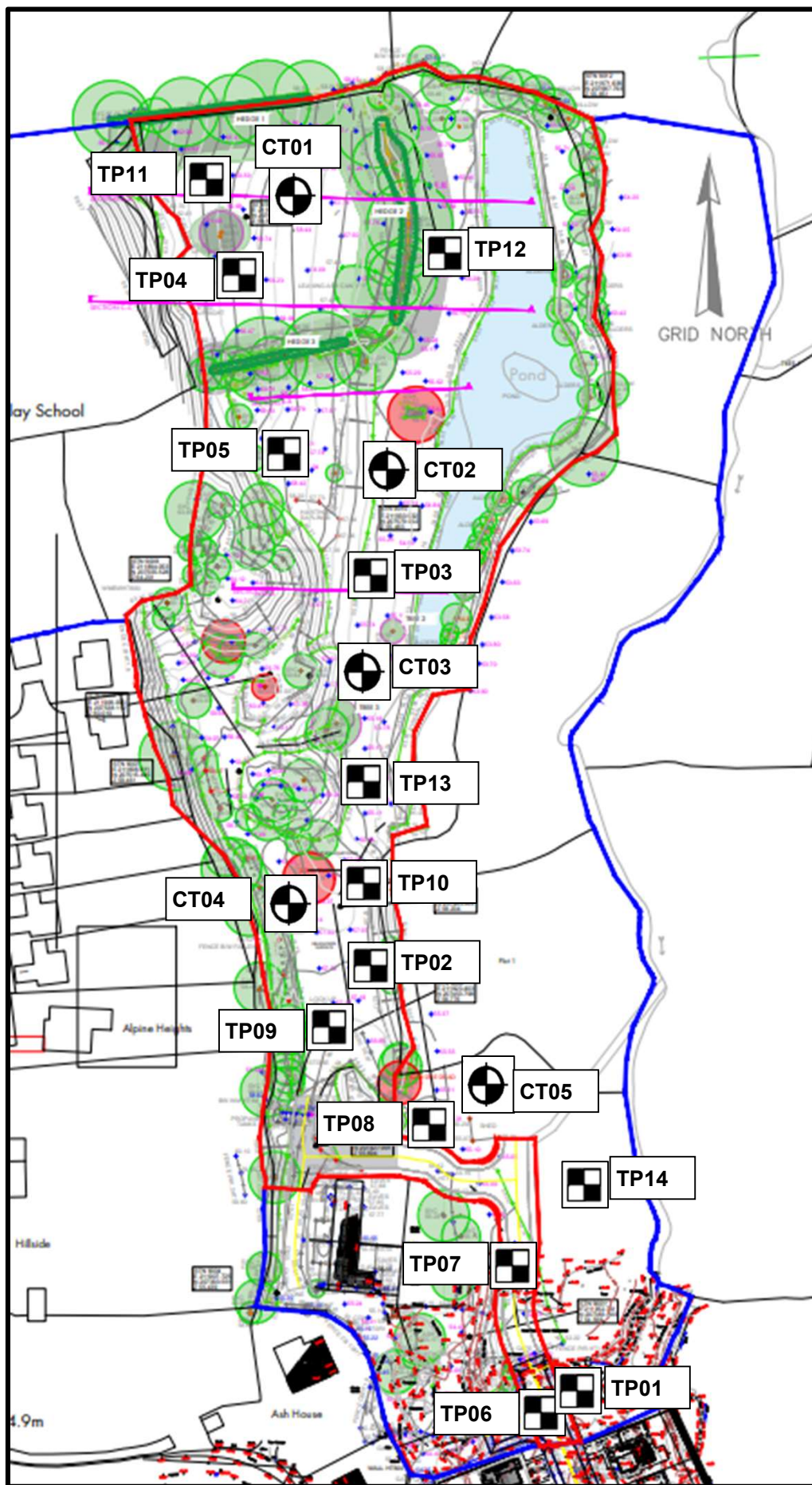
For more information and to order this report please visit:

<https://www2.groundstability.com/interpretive-report>

Mine entry plan and data sheets - give additional information on mine entries recorded on a piece of land. To order this report use the same boundary as the CON29M report and a member of our team will contact you to confirm the mine entries to include in this bespoke report.

For more information and to order this report please visit:

<https://www2.groundstability.com/plan-and-data-sheets>



Key:

 Approximate Site Boundary



Boreholes



Trial Pits



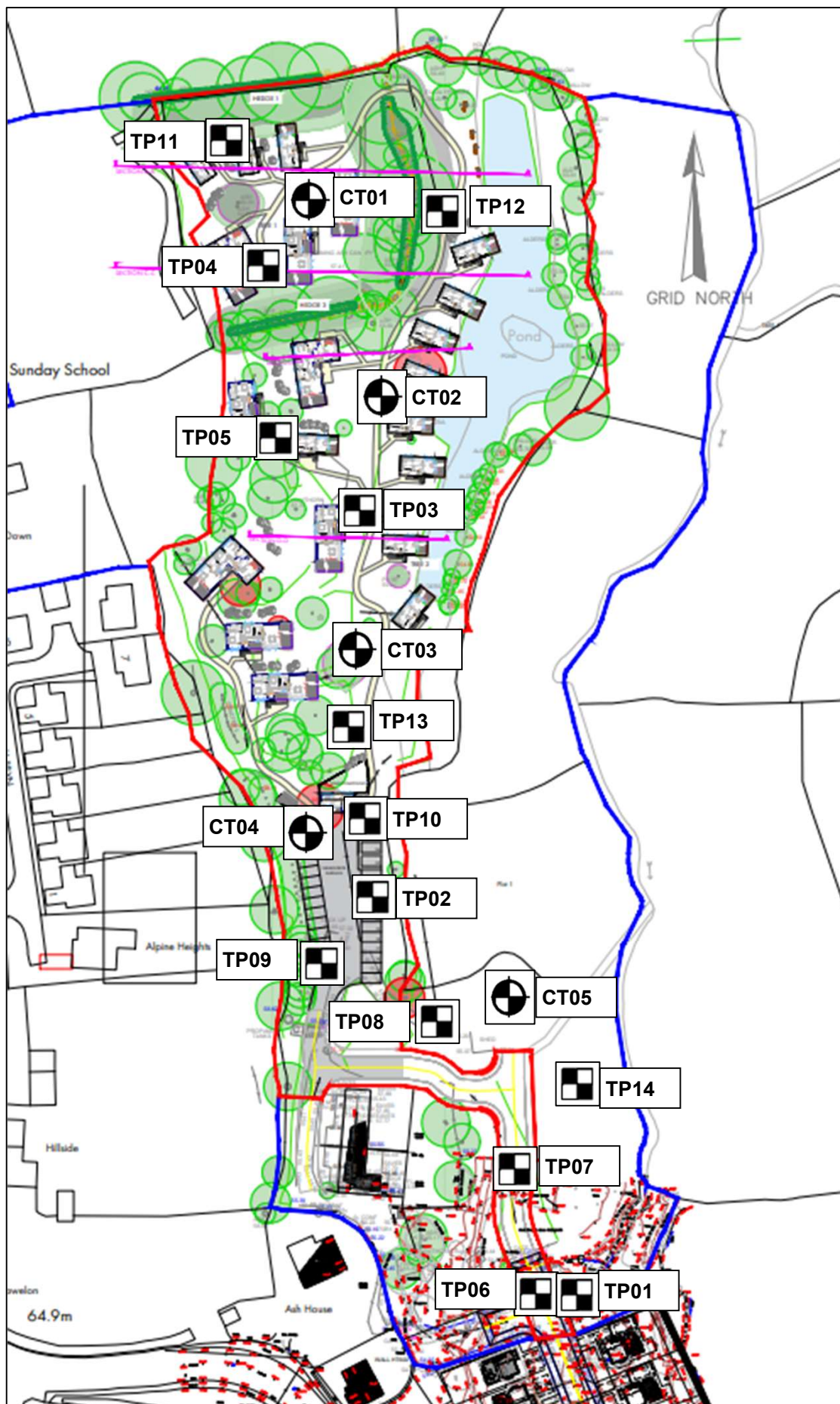
LISTERS GEO

Geotechnical and Geoenvironmental Consultants

Title: Exploratory Hole Location Plan - Existing

Site: Begelly Park Gardens, SA68 0YH

Scale: NTS Job Number: 13.10.028b Drawn By: LC



Key:
 Approximate Site Boundary

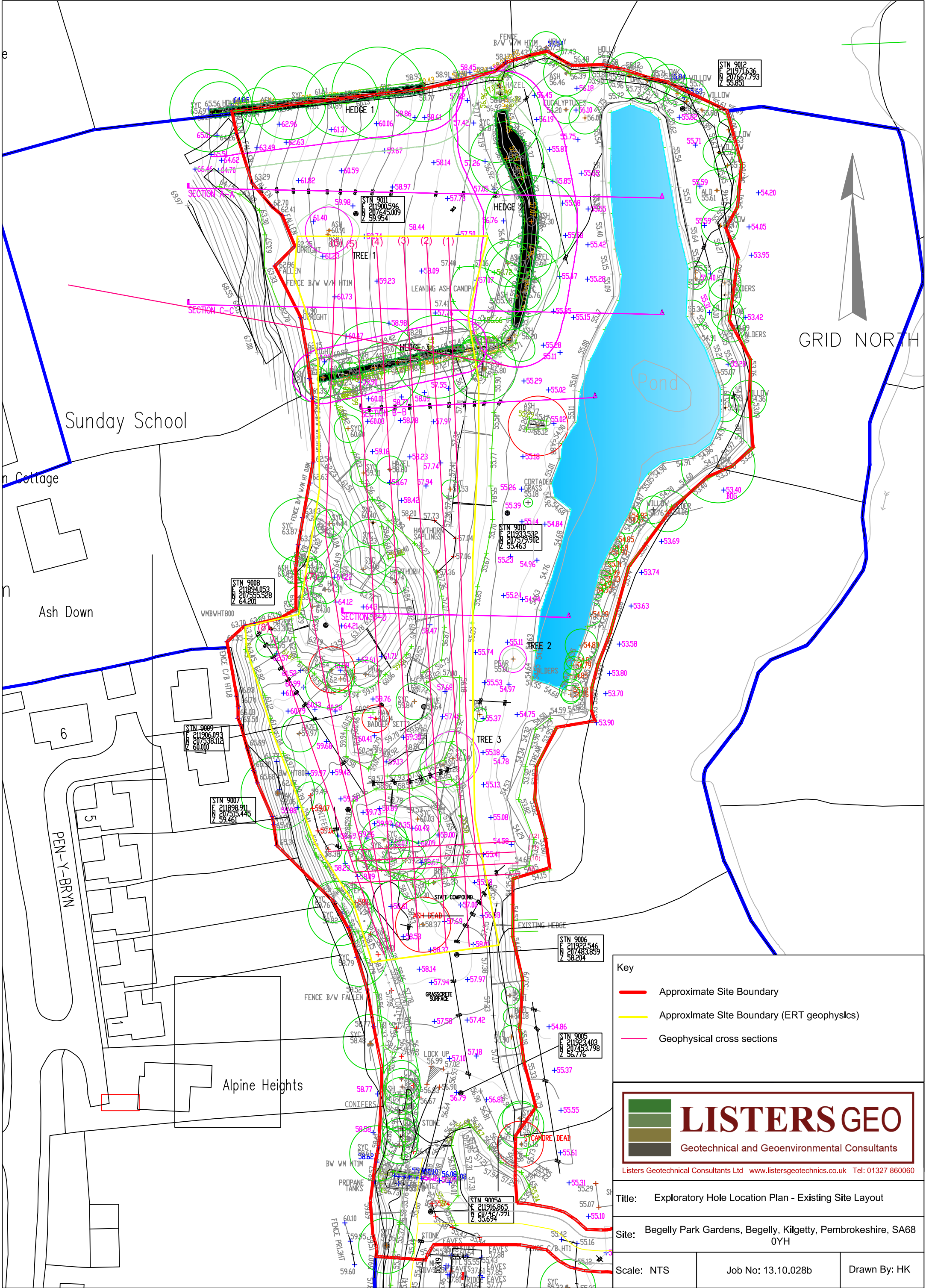
 Boreholes

 Trial Pits

Title: Exploratory Hole Location Plan - Proposed

Site: Begelly Park Gardens, SA68 0YH

Scale: NTS **Job Number:** 13.10.028b **Drawn By:** LC



Key

- Approximate Site Boundary
- Approximate Site Boundary (ERT geophysics)
- Geophysical cross sections

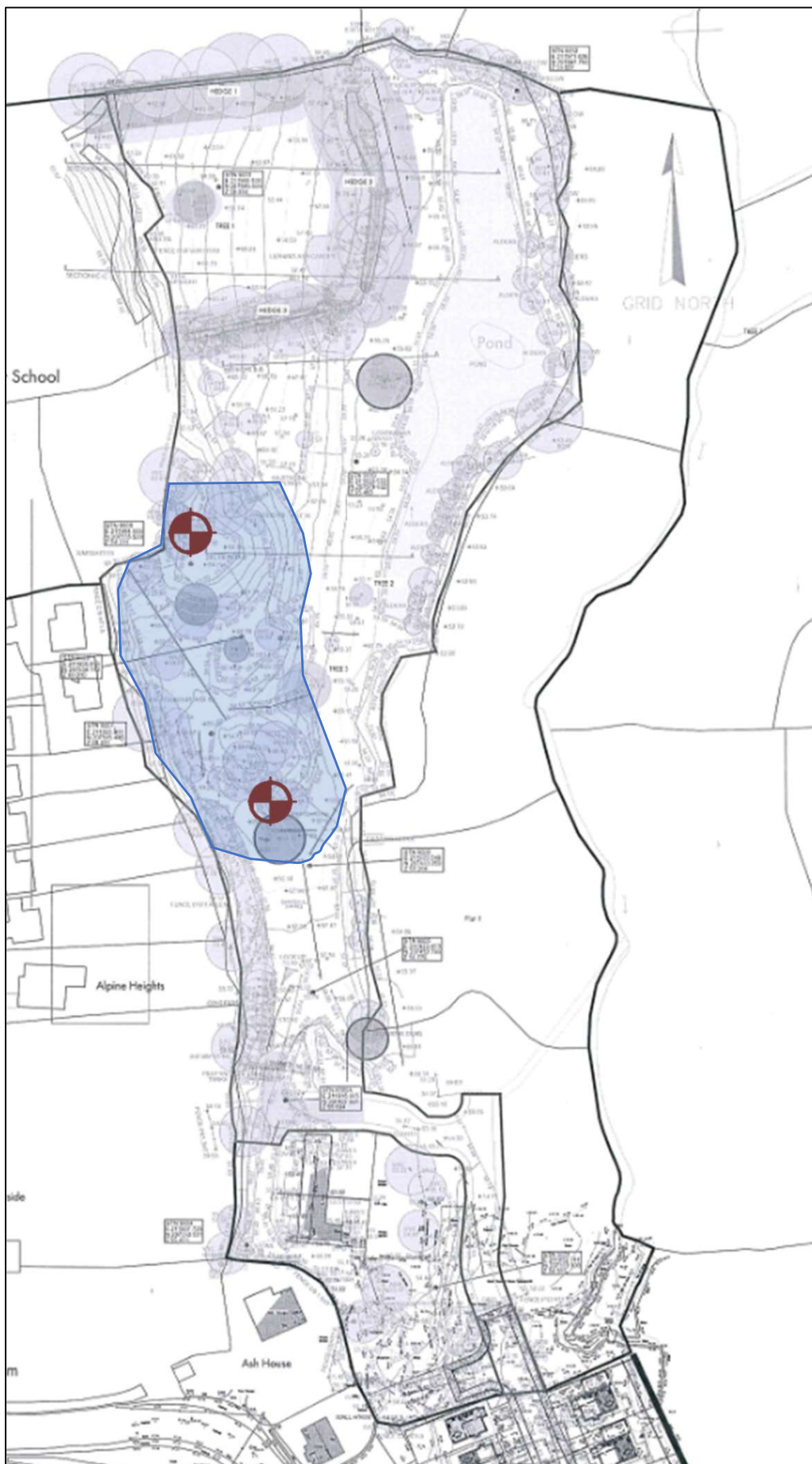
LISTERS GEO
Geotechnical and Geoenvironmental Consultants

Listers Geotechnical Consultants Ltd www.listersgeotechnics.co.uk Tel: 01327 860060

Title: Exploratory Hole Location Plan - Existing Site Layout

Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Scale: NTS	Job No: 13.10.028b	Drawn By: HK
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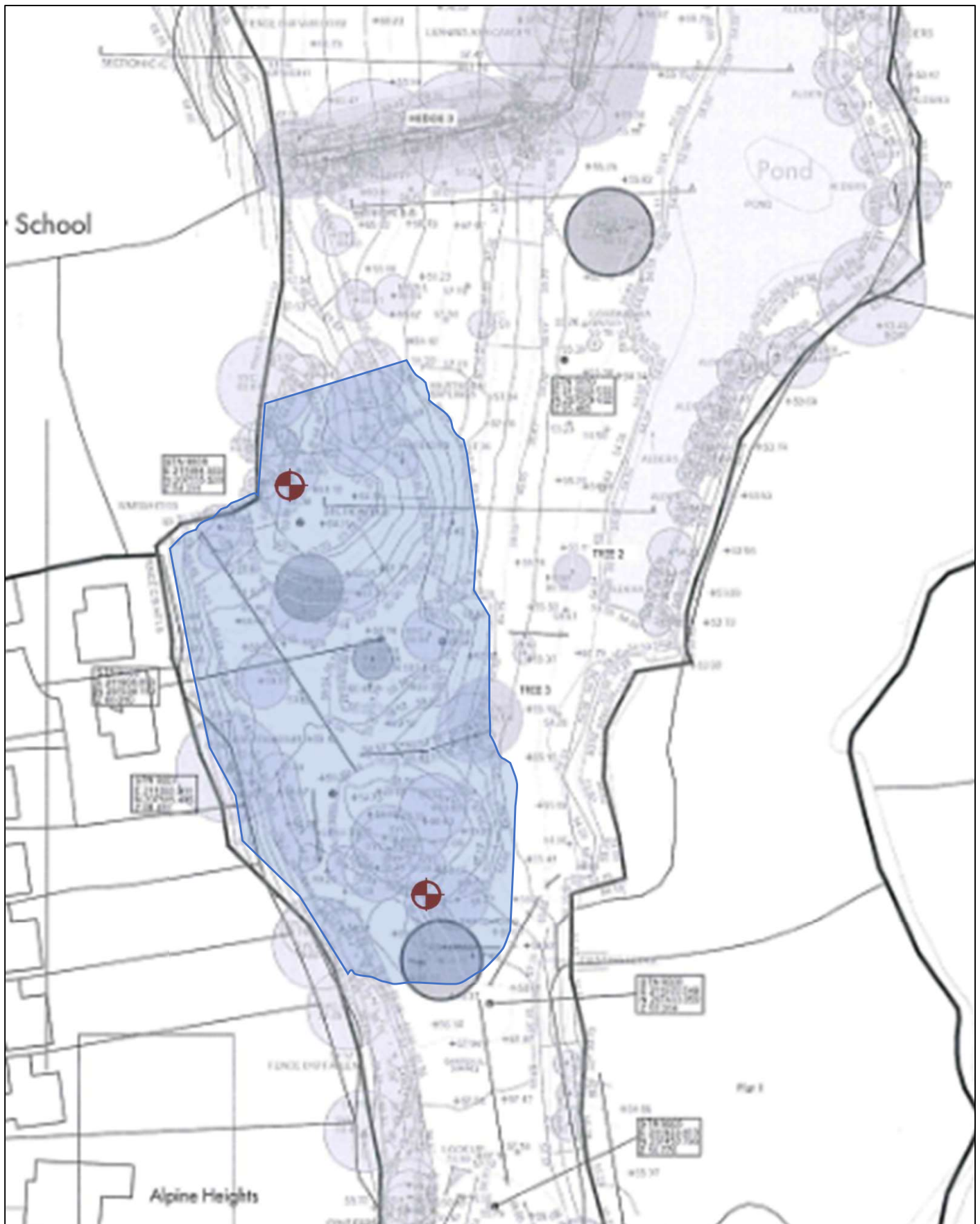
Key:

- Zone of potential vertical features
- +
 Approximate location of Coal Authority mine entries

Title: Potential Vertical Features

Site: Begelly Park Gardens, SA68 0YH

Scale: NTS **Job Number:** 13.10.028b **Drawn By:** LC



Key:

-  Zone of potential vertical features
-  Approximate location of Coal Authority mine entries

Title: Potential Vertical Features

Site: Begelly Park Gardens, SA68 0YH

Scale: NTS **Job Number:** 13.10.028b **Drawn By:** LC



Southern entrance



Viewing south across the southern area



Viewing north across the southwestern area



Viewing north across the central area



Mounds in the central western area



Mounds I the central western area



Mounds in the central western area



Viewing northeast cross the pond in the northeastern area



Viewing south across the central area



Viewing northwest across the northwestern area



Viewing south across the northern area



TP05



TP03

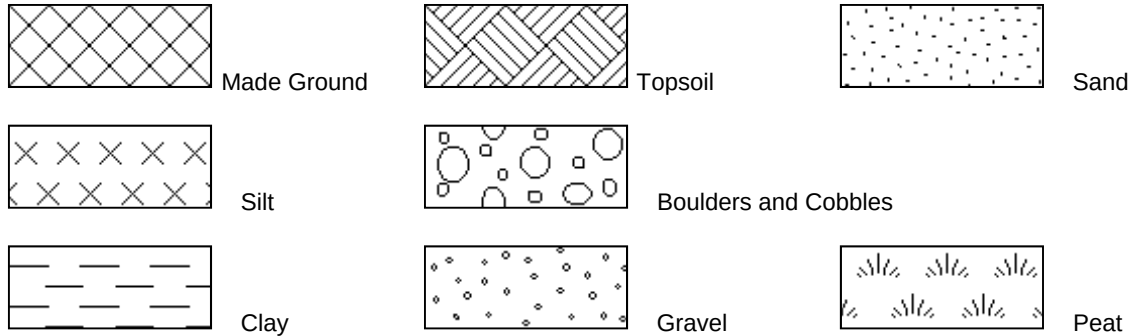


TP12

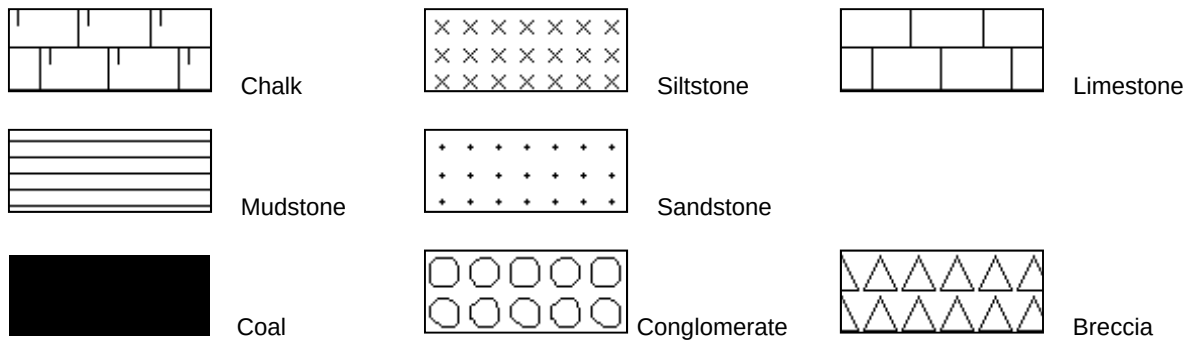
APPENDIX B

FIELDWORK AND TESTING

LEGEND - Soils



LEGEND - Rocks (Sedimentary)



LOG ABBREVIATIONS

W	Water Sample		Water Strike
B	Bulk Sample		Water (Standing Level)
D	Disturbed Sample	PP	Pocket Penetrometer
J	Jar Sample	HV	Hand Vane
U	Undisturbed Sample	SPT	Standard Penetration Test
(No. of blows shown in brackets for U100 samples)		CPT	Cone Penetration Test
WAC	Waste Acceptance Criteria Sample	CBR	California Bearing Ratio
		*	Extrapolated Value

Pocket penetrometer testing provides values of unconfined compressive strength. The results have been converted to an approximate equivalent shear strength which should be used with due circumspection. As the pocket penetrometer tends to overestimate shear strength, we have used an appropriate reduction factor.

LOG KEY

Continuous Tube Sampler Log

Borehole No.

CT 01
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

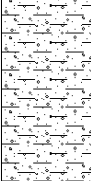
Co-ords: 211918E - 207642N

Project Number:
13.10.028b

Level: 58.00

Logged By:
Dates: 13/03/2023

 Lee Chippington
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.40 - 1.00	D		0.40	57.60		TOPSOIL Dark brown slightly sandy organic CLAY	
		1.00 - 1.40	D					MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains abundant gravel sized siltstone and mudstone lithorelicts	1
		1.00	PP	1.8kg/cm ²					
		1.00	SPT(S)	N=14 (3/3,3,4,4)					
		1.40 - 2.00	D					<i>Becomes stiff high strength at 1.40m</i>	
		2.00	SPT(S)	N=17 (6/4,3,5,5)					2
	▽	2.50 - 3.00	D		2.50	55.50		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	3
		3.00	SPT(S)	N=62 (19/14,14,15,19)					
					3.50	54.50		End of Borehole at 3.50m	4
									5
									6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Groundwater strike at 2.30m depth

Instrumentation: No Installation

Remarks: Borehole terminated at 3.50m depth due to refusal


Continuous Tube Sampler Log

Borehole No.

CT 02
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

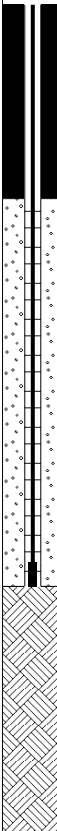
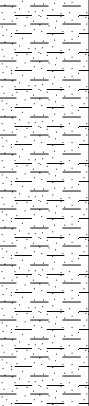
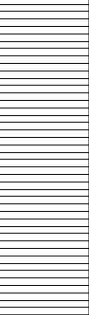
Co-ords: 211938E - 207599N

Project Number:
13.10.028b

Level: 55.80

Logged By:
Lee Chippington
to BS 5930:2015

Dates: 13/03/2023

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
	 	0.40 - 1.00	D	1.8kg/cm ²	0.40	55.40		TOPSOIL Dark brown slightly sandy slightly gravelly organic CLAY. Gravel is fine to medium sub-angular siltstone	1
		1.00 - 1.40	D		2.60	53.20		MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains abundant gravel sized mudstone and siltstone lithorelicts	
		1.00	PP						
		1.40 - 2.00	D					- Becomes stiff high strength at 4.00m	2
		2.00 - 2.60	D						
	 	3.00 - 4.00	D		4.30	51.50		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	3
									4
									5
								End of Borehole at 4.30m	6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Groundwater strike at 1.30m depth. On completion 0.80m

Instrumentation: Gas/Groundwater pipe installed to 3.00m

Remarks: Borehole terminated at 4.30m depth due to refusal


Continuous Tube Sampler Log

Borehole No.

CT 03
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

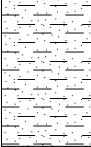
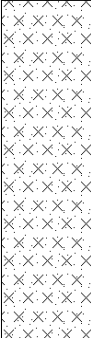
Co-ords: 211925E - 207540N

Project Number:
13.10.028b

Level: 55.50

Logged By:
Dates: 13/03/2023

 Lee Chippington
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.40 - 0.50 0.50 - 0.90	D D		0.40	55.10		TOPSOIL Dark brown slightly gravelly slightly sandy organic CLAY. Gravel is fine to medium sub-angular siltstone	
		0.90 - 1.20 1.00 1.00 1.20 - 1.60	D PP SPT(S) D	1.8kg/cm ² N=6 (2/1,2,1,2)	1.20	54.30		MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains patches of coal	1
		1.60 - 1.90	D					MIDDLE COAL MEASURES Stiff high strength grey brown slightly sandy SILT. Contains many gravel sized siltstone and mudstone lithorelicts	2
		2.00 - 3.00 2.00	D SPT(S)	N=10 (5/3,3,2,2)					
		3.00	SPT(S)	N=49 (12/9,11,14,15)	3.00	52.50		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	3
		3.80 3.90 - 4.00	SPT(S) D	99 for 225mm (21/19,30,50,0 for 0mm)	4.00	51.50			4
								End of Borehole at 4.00m	5
									6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Groundwater strike at 1.90m. On completion 0.80m depth

Instrumentation: No Installation

Remarks: Borehole terminated at 4.00m depth due to refusal


Continuous Tube Sampler Log

Borehole No.

CT 04
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

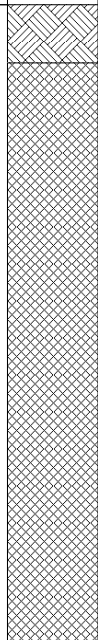
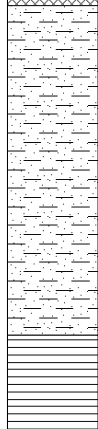
Co-ords: 211915E - 207474N

Project Number:
13.10.028b

Level: 57.90

Logged By:
Dates: 13/03/2023

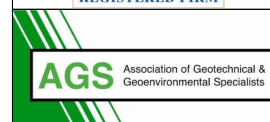
 Lee Chippington
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.30 - 0.80	D		0.30	57.60		TOPSOIL Dark brown slightly gravelly slightly sandy organic CLAY. Gravel is fine to medium sub-angular siltstone and some clinker MADE GROUND Grey brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse sub-angular to angular siltstone	1
		1.00 - 1.50	D						
		1.00	PP	1.8kg/cm ²					
		1.00	SPT(S)	N=8 (1/1,1,2,4)					
		1.50 - 2.10	D						
		2.00	SPT(S)	1 for 75mm (0/0 for 0mm, 1)					2
		2.10 - 2.50	D						
		2.25	PP	0.2kg/cm ²					
		2.50 - 3.00	D						
		2.50	PP	1.0kg/cm ²					
		3.00 - 3.30	D						3
		3.00	PP	1.0kg/cm ²					
		3.00	SPT(S)	N=8 (0/1,2,2,3)					
		3.30 - 4.00	D		3.30	54.60			
		4.00 - 5.00	D						4
		4.00	SPT(S)	N=10 (3/3,3,4,0)					
		5.00	SPT(S)	N=37 (14/10,10,9,8)	5.00	52.90			5
					5.50	52.40		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel End of Borehole at 5.50m	6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Groundwater strike at 2.00m. On completion 0.80m depth

Instrumentation: Gas/groundwater pipe installed to 3.00m

Remarks: Borehole terminated at 5.50m depth due to refusal


Continuous Tube Sampler Log

Borehole No.

CT 05
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Co-ords: 211944E - 207453N

Project Number:
13.10.028b

Level: 55.30

Logged By:
Dates: 13/03/2023

 Lee Chippington
to BS 5930:2015

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Result					
		0.10			0.10	55.20		TOPSOIL Dark brown slightly gravelly slightly sandy organic CLAY. Gravel is fine to medium sub-angular to angular siltstone and clinker	
		0.70 - 1.20	D		0.70	54.60		MADE GROUND Grey sandy fine to coarse sub-angular to angular GRAVEL of clinker and roadstone	
		1.00	PP	1.8kg/cm ²				MADE GROUND	
		1.00	SPT(S)	N=5 (1/1,1,1,2)				Grey brown slightly gravelly sandy CLAY. Gravel is fine to medium sub-angular ironstone	1
		1.20 - 1.50	D		1.20	54.10		MIDDLE COAL MEASURES	
		1.50 - 1.80	D					Firm medium strength grey brown slightly sandy SILT. Contains many gravel sized siltstone and mudstone lithorelicts and patches of black coal fragments	
		1.80 - 2.40	D						
		2.00	SPT(S)	N=9 (4/2,2,2,3)					2
		2.40 - 3.00	D		2.40	52.90		MIDDLE COAL MEASURES	
								Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	
		3.00	SPT(S)	N=25 (8/4,6,7,8)					3
		3.50 - 4.00	D						
		4.00	SPT(S)	N=40 (16/7,8,11,14)					4
		5.00	SPT						
		5.00	SPT(S)	N=101 (20/20,21,26,34)					5
					5.50	49.80		End of Borehole at 5.50m	
									6
									7

Borehole Diameter: 87mm to 57mm

Groundwater: Not encountered

Instrumentation: No Installation

Remarks:


Trial Pit Log

Trial Pit No.
TP 01
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

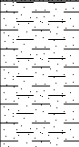
Co-ords: 211970E - 207389N

Level: 52.20

Dates: 13/03/2023

Project Number:
13.10.028b

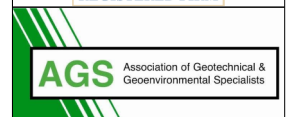
Logged By:
Lee Chippington
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
▽	0.50	D	70kPa	0.50	51.70		MADE GROUND Grey sandy clayey coarse sub-angular gravel of siltstone	1
	1.00	HV					MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains some gravel sized mudstone lithorelicts and coal fragments	
	1.50	D						
	2.00	D		2.10	50.10		End of Trial Pit at 2.10m	2
								3
								4

Method of excavation: JCB 3CX **Dimensions:** 0.60m(W) x 2.0m(L) x 2.10m(D)

Stability: Sides stable

Groundwater: Minor seepage between 0.00 and 0.50m depth

Remarks:


Trial Pit Log

Trial Pit No.

TP 02
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

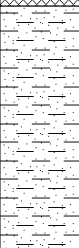
Co-ords: 211926E - 207469N

Project Number:
13.10.028b

Level: 57.20

Logged By:
Dates: 13/03/2023

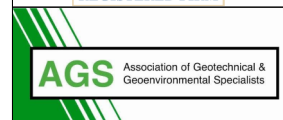
 Lee Chippington
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	1.00	D		1.30	55.90		MADE GROUND Dark grey slightly gravelly slightly sandy CLAY. Gravel is fine to coarse sub-angular siltstone and occasional plastic. Contains many roots	1
	1.50	D					MIDDLE COAL MEASURES Stiff brown slightly sandy CLAY. Contains abundant gravel sized siltstone lithorelicts	2
	2.00	D		2.10	55.10		End of Trial Pit at 2.10m	3
								4

Method of excavation: JCB 3CX **Dimensions:** 0.60m(W) x 2.00m(L) x 2.10m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks: Roots visible down to 1.80m depth


Trial Pit Log

Trial Pit No.

TP 03
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

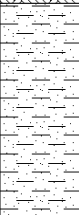
Co-ords: 211932E - 207571N

Project Number:
13.10.028b

Level: 55.10

Logged By:
Dates: 13/03/2023

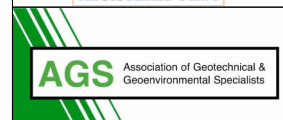
 Lee Chippington
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
▽	0.30			0.30	54.80		TOPSOIL Dark brown slightly sandy organic CLAY	1
	1.00	D					MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains many gravel sized lithorelicts	
	1.00	HV	75kPa				- Stiff high strength below 1.00m depth	
	1.20	D		1.20	53.90		MIDDLE COAL MEASURES Very weak highly fractured grey MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	2
	1.50	D						
	2.00	D						
	2.20			2.20	52.90		End of Trial Pit at 2.20m	3
								4

Method of excavation: JCB 3CX **Dimensions:** 0.60m(W) x 2.00m(L) x 2.20m(D)

Stability: Sides stable

Groundwater: Steady inflow below 1.20m. On completion 1.20m depth

Remarks: Roots visible down to 0.50m depth


Trial Pit Log

Trial Pit No.

TP 04
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

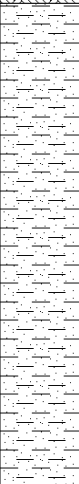
Co-ords: 211908E - 207637N

Project Number:
13.10.028b

Level: 59.70

Logged By:
Dates: 13/03/2023

 Lee Chippington
to BS 5930:2015

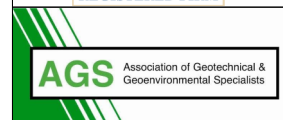
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	1.00	D		0.30	59.40		TOPSOIL Dark brown slightly sandy organic CLAY	1
							MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY. Contains many gravel sized siltstone and mudstone lithorelicts	
	2.00	D		1.80	57.90		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel	2
				2.20	57.50		End of Trial Pit at 2.20m	3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 2.00m(L) x 2.20m(D)

Stability: Sides stable

Groundwater: Minor seepage below 1.80m depth

Remarks: Roots visible down to 0.60m depth


Trial Pit Log

Trial Pit No.

TP 05
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

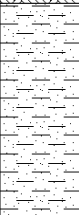
Co-ords: 211915E - 207595N

Project Number:
13.10.028b

Level: 58.50

Logged By:
Dates: 14/03/2023

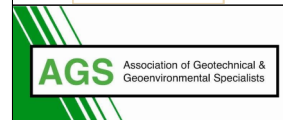
 Lee Chippington
to BS 5930:2015

Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
				0.30	58.20		TOPSOIL Dark brown slightly sandy organic CLAY	
	1.00 1.00	D HV	70kPa				MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy CLAY	
							- Contains some gravel sized mudstone lithorelicts below 1.00m depth	1
	1.50	D		1.50	57.00		MIDDLE COAL MEASURES Black coal recovered as silty very sandy GRAVEL.	2
				2.30	56.20		End of Trial Pit at 2.30m	3
								4

Method of excavation: JCB 3CX **Dimensions:** 0.60m(W) x 2.0m(L) x 2.30m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 06
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Co-ords: 211961E - 207387N

Project Number:
13.10.028b

Level: 52.50

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

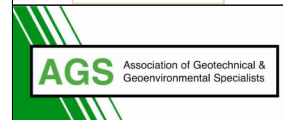
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.60	D		0.50	52.00		MADE GROUND Grey brown clayey sandy fine to coarse sub-rounded to sub-angular GRAVEL of siltstone and sandstone	
	0.60	HV	60kPa	0.70	51.80		MIDDLE COAL MEASURES Firm medium strength grey brown slightly sandy SILT.	
							End of Trial Pit at 0.70m	
								1
								2
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 1.50m(L) x 0.70m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 07
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

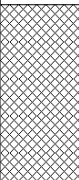
Co-ords: 211961E - 207410N

Project Number:
13.10.028b

Level: 54.20

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

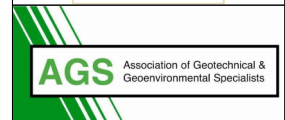
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.50	D		0.60	53.60		MADE GROUND Grey very clayey sandy coarse sub-angular GRAVEL of sandstone	
							End of Trial Pit at 0.60m	
								1
								2
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 1.5m(L) x 0.6m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 08
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

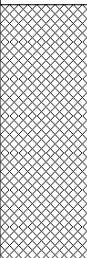
Co-ords: 211941E - 207447N

Project Number:
13.10.028b

Level: 55.70

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

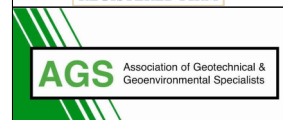
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.75	D		0.80	54.90		MADE GROUND Grey very clayey sandy coarse sub-angular GRAVEL of siltstone	
							End of Trial Pit at 0.80m	1
								2
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 1.50m(L) x 0.80m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 09
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Co-ords: 211930E - 207461N

Project Number:
13.10.028b

Level: 56.60

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

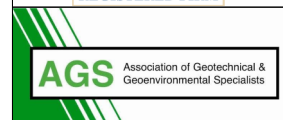
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.60 - 0.70	D		0.70	55.90		MADE GROUND Grey brown slightly gravelly sandy CLAY. Gravel is fine to coarse sub-rounded to sub-angular brick, concrete, metal and siltstone. Contains some whole bricks and cobble sized concrete	
							End of Trial Pit at 0.70m	1
								2
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 1.50m(L) x 0.70m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 10
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Co-ords: 211924E - 207487N

Project Number:
13.10.028b

Level: 58.00

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

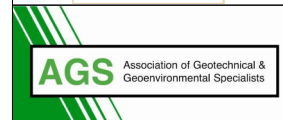
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.65	D		0.70	57.30		MADE GROUND Brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse sub-angular siltstone and coal	
							End of Trial Pit at 0.70m	1
								2
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 1.50m(L) x 0.70m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks:


Trial Pit Log

Trial Pit No.

TP 11
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

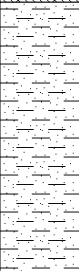
Co-ords: 211911E - 207555N

Project Number:
13.10.028b

Level: 61.00

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

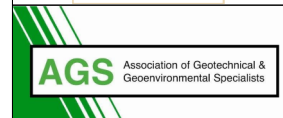
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.40			0.40	60.60		TOPSOIL Dark brown slightly sandy organic CLAY	
	1.00	D		1.30	59.70		MIDDLE COAL MEASURES Firm medium strength brown slightly sandy CLAY. Contains some gravel sized lithorelicts	1
	2.00	D		3.00	58.00		MIDDLE COAL MEASURES Very weak highly fractured grey brown SILSTONE. Partially weathered so that it was recovered as clay sandy gravel	2
							End of Trial Pit at 3.00m	3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60 m(W) x 2.50m(L) x 3.00m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks: Roots visible down to 0.60m


Trial Pit Log

Trial Pit No.

TP 12
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

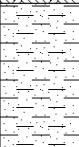
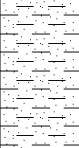
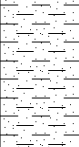
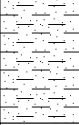
Co-ords: 211945E - 207643N

Project Number:
13.10.028b

Level: 55.80

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

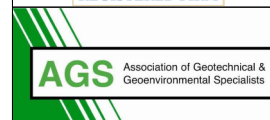
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
				0.30	55.50		TOPSOIL Dark brown sightly sandy organic CLAY	
	0.80	HV	65kPa				MIDDLE COAL MEASURES Soft low strength grey brown slightly sandy CLAY	
	1.00	D					- Firm medium strength and contains some gravel sized siltstone lithorelicts below 0.80m depth	1
	1.50	D						
				2.10	53.70		MIDDLE COAL MEASURES Very weak highly fractured grey brown MUDSTONE. Partially weathered so that it was recovered as clayey sandy gravel, including some coal fragments	2
	2.50	D						
				2.80	53.00		End of Trial Pit at 2.80m	3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 2.50m(L) x 2.80m(D)

Stability: Sides stable

Groundwater: Seepages below 2.10m depth

Remarks: Roots visible down to 0.50m


Trial Pit Log

Trial Pit No.

TP 13
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

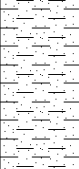
Co-ords: 211930E - 207517N

Project Number:
13.10.028b

Level: 55.10

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

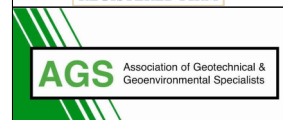
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
				0.20	54.90		TOPSOIL Dark brown slightly sandy organic CLAY.	
							MIDDLE COAL MEASURES Soft low strength grey brown slightly sandy CLAY	
	1.00	HV	65kPa				- Firm medium strength below 0.80m depth	1
	1.20	D						
							- Stiff and contains some gravel sized mudstone and siltstone lithorelicts below 1.60m depth	
	2.00	D					- Contains some black carbonaceous material below 2.00m depth	2
				2.50	52.60		End of Trial Pit at 2.50m	
								3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 2.00m(L) x 2.50m(D)

Stability: Sides stable

Groundwater: Minor seepages below 2.00m depth

Remarks: Roots visible down to 0.50m


Trial Pit Log

Trial Pit No.

TP 14
Project Location: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Co-ords: 211970E - 207435N

Project Number:
13.10.028b

Level: 54.00

Logged By:
Dates: 14/03/2023

 Lee Chippington
to BS 5930:2015

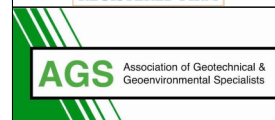
Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth (m)	Type	Result					
	0.70			0.70	53.30		MADE GROUND Grey brown sandy very clayey fine to coarse sub-rounded to sub-angular GRAVEL of concrete. Some cobbles and boulders	
	1.00	D					MADE GROUND Dark grey brown slightly sandy slightly organic CLAY. Contains many roots	1
	2.00	D						2
	2.50	D		2.50	51.50		MIDDLE COAL MEASURES Firm grey brown slightly sandy CLAY. Contains some gravel sized mudstone lithorelicts	
				2.80	51.20		End of Trial Pit at 2.80m	3
								4

Method of excavation: JCB 3CX

Dimensions: 0.60m(W) x 2.50m(L) x 2.80m(D)

Stability: Sides stable

Groundwater: Not encountered

Remarks: Roots visible down to 2.50m


Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

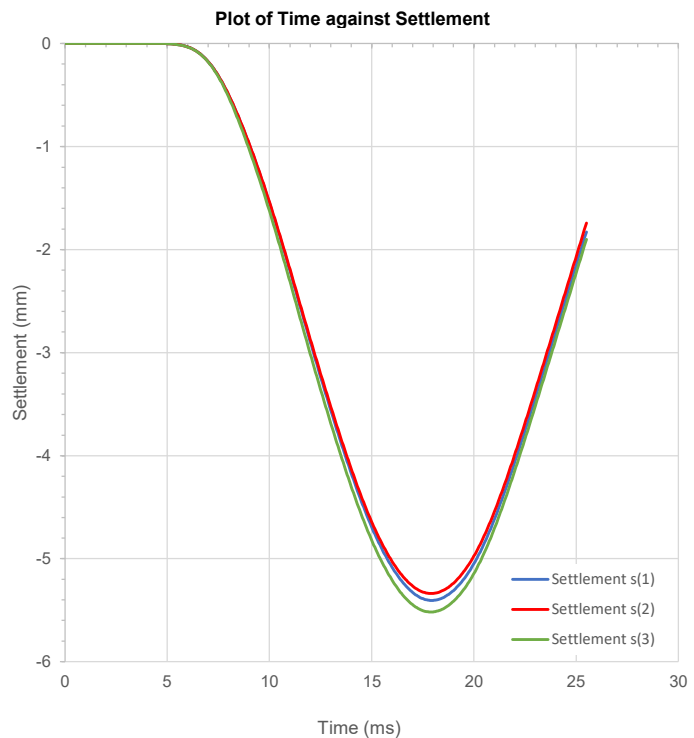
Test Location Reference TP05
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

Description of test stratum/strata Firm medium strength grey brown slightly sandy CLAY

Test Record

Device No. 8342
Measuring Series 15
Plate diameter 300 mm
Mass of drop weight 10 kg
Height of drop 1,135 mm
Max impact force 7070 N
Duration of impact 18 ms

Max Settlement (mm)
 s(1) = 5.405 mm
 s(2) = 5.338 mm
 s(3) = 5.518 mm
Max Velocity (mm/s)
 v(1) = 36.9 mm/s
 v(2) = 28.4 mm/s
 v(3) = 53.8 mm/s
Mean Settlement (mm)
 s(m) = 5.420 mm
Mean Velocity (mm/s)
 v(m) = 39.7 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.137
 Dynamic Modulus of Deformation, E_{vd} = 4.15 MPa

Equivalent CBR value 2.0 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP06
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

Description of test stratum/strata Firm medium strength grey brown slightly sandy SILT

Test Record

Device No. 8342
Measuring Series 16
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

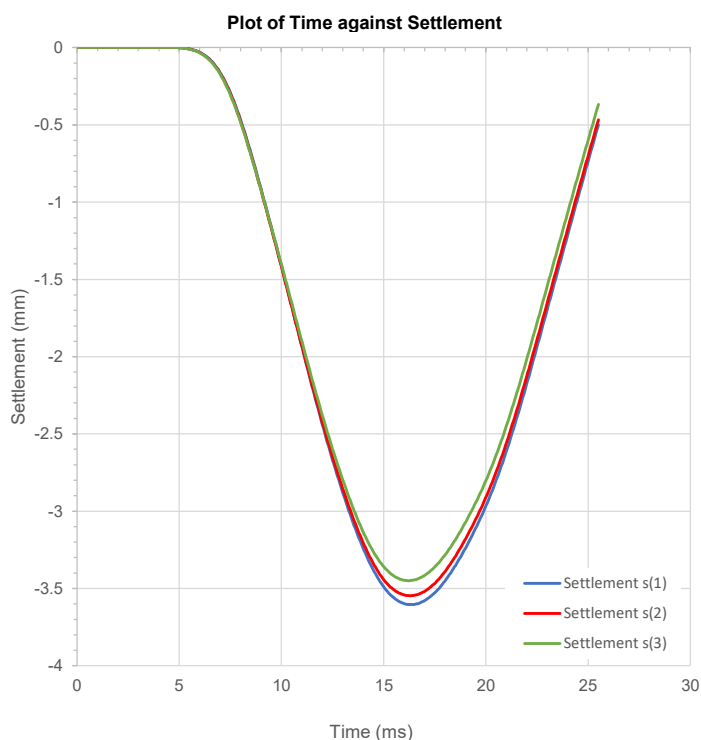
mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 3.605 mm
 s(2) = 3.547 mm
 s(3) = 3.450 mm

Max Velocity (mm/s)
 v(1) = 521.8 mm/s
 v(2) = 511.7 mm/s
 v(3) = 497.4 mm/s

Mean Settlement (mm)
 s(m) = 3.534 mm

Mean Velocity (mm/s)
 v(m) = 510.3 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.007
 Dynamic Modulus of Deformation, E_{vd} = 6.37 MPa

Equivalent CBR value 2.3 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP07
Test Number 0.5
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

Description of test stratum/strata Grey very clayey sandy Gravel

Test Record

Device No. 8342
Measuring Series 16
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

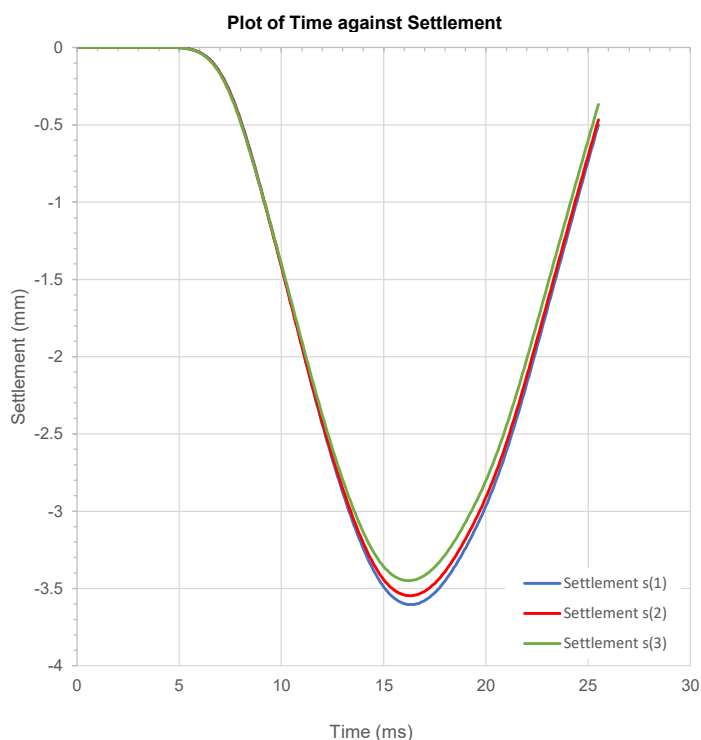
mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 3.605 mm
 s(2) = 3.547 mm
 s(3) = 3.450 mm

Max Velocity (mm/s)
 v(1) = 521.8 mm/s
 v(2) = 511.7 mm/s
 v(3) = 497.4 mm/s

Mean Settlement (mm)
 s(m) = 3.534 mm

Mean Velocity (mm/s)
 v(m) = 510.3 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.007
 Dynamic Modulus of Deformation, E_{vd} = 6.37 MPa

Equivalent CBR value 2.3 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP08
Test Number 0.7
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

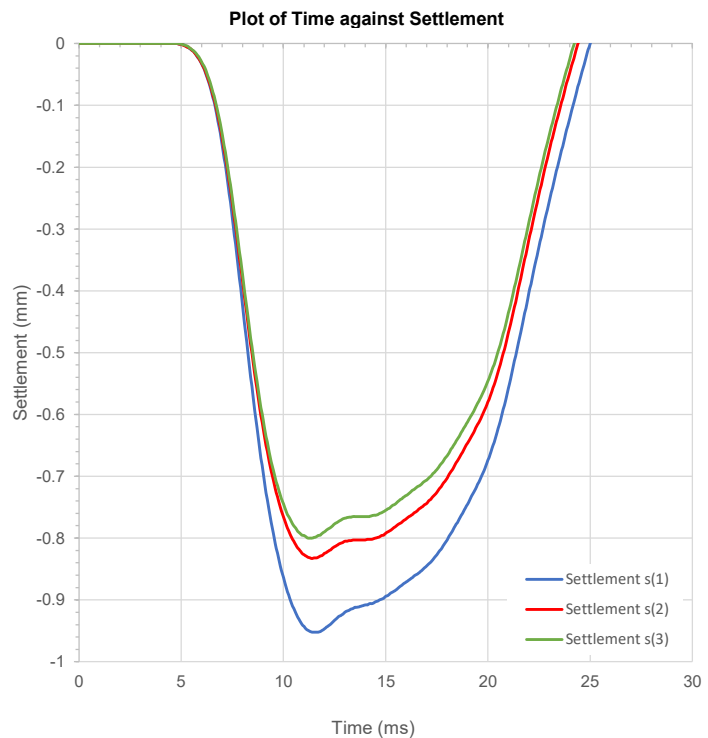
Description of test stratum/strata Grey very clayey sandy Gravel

Test Record

Device No. 8342
Measuring Series 18
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 0.953 mm
 s(2) = 0.833 mm
 s(3) = 0.800 mm
Max Velocity (mm/s)
 v(1) = 289.5 mm/s
 v(2) = 256.3 mm/s
 v(3) = 253.1 mm/s
Mean Settlement (mm)
 s(m) = 0.862 mm
Mean Velocity (mm/s)
 v(m) = 266.3 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.003
 Dynamic Modulus of Deformation, E_{vd} = 26.11 MPa

Equivalent CBR value 14 %

Remarks:

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP09
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

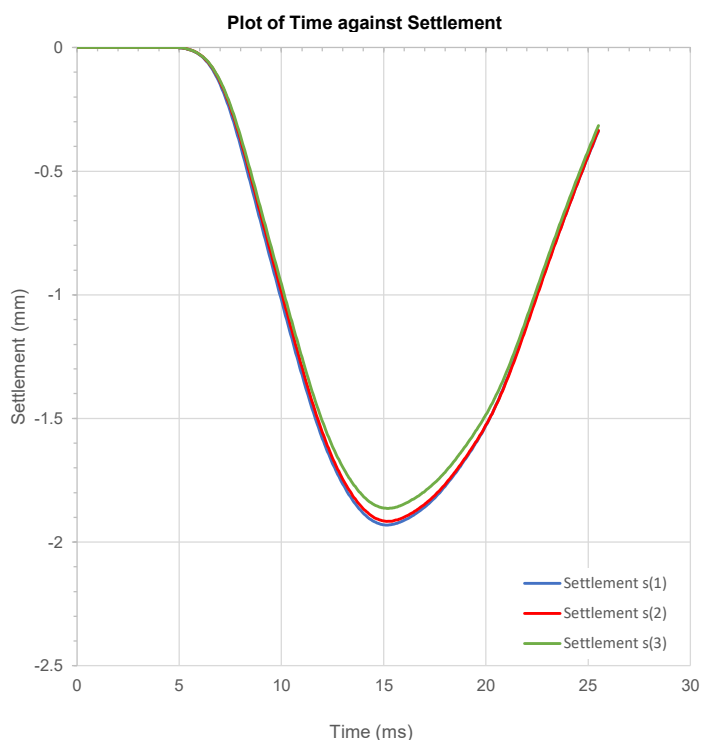
Description of test stratum/strata Grey brown slightly sandy gravelly CLAY

Test Record

Device No. 8342
Measuring Series 19
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 1.931 mm
 s(2) = 1.916 mm
 s(3) = 1.864 mm
Mean Settlement (mm)
 s(m) = 1.904 mm
Max Velocity (mm/s)
 v(1) = 314.8 mm/s
 v(2) = 312.6 mm/s
 v(3) = 303.1 mm/s
Mean Velocity (mm/s)
 v(m) = 310.2 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.006
 Dynamic Modulus of Deformation, E_{vd} = 11.82 MPa

Equivalent CBR value 4.6 %

Remarks:

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP10
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

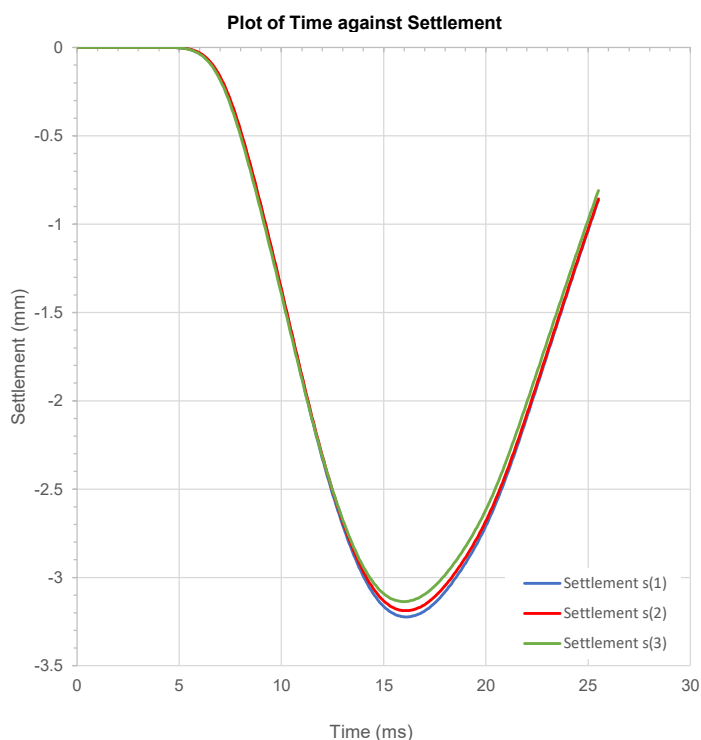
Description of test stratum/strata Brown slightly sandy slightly gravelly CLAY

Test Record

Device No. 8342
Measuring Series 20
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 3.224 mm
 s(2) = 3.189 mm
 s(3) = 3.137 mm
Max Velocity (mm/s)
 v(1) = 493.6 mm/s
 v(2) = 489.1 mm/s
 v(3) = 481.4 mm/s
Mean Settlement (mm)
 s(m) = 3.183 mm
Mean Velocity (mm/s)
 v(m) = 488.0 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.007
 Dynamic Modulus of Deformation, E_{vd} = 7.07 MPa

Equivalent CBR value 2.5 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP11
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

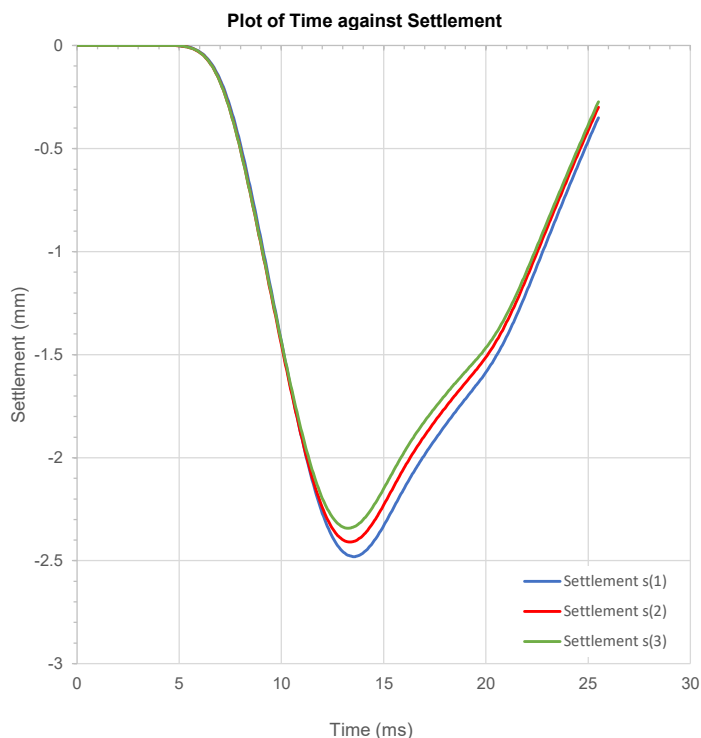
Description of test stratum/strata Firm medium strength brown slightly sandy CLAY

Test Record

Device No. 8342
Measuring Series 21
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 2.480 mm
 s(2) = 2.409 mm
 s(3) = 2.342 mm
Mean Settlement (mm)
 s(m) = 2.410 mm
Max Velocity (mm/s)
 v(1) = 497.2 mm/s
 v(2) = 486.4 mm/s
 v(3) = 477.0 mm/s
Mean Velocity (mm/s)
 v(m) = 486.9 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.005
 Dynamic Modulus of Deformation, E_{vd} = 9.34 MPa

Equivalent CBR value 3.3 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP12
Test Number 0.6
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

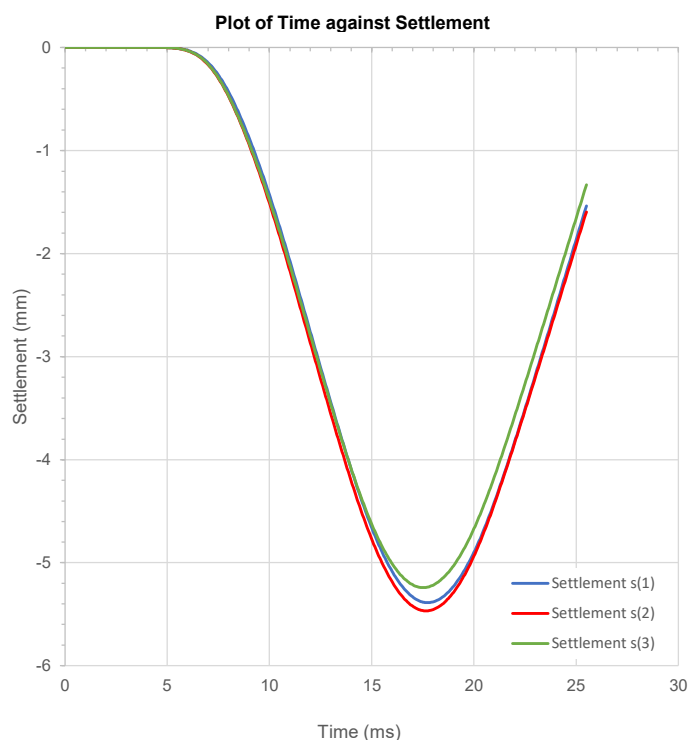
Description of test stratum/strata Soft low strength grey brown slightly sandy CLAY

Test Record

Device No. 8342
Measuring Series 22
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 5.388 mm
 s(2) = 5.467 mm
 s(3) = 5.242 mm
Max Velocity (mm/s)
 v(1) = 35.2 mm/s
 v(2) = 43.1 mm/s
 v(3) = 23.4 mm/s
Mean Settlement (mm)
 s(m) = 5.366 mm
Mean Velocity (mm/s)
 v(m) = 33.9 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.158
 Dynamic Modulus of Deformation, E_{vd} = 4.19 MPa

Equivalent CBR value 2.0 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Report No: 13.10.028b
Site: Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH

Test Location Reference TP13
Test Number 0.5
Depth of test Ground Level
Plate size 300 mm diameter circular
Sample reference -
Sample depth - m (below Ground Level)
Technician LC
Date of test 14.03.2023
Weather -

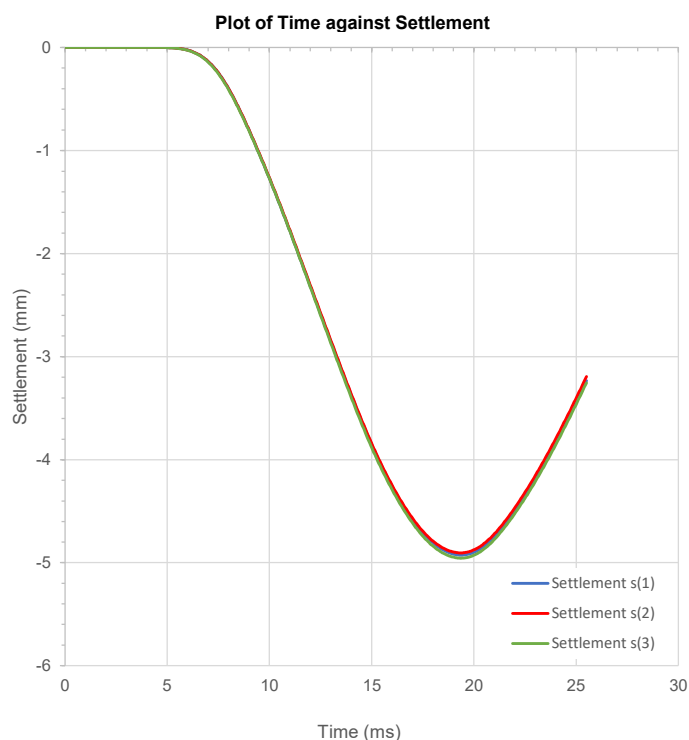
Description of test stratum/strata Soft low strength grey brown slightly sandy CLAY

Test Record

Device No. 8342
Measuring Series 23
Plate diameter 300
Mass of drop weight 10
Height of drop 1,135
Max impact force 7070
Duration of impact 18

mm
kg
mm
N
ms

Max Settlement (mm)
 s(1) = 4.926 mm
 s(2) = 4.905 mm
 s(3) = 4.956 mm
Max Velocity (mm/s)
 v(1) = 535.9 mm/s
 v(2) = 535.8 mm/s
 v(3) = 544.1 mm/s
Mean Settlement (mm)
 s(m) = 4.929 mm
Mean Velocity (mm/s)
 v(m) = 538.6 mm/s



Calculation and Result

Dynamic compactness ratio, s/v = 0.009
 Dynamic Modulus of Deformation, E_{vd} = 4.57 MPa

Equivalent CBR value 2.1 %

Remarks: Test for guidance only - result outside acceptable range for this method: $10\text{MPa} < E_{vd} < 70\text{MPa}$

DYNAMIC PLATE LOAD TEST CERTIFICATE

TP BF-StB, Part B 8.3. Technical specification for soil and rock in road construction, Dynamic Plate Loading Test, German Road and Transportation Research Association, 2003

Report No.:

13.10.028b

Site: Begelly Park Gardens, Begelly, Pembrokeshire,
SA68 0YH

Report No: 13.10.028b

Date Tested: 13th March 2022

Test Location: TP01

Groundwater: unknown

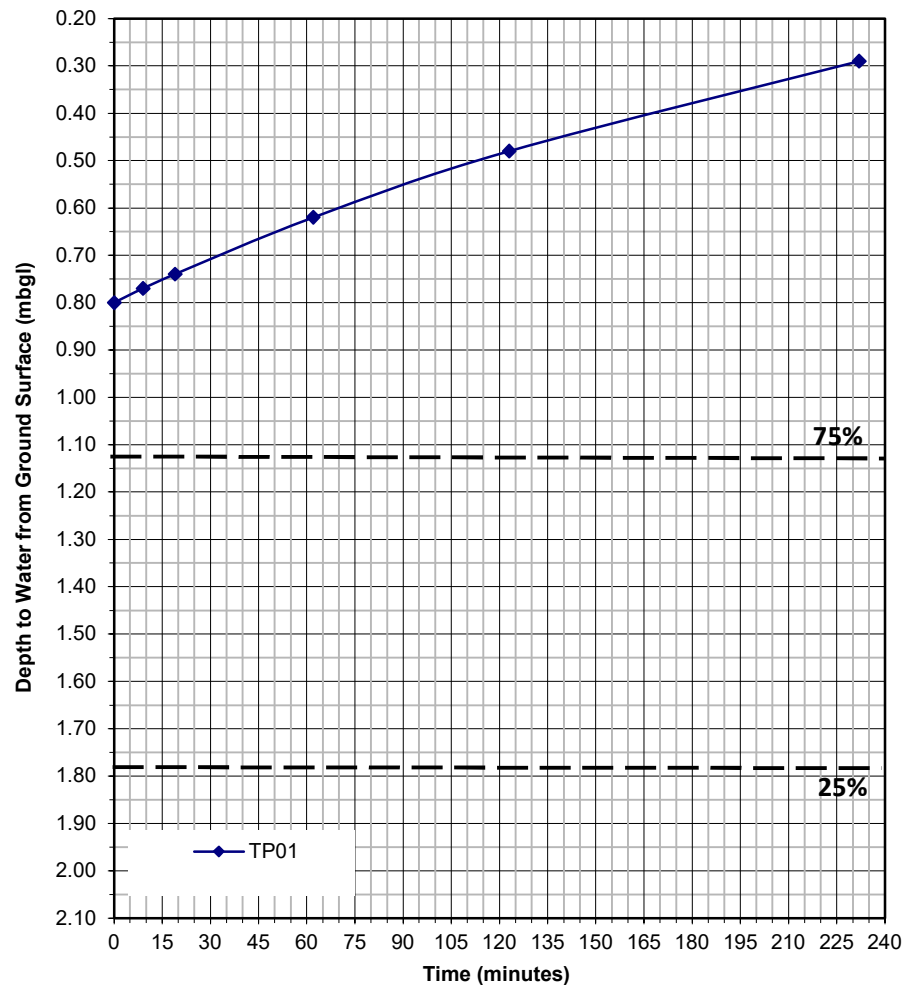
Dimensions: 0.6mWx2.0mLx2.10mD

Soil Description - test response zone:

0.5m to 2.1m - Slightly sandy CLAY, containing some gravel sized mudstone and coal lithorelicts (Middle Coal Measures)

Time (mins) Depth BGL

0	0.80
9	0.77
19	0.74
62	0.62
123	0.48
232	0.29
0	0.00



Infiltration rate could not be calculated - water level rose by 51cm over the 232 minutes that the test was run

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Pembrokeshire,
SA68 0YH

Report No: 13.10.028b

Date Tested: 13th March 2013

Test Location: TP02

Groundwater: unknown

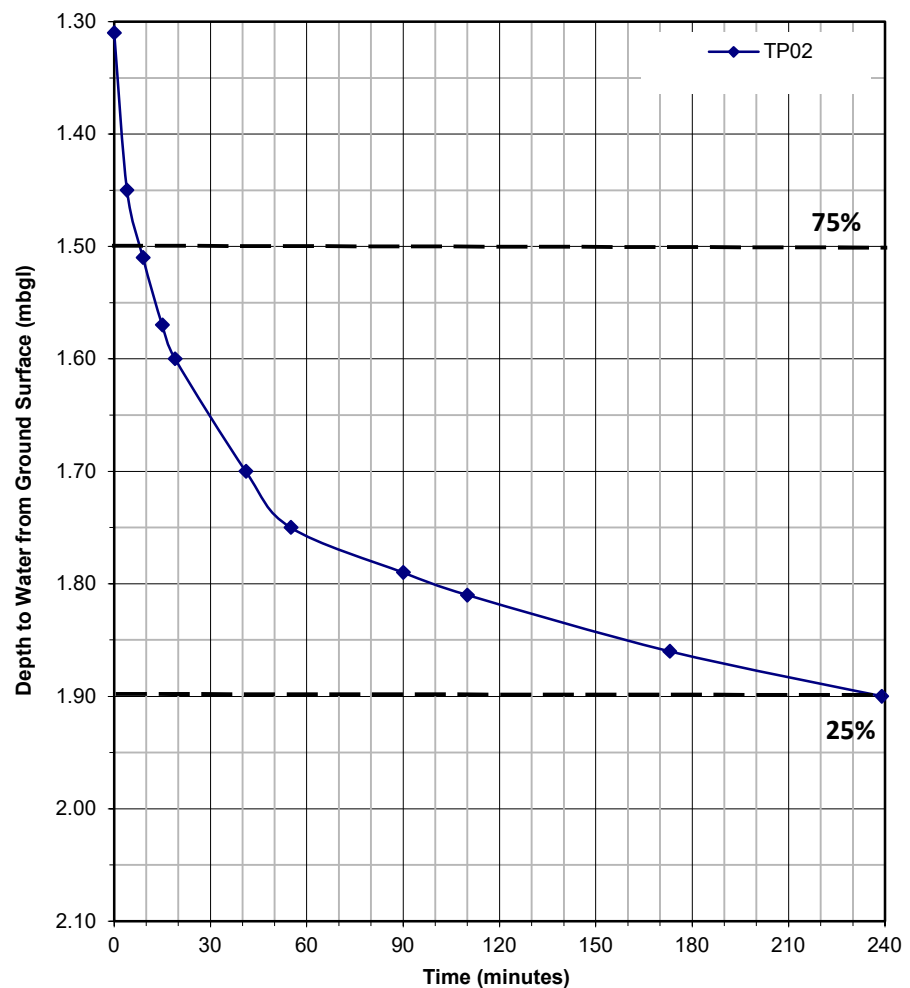
Dimensions: 0.6mWx2.0mLx2.10mD

Soil Description - test response zone:

1.3m to 2.1m - Slightly sandy CLAY, containing abundant gravel sized siltstone lithorelicts (Middle Coal Measures)

Time (mins) Depth BGL

0	1.31
4	1.45
9	1.51
15	1.57
19	1.60
41	1.70
55	1.75
90	1.79
110	1.81
173	1.86
239	1.90



Calculated Soil Infiltration Rate, $f = 1.0 \times 10^{-5}$ to 1.3×10^{-5} m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

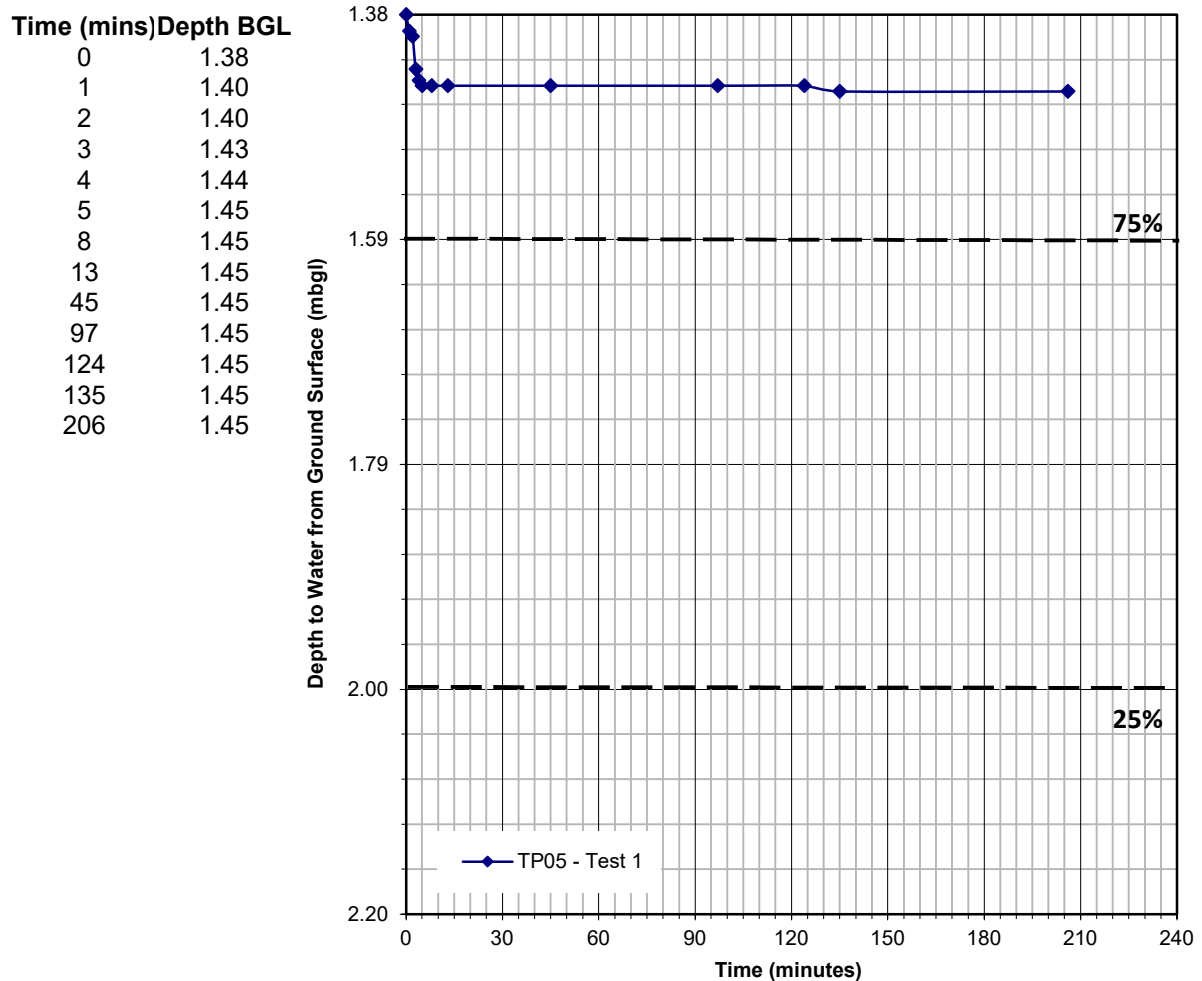
Test Location: TP05 - Test 1

Groundwater: unknown

Dimensions: 0.6mWx1.7mLx2.20mD

Soil Description - test response zone:

0.3m to 2.3m - Slightly sandy CLAY, containing some gravel sized mudstone lithorelicts (Middle Coal Measures)



Infiltration Rate could not be calculated(0.07m drop; 09% empty in 206 minutes)

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

Test Location: TP07 - Test 1

Groundwater: unknown

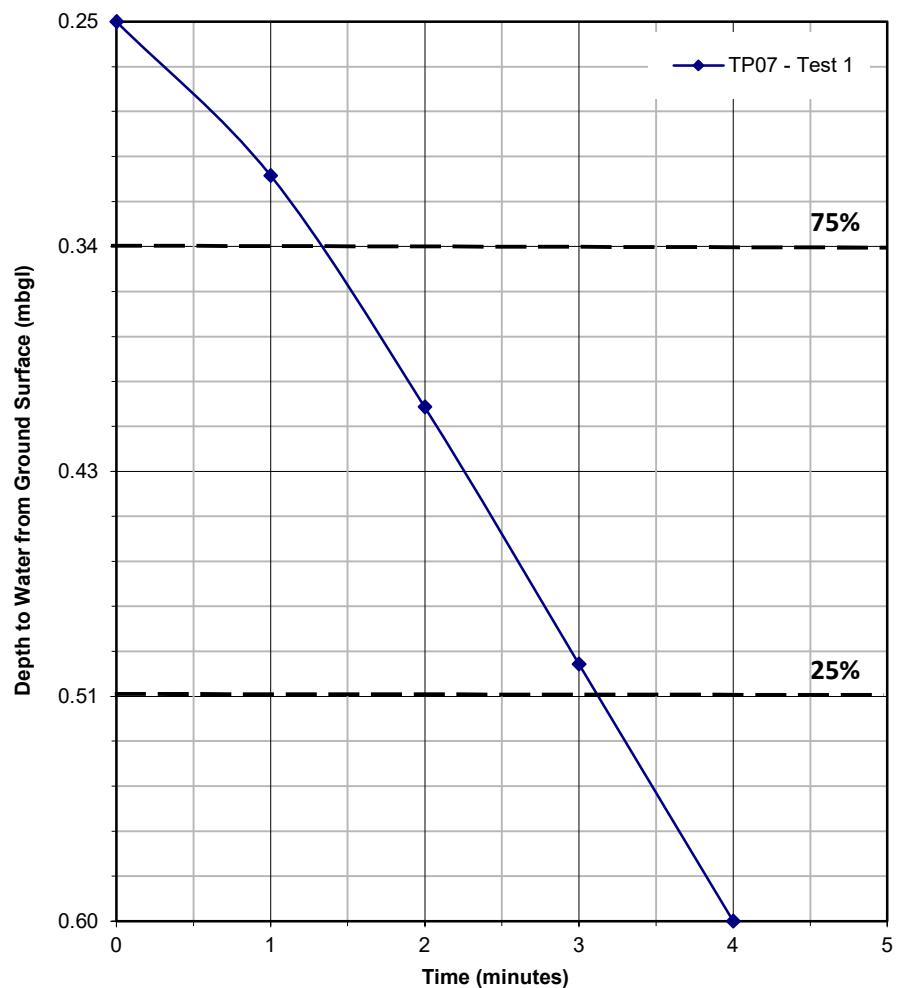
Dimensions: 0.6mWx1.5mLx0.60mD

Soil Description - test response zone:

0.0m to 0.7m - Very clayey sandy GRAVEL (Made Ground)

Time (mins)Depth BGL

0	0.25
1	0.31
2	0.40
3	0.50
4	0.60
0	0.00
0	0.00



Calculated Soil Infiltration Rate, $f = 1.0 \times 10^{-3}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

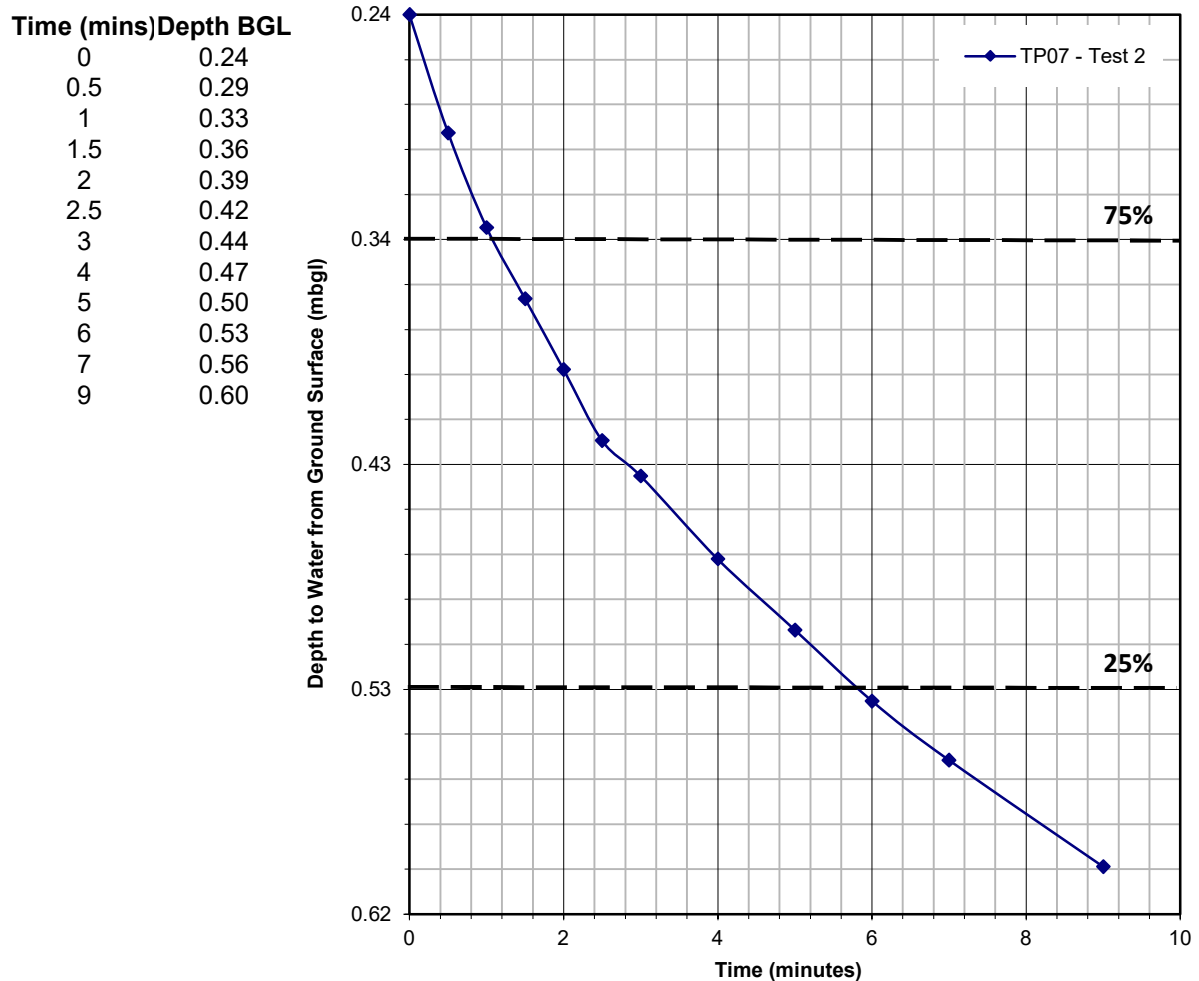
Test Location: TP07 - Test 2

Groundwater: unknown

Dimensions: 0.6mWx1.5mLx0.60mD

Soil Description - test response zone:

0.0m to 0.7m - Very clayey sandy GRAVEL (Made Ground)



Calculated Soil Infiltration Rate, $f = 3.6 \times 10^{-4}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

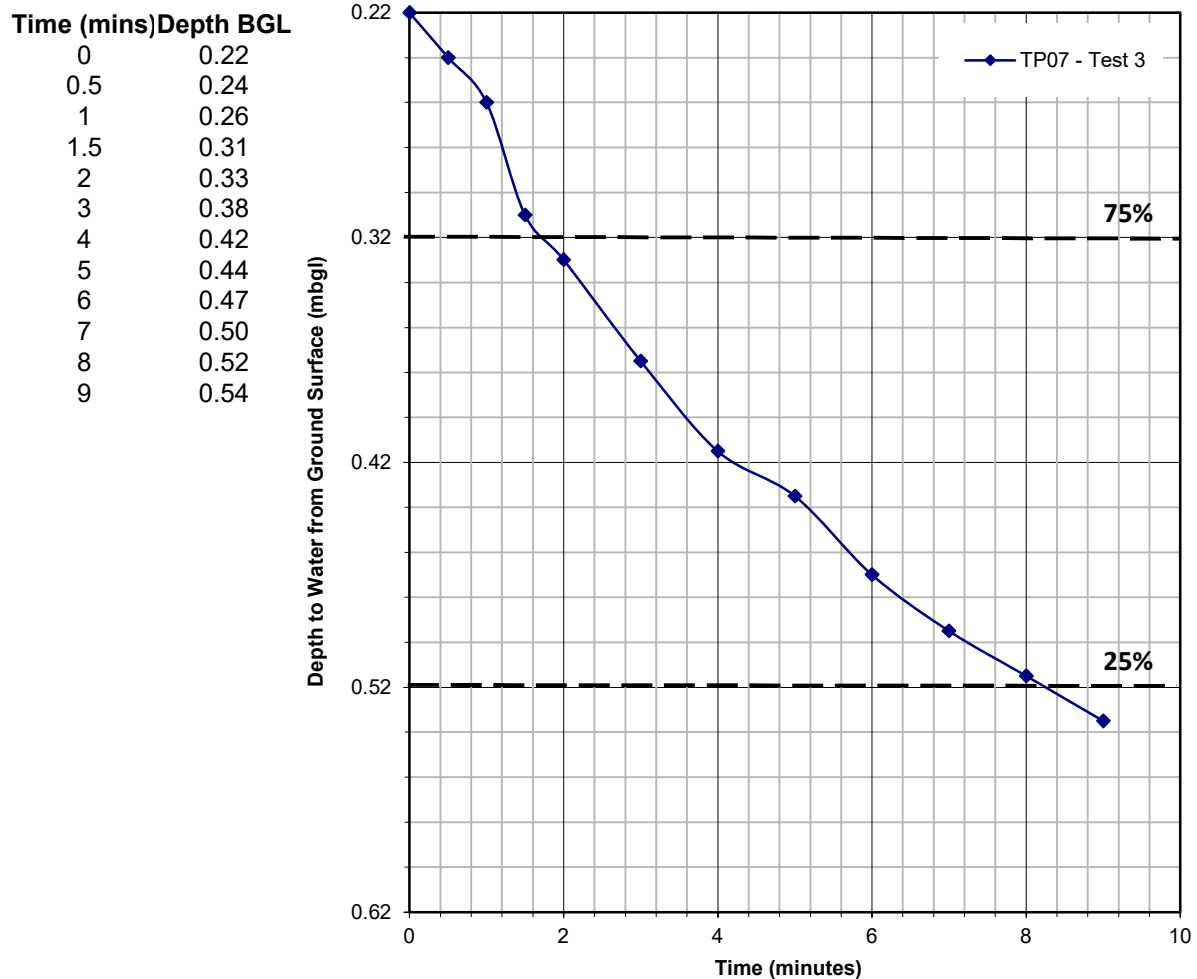
Test Location: TP07 - Test 3

Groundwater: unknown

Dimensions: 0.7mWx1.1mLx0.62mD

Soil Description - test response zone:

0.0m to 0.7m - Very clayey sandy GRAVEL (Made Ground)



Calculated Soil Infiltration Rate, $f = 2.6 \times 10^{-4}$ m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

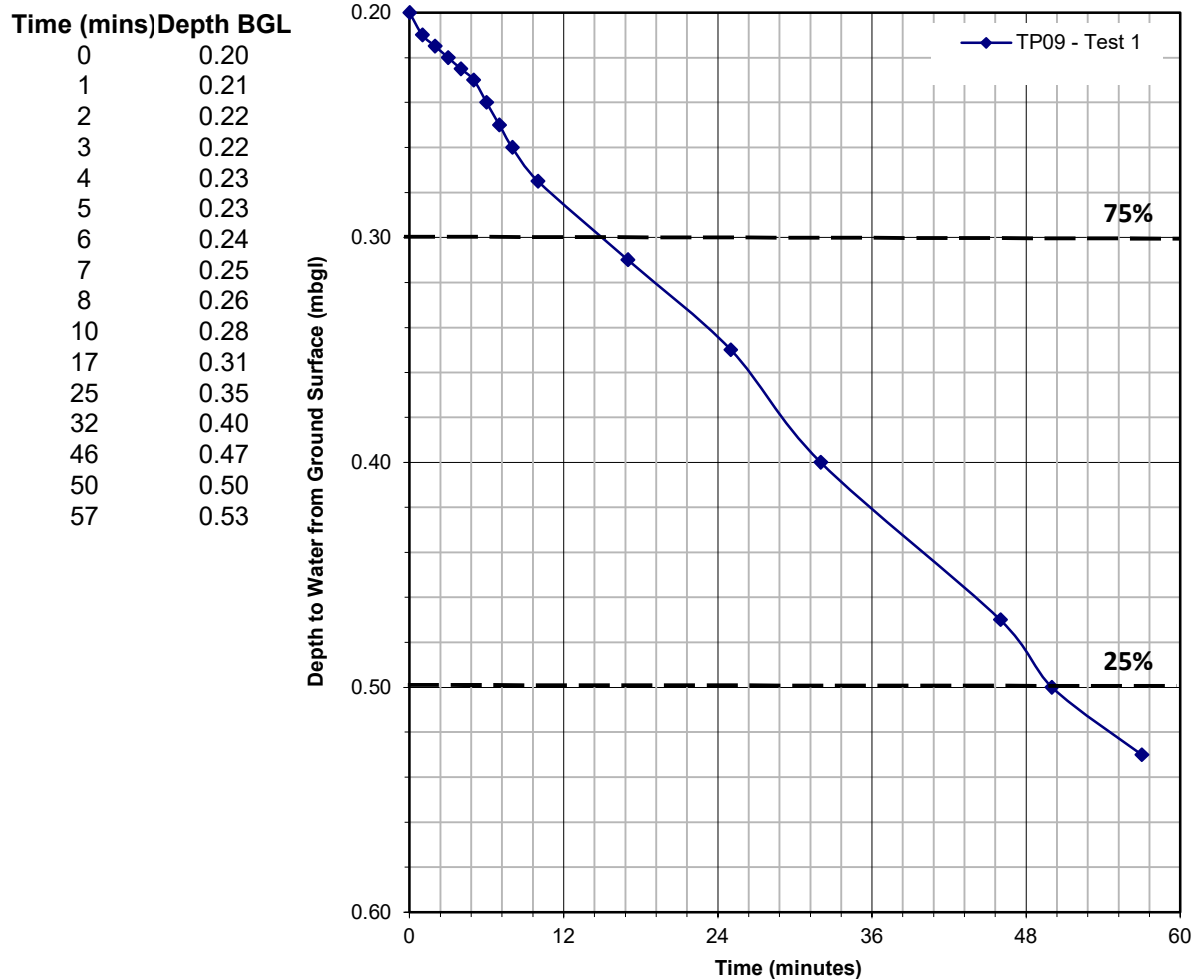
Test Location: TP09 - Test 1

Groundwater: unknown

Dimensions: 0.6mWx1.2mLx0.70mD

Soil Description - test response zone:

0.0m to 0.7m - Slightly gravelly sandy CLAY. Contains some cobble and boulder sized brick and concrete (Made Ground)



Calculated Soil Infiltration Rate, $f = 3.6 \times 10^{-5}$ to 4.3×10^{-5} m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Site: Begelly Park Gardens, Begelly, Kilgetty,
Pembrokeshire, SA68 0YH

Report No: 13.10.028b

Date Tested: 14/03/2023

Test Location: TP09 - Test 2

Groundwater: unknown

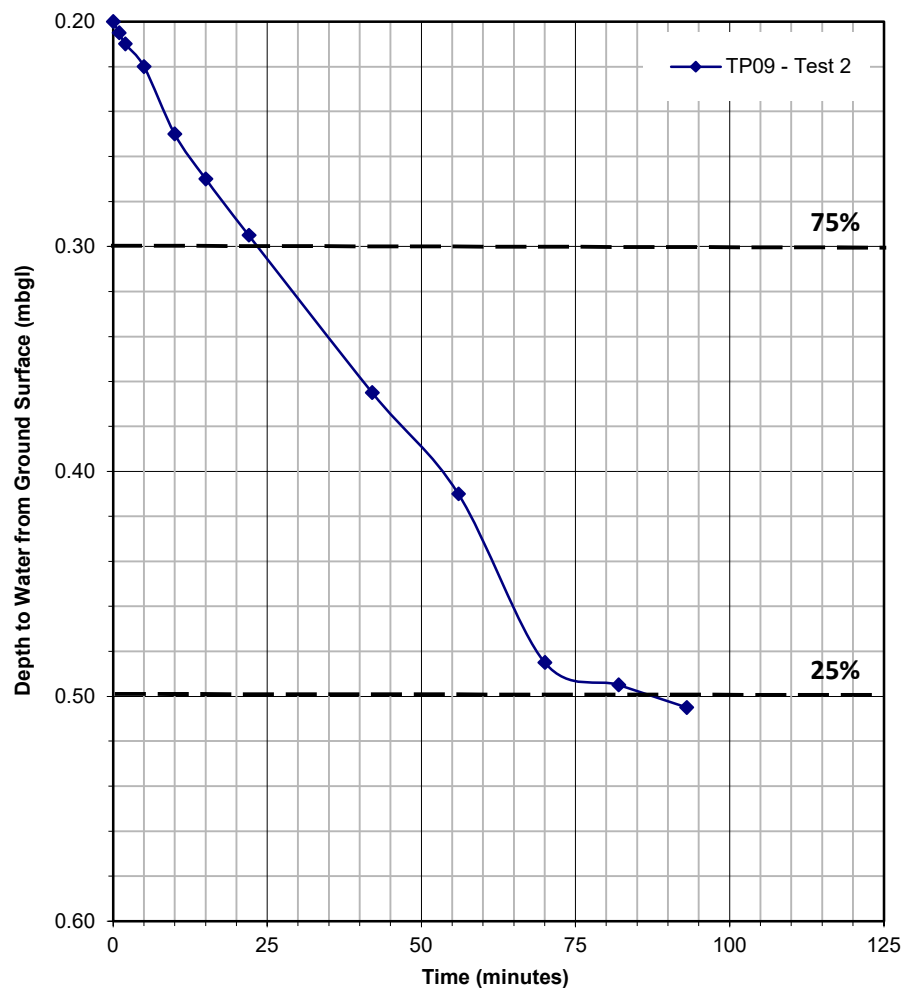
Dimensions: 0.6mWx1.2mLx0.70mD

Soil Description - test response zone:

0.0m to 0.7m - Slightly gravelly sandy CLAY. Contains some cobble and boulder sized brick and concrete (Made Ground)

Time (mins) Depth BGL

0	0.20
1	0.21
2	0.21
5	0.22
10	0.25
15	0.27
22	0.30
42	0.37
56	0.41
70	0.49
82	0.50
93	0.51



Calculated Soil Infiltration Rate, $f = 2.2 \times 10^{-5}$ to 2.7×10^{-5} m/s

**TRIAL PIT INFILTRATION TESTING
to BRE Digest 365**

Report:
13.10.028b

Project:	Begelly Park Gardens, Begelly, Pembrokeshire, SA68 0YH
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Ambient air temperature (°C): 9

Barometric pressure (mB): 1007

Barometric trend: Falling

Weather conditions: Light rain

Groundwater monitoring					

Hole ID	Ground level (mAOD)	Water depth (m)	Water level (mAOD)	Depth of pipe base (m)	Remarks
CT02	+55.80	1.10	+54.70	3.00	
CT04	+57.90	2.40	+55.50	3.00	

Gas monitoring									
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Gas Monitoring							
Hole ID	Methane CH ₄ (%v/v)	Carbon Dioxide CO ₂ (%v/v)	Oxygen O ₂ (%v/v)	Flow Rate (l/h)	Well Pressure (mBar)	PID* (ppm)	Remarks
CT02	<0.1	0.3	20.5	0.0	0.00		
CT04	<0.1	1.2	15.9	0.2	0.03		

Note: See Exploratory Hole log for well details

SUMMARY OF GAS & GROUNDWATER MONITORING - 28.Mar.23	Report No.
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Report No.
13.10.028b

APPENDIX C

LABORATORY TEST REPORTS

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone:- 01327 860947/860060

Email: lab@listersgeotechnics.co.uk

PROJECT INFORMATION		SAMPLE INFORMATION	
Site Location:- Begelly Park Gardens Begelly Park Gardens Kilgetty Pembrokeshire SA68 0YH	Laboratory Tests Undertaken:- TEST TYPE Natural Moisture Contents (MC%) Liquid Limits (%) Plastic Limits (%) Plasticity Index (%) Linear Shrinkage (%) PSD - Wet Sieving Engineering Sample Descriptions Passing 425/63 (µm) Hydrometer Loss on Ignition (%) Soil Suctions (kPa) Bulk Density (Mg/m ³) Strength Tests Soluble Sulphate Content (SO ₄ g/l) pH value California Bearing Ratios (CBR) Compaction Tests	TEST METHOD (BS 1377:Part 2:1990 Clause 3.2) (BS 1377:Part 2:1990 Clause 4.3) (BS 1377:Part 2:1990 Clause 5.3) (BS 1377:Part 2:1990 Clause 5.4) (BS 1377:Part 2:1990 Clause 6.5) (BS 1377:Part 2:1990 Clause 9.2) (BS 5930 : Section 6) - (BS 1377:Part 2:1990 Clause 9.5) - BRE Digest IP 4/93, 1993 (BS 1377:Part 2:1990 Clause 7.2) (BS 1377:Part 7:1990 Clause 8 & 9) (BS 1377:Part 3:1990 Clause 5.3) (BS 1377:Part 3:1990 Clause 9.4) (BS 1377:Part 4:1990 Clause 7) (BS 1377:Part 4:1990 Clauses 3.0-3.6)	TESTED ☒ ☒ ☒ ☒ ☐ ☒ ☐ ☒ ☐ ☐ ☒ ☒ ☐ ☐
Client Reference:- Date Samples Received:- 22 March 2023 Date Testing Completed:- 31 March 2023	The results relate only to the samples tested This test-report may not be reproduced, except with full and written approval of GROUNDTECH LABORATORIES		
Laboratory testing in accord with BS EN ISO/IEC 17025-2000 and Quality Management in accord with ISO 9001			Quality Assured to ISO 9001
Signed on behalf of GroundTech Laboratories:-  Technical Signatory			
GEOTECHNICAL LABORATORY TEST RESULTS		Report No:	13.10.028b

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone: 01327 860947/860060

Fax: 01327 860430

Email: groundtech@listersgeotechnics.co.uk

**Quality Assured
to ISO 9001**

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS			
Test Location	Sample Type	Sample Depth -m	Test Type	WC %	LL %	PL %	PI %	Passing 425 μm %	Modified PI %	Class	Passing 63 μm %	WC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m³	Test Type	Cell Pressure kN/m²	Deviator Stress kN/m²	Apparent Cohesion kN/m²	φ	pH Value	Soluble Sulphate Content SO4 g/l		
CT 01	D	0.40		19																						
	D	1.00	PI/63	16	36	24	12	48	6	CI	40	0.44	26	-0.67									5.3	0.19		
	D	1.40	PI/63	13	33	23	10	31	3	CL	22	0.39	25	-1.00												
CT 02	D	2.50	PSD	12																						
	D	0.40		28																						
	D	1.00	PI/63	22	41	25	16	65	10	CI	55	0.54	27	-0.19												
CT 03	D	1.40		20																						
	D	2.00	PI/63	23	33	22	11	39	4	CL	30	0.70	24	0.09												
	D	3.00	PI/63	15	37	24	13	47	6	CI	39	0.41	26	-0.69												
CT 04	D	0.40		39																						
	D	0.50	PI/63	37	52	26	26	99	26	CH	88	0.71	28	0.42									5.0	0.19		
	D	0.90		48											21											
CT 04	D	1.20	PI/63	21	37	25	12	95	11	MI	68	0.57	27	-0.33												
	D	1.60		23																						
	D	2.00	PI/63	22	34	24	10	53	5	ML	41	0.65	26	-0.20												
CT 04	D	3.90		13																						
	D	0.30		16																						
	D	1.00	PI/63	18	47	28	19	49	9	MI	38	0.38	30	-0.53		7										
CT 04	D	1.50		22																						
	D	2.10	PI/63	53	72	36	36	98	35	MV	89	0.74	38	0.47												
	D	2.50		29																						
CT 04	D	3.00		30																						
	D	3.30	PI/63	19	35	23	12	60	7	CL	47	0.54	25	-0.33												
Symbols:				U	Undisturbed Sample					R	Remoulded				PI	Plasticity Index			T	Triaxial Undrained				L	100mm specimen	
				D	Disturbed Sample					63	Passing 63μm				F	Filter Paper Suction Tests			M	Multistage Triaxial				S	38mm specimen	
				B	Bulk Sample					H	Hydrometer				CC	Continuous Core			HP	Hand Penetrometer						
				W	Water Sample					PSD	Wet Sieving								V	Vane Test						
LABORATORY TEST RESULTS																				Project Reference 13.10.028b						

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

Telephone: 01327 860947/860060

Fax: 01327 860430

Email: groundtech@listersgeotechnics.co.uk

**Quality Assured
to ISO 9001**

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS			
Test Location	Sample Type	Sample Depth -m	Test Type	WC %	LL %	PL %	PI %	Passing 425 µm %	Modified PI %	Class	Passing 63 µm %	WC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m³	Test Type	Cell Pressure kN/m²	Deviator Stress kN/m²	Apparent Cohesion kN/m²	φ	pH Value	Soluble Sulphate Content SO4 g/l		
CT 04	D	4.00		19																						
CT 05	D	0.70		18																						
	D	1.20	PI/63	34	45	30	15	91	14	MI	78	0.76	32	0.27	27								4.5	0.15		
	D	1.50	PI/63	37	59	33	26	84	22	MH	71	0.63	35	0.15												
	D	1.80		65																						
	D	2.40	PI/63	12	34	24	10	32	3	ML	19	0.35	26	-1.20												
	D	3.50		17																						
	SPT	5.00		17																						
TP 01	D	0.50		50																						
	D	1.50	PI/63	25	42	24	18	82	15	CI	68	0.60	26	0.06									6.6	0.15		
	D	2.00		24																						
TP 02	D	1.00		16																						
	D	1.50	PI/63	24	40	25	15	64	10	CI	52	0.60	27	-0.07												
	D	2.00		28																						
TP 03	D	1.00	PI/63	31	50	26	24	98	24	CI	83	0.62	28	0.21												
	D	1.50	PSD	20																						
	D	2.00		14																						
TP 04	D	1.00		15																						
	D	2.00	PSD	14																						
TP 05	D	1.00	PI/63	22	35	24	11	53	6	CL	42	0.63	26	-0.18									6.1	0.17		
	D	1.50	PSD	19											32											
TP 06	D	0.60	PI/63	36	56	32	24	87	21	MH	72	0.64	34	0.17												
TP 07	D	0.50	PI/63	17	34	22	12	35	4	CL	24	0.50	24	-0.42												
Symbols:				U	Undisturbed Sample					R	Remoulded				PI	Plasticity Index			T	Triaxial Undrained				L	100mm specimen	
				D	Disturbed Sample					63	Passing 63µm				F	Filter Paper Suction Tests			M	Multistage Triaxial				S	38mm specimen	
				B	Bulk Sample					H	Hydrometer				CC	Continuous Core			HP	Hand Penetrometer						
				W	Water Sample					PSD	Wet Sieving								V	Vane Test						
LABORATORY TEST RESULTS																					Project Reference 13.10.028b					

GroundTech Laboratories

Geotechnical Testing Facility

Slapton Hill Barn, Blakesley Road, Slapton, Towcester, Northants. NN12 8QD

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**Quality Assured
to ISO 9001**

SAMPLES				CLASSIFICATION TESTS							CLASSIFICATION TESTS							STRENGTH TESTS					CHEMICAL TESTS			
Test Location	Sample Type	Sample Depth -m	Test Type	WC %	LL %	PL %	PI %	Passing 425 μm %	Modified PI %	Class	Passing 63 μm %	WC/ LL	PL+ 2%	Liquidity Index	Loss on Ignition %	Soil Suction kPa	Bulk Density Mg/m³	Test Type	Cell Pressure kN/m²	Deviator Stress kN/m²	Apparent Cohesion kN/m²	φ	pH Value	Soluble Sulphate Content SO4 g/l		
TP 08	D	0.75	PI/63	16	35	22	13	50	7	CL	38	0.46	24	-0.46									7.1	0.25		
TP 09	D	0.60		11																			7.2	0.17		
TP 10	D	0.65	PI/63	18	37	24	13	46	6	CI	32	0.49	26	-0.46												
TP 11	D	1.00	PI/63	14	31	20	11	38	4	CL	29	0.45	22	-0.55												
TP 12	D	2.00	PSD	12																						
	D	1.00		29																						
	D	1.50	PI/63	13	39	24	15	52	8	CI	41	0.33	26	-0.73												
TP 13	D	2.50	PI/63	17	34	21	13	42	6	CL	28	0.50	23	-0.31	5											
	D	1.20	PI/63	23	36	22	14	77	11	CI	61	0.64	24	0.07									5.9	0.13		
	D	2.00	PI/63	18	33	21	12	49	6	CL	36	0.55	23	-0.25												
TP 14	D	1.00		28											11											
	D	2.00	PI/63	33	50	34	16	66	10	MI	51	0.66	36	-0.06	10											
	D	2.50		47											8								5.4	0.21		
Symbols:				U	Undisturbed Sample					R	Remoulded				PI	Plasticity Index			T	Triaxial Undrained				L	100mm specimen	
				D	Disturbed Sample					63	Passing 63μm				F	Filter Paper Suction Tests			M	Multistage Triaxial				S	38mm specimen	
				B	Bulk Sample					H	Hydrometer				CC	Continuous Core			HP	Hand Penetrometer						
				W	Water Sample					PSD	Wet Sieving								V	Vane Test						
LABORATORY TEST RESULTS																				Project Reference 13.10.028b						

GroundTech Laboratories

Geotechnical Testing Facility

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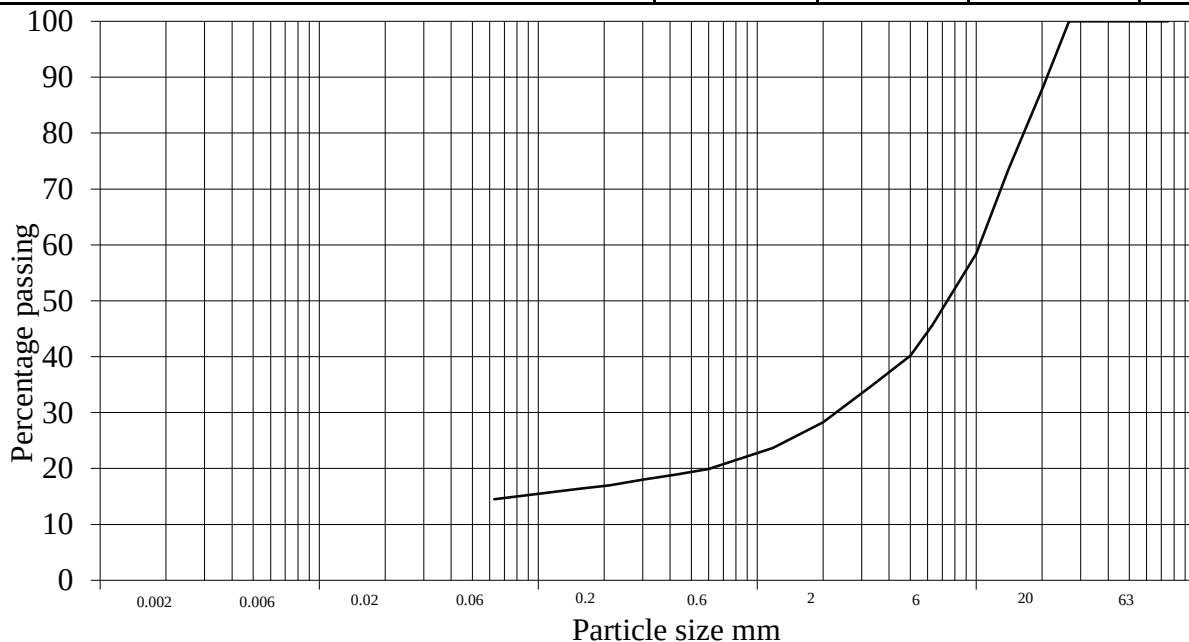
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		Test Method: BS 1377 : Part 2 : 1990 : 9.2			
		BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
Site:	Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH	75mm	100.00		
		63mm	100.00		
Test Location:	CT 01	50mm	100.00		
		37.5mm	100.00		
Sample Depth:	2.50m -3.00m	26.5mm	100.00		
		20mm	87.80		
14mm		73.40			
10mm		58.40			
6.3mm		45.60			
5mm		40.20			
Hydrometer No.:		3.5mm	34.90		
		2mm	28.30		
SG Gs:		1.18mm	23.70		
Water Visc. (N):		600µm	19.90		
		425µm	18.90		
		300µm	18.00		
		212µm	17.00		
		150µm	16.30		
		63µm	14.50		
Dry Mass of Soil after pretreatment (g):					



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
15%				14%			72%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
13.10.028b

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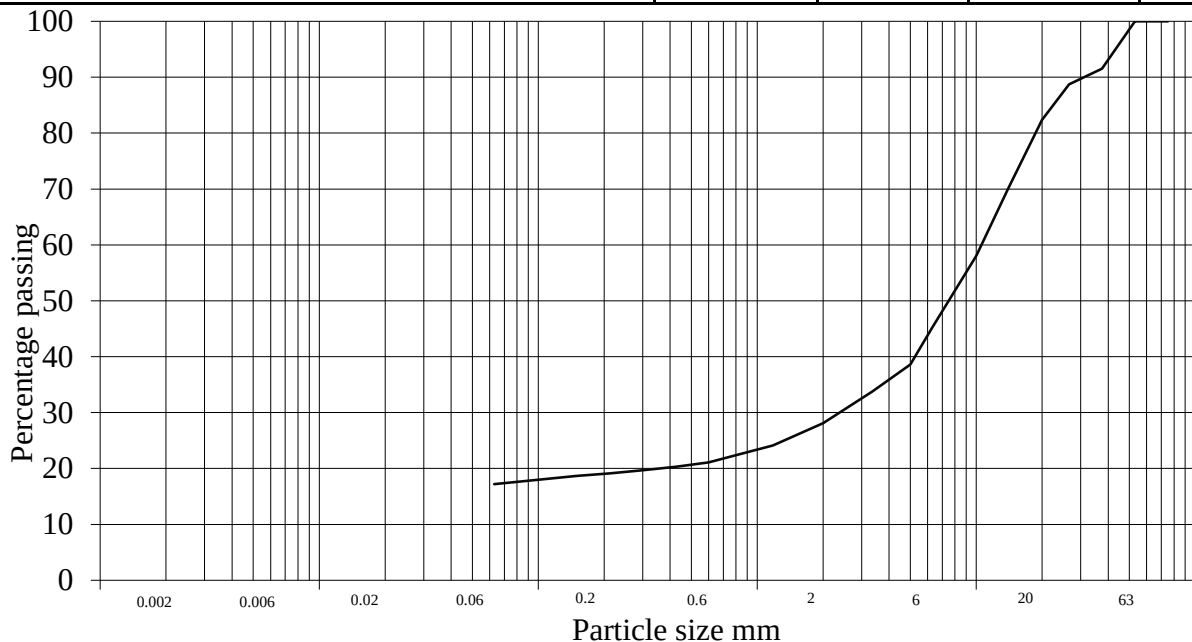
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**Quality
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ISO 9001**

		Test Method: BS 1377 : Part 2 : 1990 : 9.2			
		BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
Site:	Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH	75mm	100.00		
		63mm	100.00		
Test Location:	TP 03	50mm	100.00		
		37.5mm	91.50		
Sample Depth:	1.50m	26.5mm	88.70		
		20mm	82.40		
Sample Description:		14mm	70.10		
		10mm	58.00		
Hydrometer No.:		6.3mm	45.20		
		5mm	38.60		
SG Gs:		3.5mm	33.80		
		2mm	28.10		
Water Visc. (N):		1.18mm	24.10		
		600µm	21.10		
Dry Mass of Soil after pretreatment (g):		425µm	20.30		
		300µm	19.70		
		212µm	19.10		
		150µm	18.70		
		63µm	17.20		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	17%			11%			72%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
13.10.028b

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Dry Mass of Soil after pretreatment (g):

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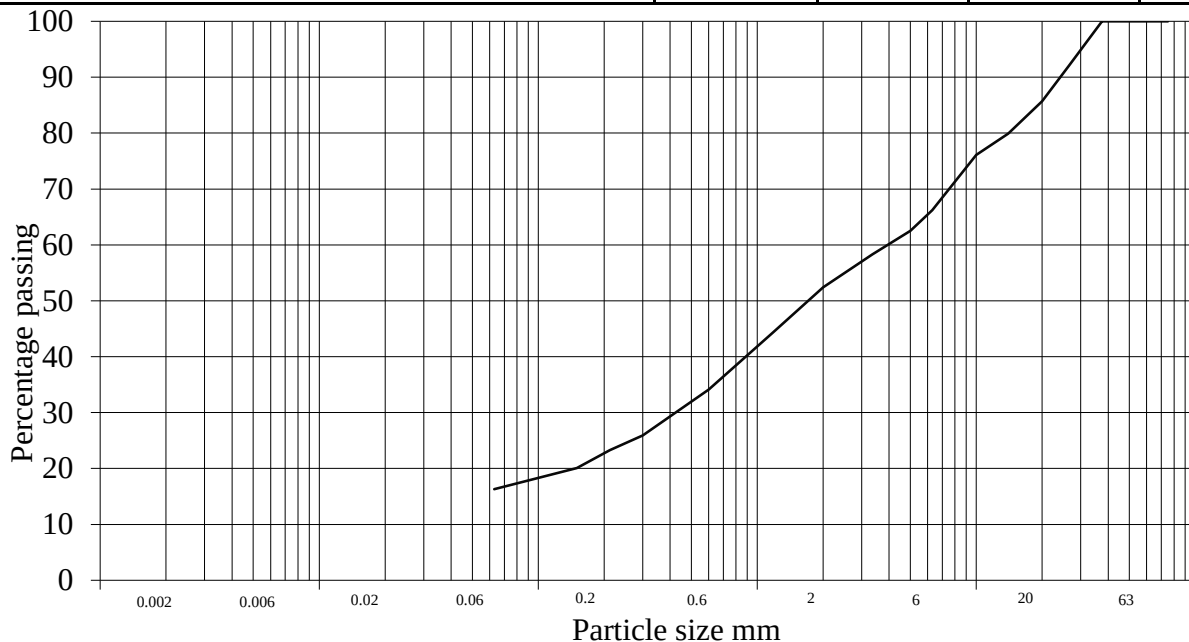
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		Test Method: BS 1377 : Part 2 : 1990 : 9.2			
		BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
Site:	Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH	75mm	100.00		
		63mm	100.00		
Test Location:	TP 05	50mm	100.00		
		37.5mm	100.00		
Sample Depth:	1.50m	26.5mm	92.10		
		20mm	85.70		
Sample Description:		14mm	79.90		
		10mm	76.10		
Hydrometer No.:		6.3mm	66.20		
		5mm	62.50		
SG Gs:		3.5mm	58.30		
		2mm	52.40		
Water Visc. (N):		1.18mm	44.30		
		600µm	34.10		
Dry Mass of Soil after pretreatment (g):		425µm	30.00		
		300µm	25.90		
		212µm	23.30		
		150µm	20.10		
		63µm	16.30		



CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
16%				36%			48%			0%

PARTICLE SIZE DISTRIBUTION

Project Reference
13.10.028b

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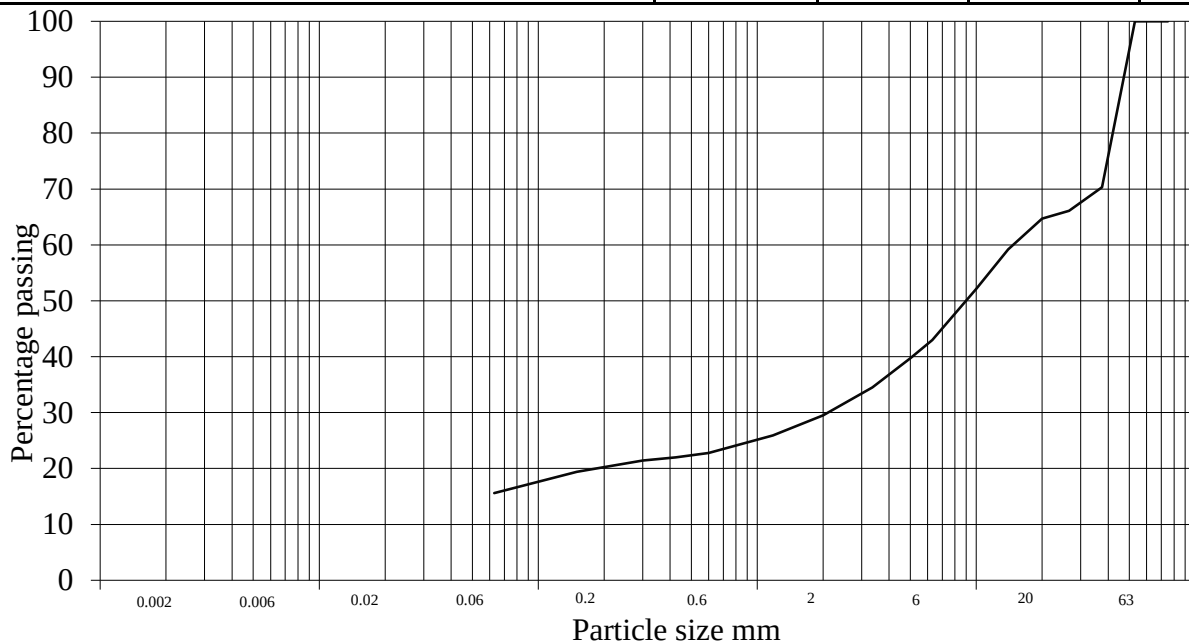
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**Quality
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ISO 9001**

		Test Method: BS 1377 : Part 2 : 1990 : 9.2			
		BS test sieve	Cumulative Passing - %	Hydrometer Particle Diameter	Cumulative Passing - %
Site:	Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH	75mm	100.00		
		63mm	100.00		
Test Location:	TP 11	50mm	100.00		
		37.5mm	70.30		
Sample Depth:	2.00m	26.5mm	66.10		
		20mm	64.70		
Sample Description:		14mm	59.20		
		10mm	52.10		
Hydrometer No.:		6.3mm	43.00		
		5mm	39.70		
SG Gs:		3.5mm	34.50		
		2mm	29.50		
Water Visc. (N):		1.18mm	25.90		
		600µm	22.80		
Dry Mass of Soil after pretreatment (g):		425µm	22.00		
		300µm	21.40		
		212µm	20.40		
		150µm	19.40		
		63µm	15.60		

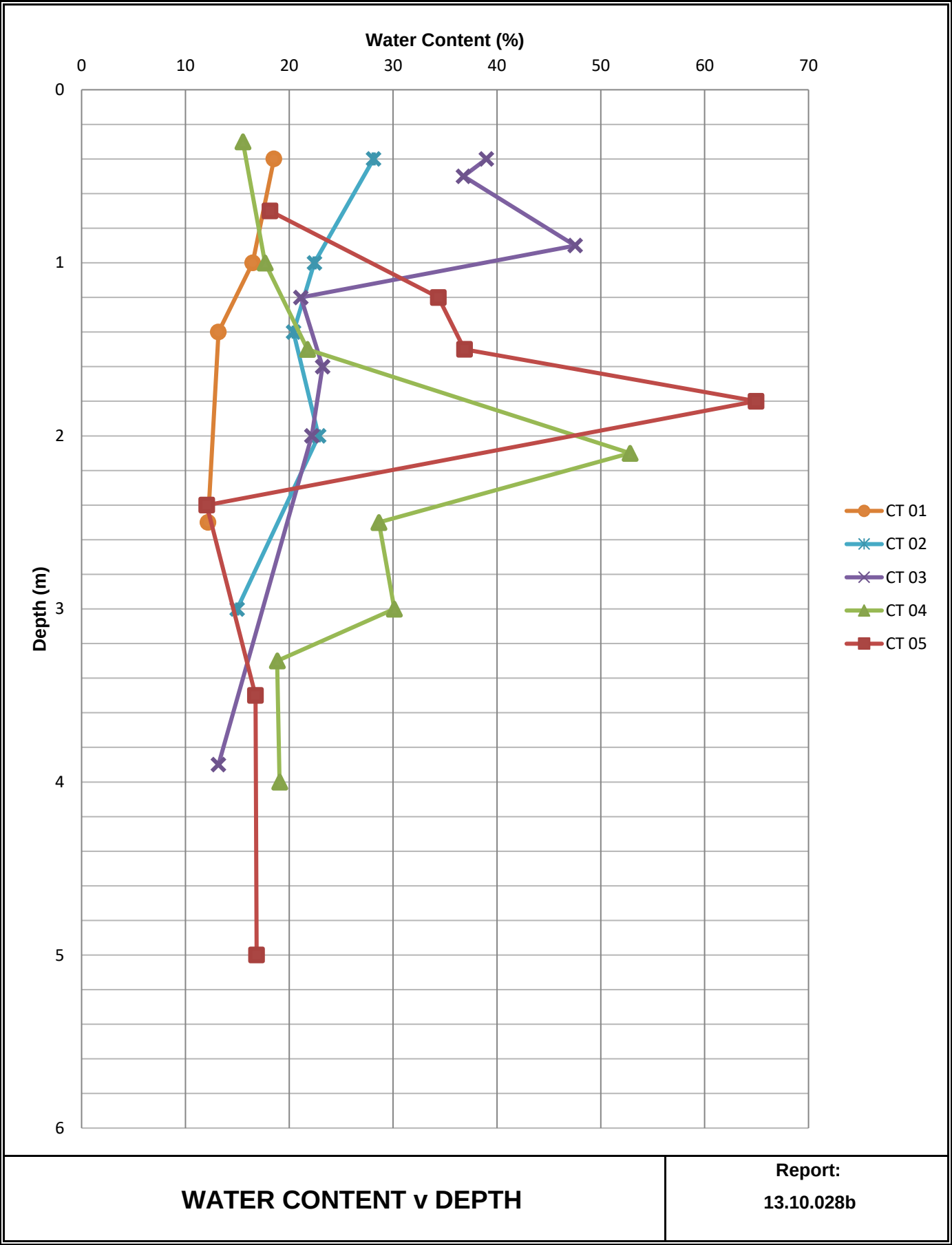


CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	16%			14%			71%			0%

PARTICLE SIZE DISTRIBUTION

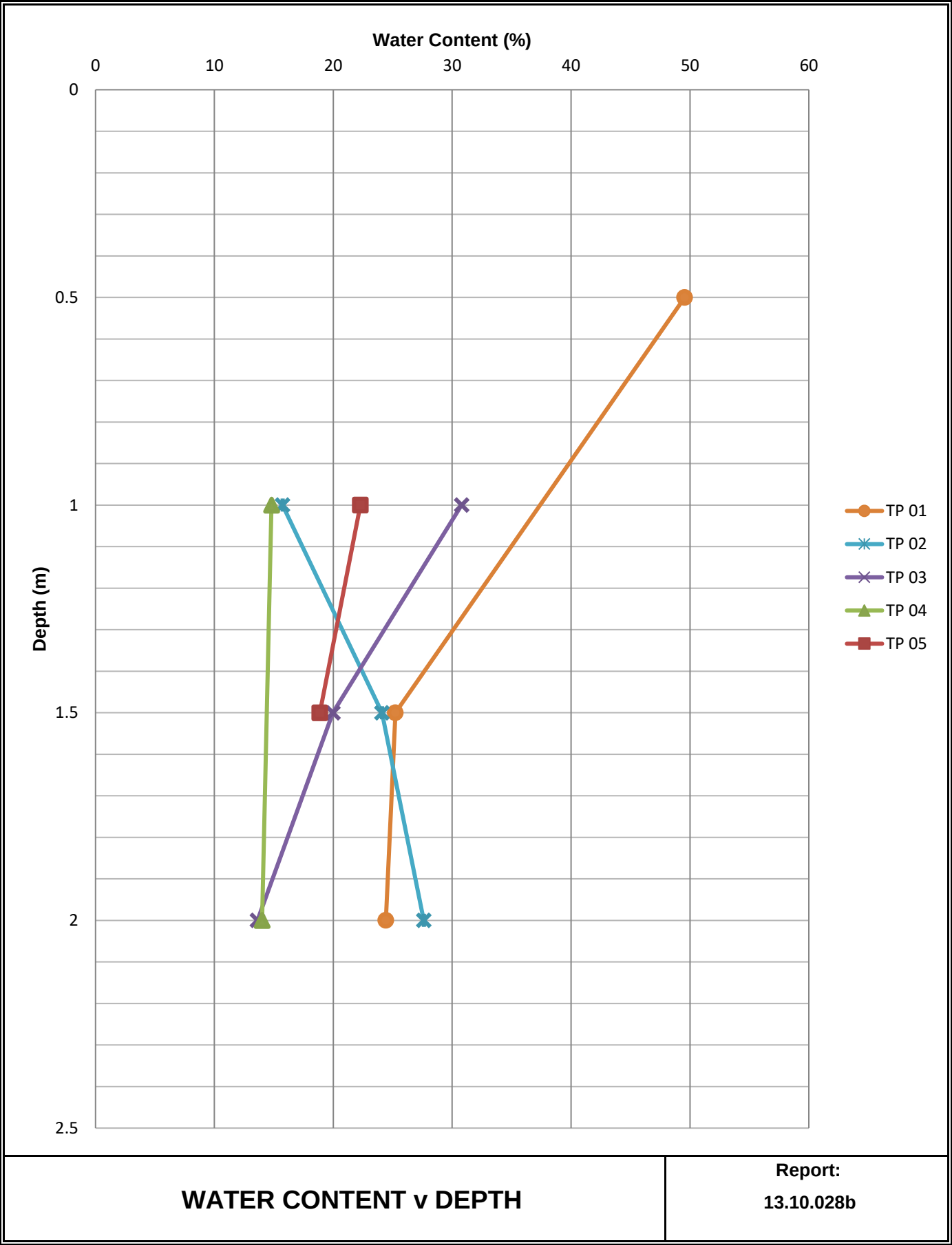
Project Reference
13.10.028b

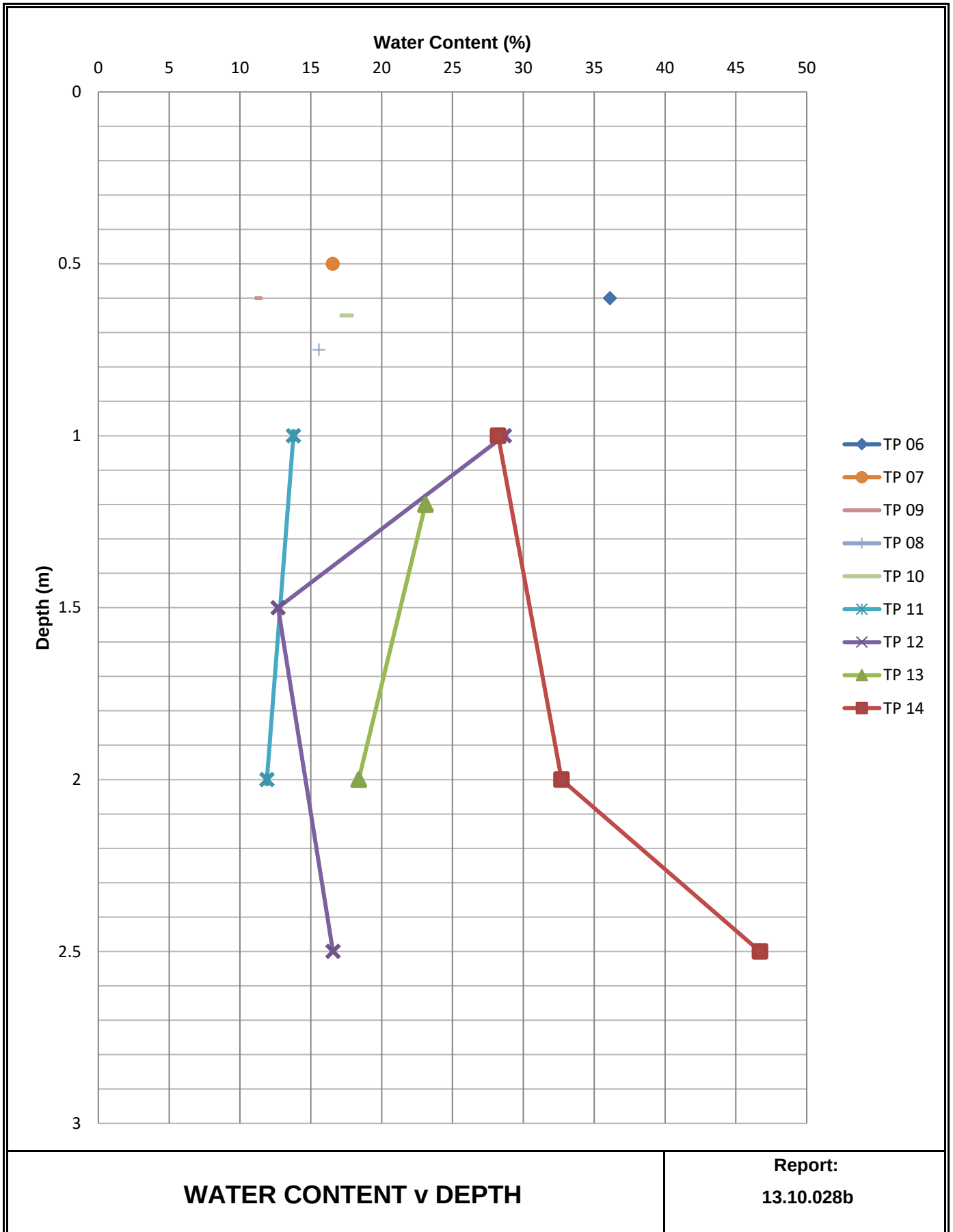
		Loss On Ignition - Summary of Results						
Project No. 13.10.028b		Project Name Begelly Park Gardens, Begelly, Kilgetty, Pembrokeshire, SA68 0YH						
Hole No.	Sample				Spec Ref.	Visual description	Loss on Ignition %	Remarks
	Ref	Top	Base	Type				
CT 03	12	0.90	1.20	D			20.9	
CT 04	18	1.00	1.50	D			6.7	
CT 05	28	1.80	2.40	D			27.3	
TP 05	44	1.50		D			32.1	
TP 12	54	2.50		D			5.4	
TP 14	57	1.00		D			11.4	
TP 14	58	2.00		D			9.8	
TP 14	59	2.50		D			8.4	
Key Tested in accordance with BS1377 : Part 3 : 1990, clause 4 unless annotated otherwise.							Approved By Tom	Table sheet 1 1

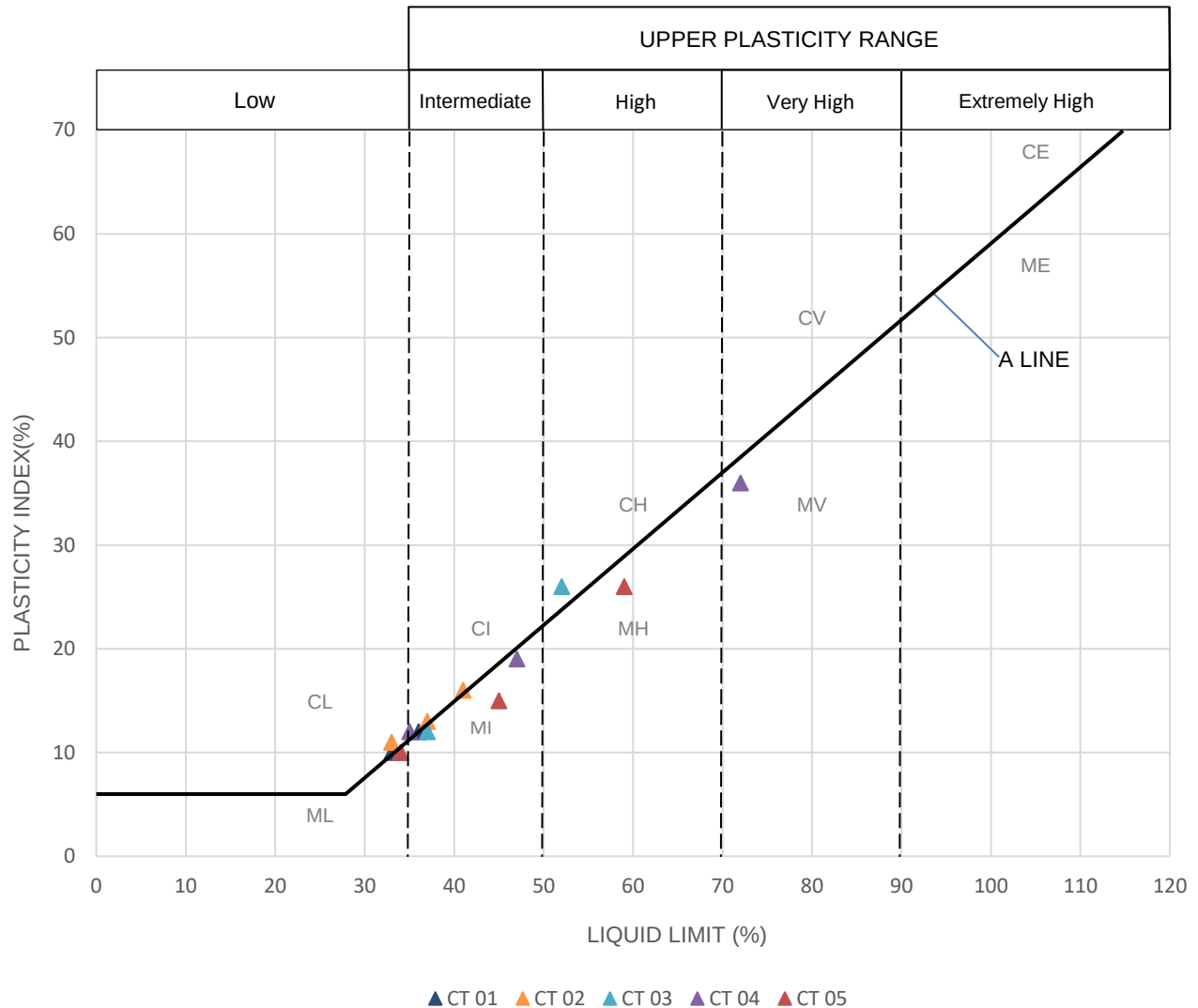


WATER CONTENT v DEPTH

Report:
13.10.028b

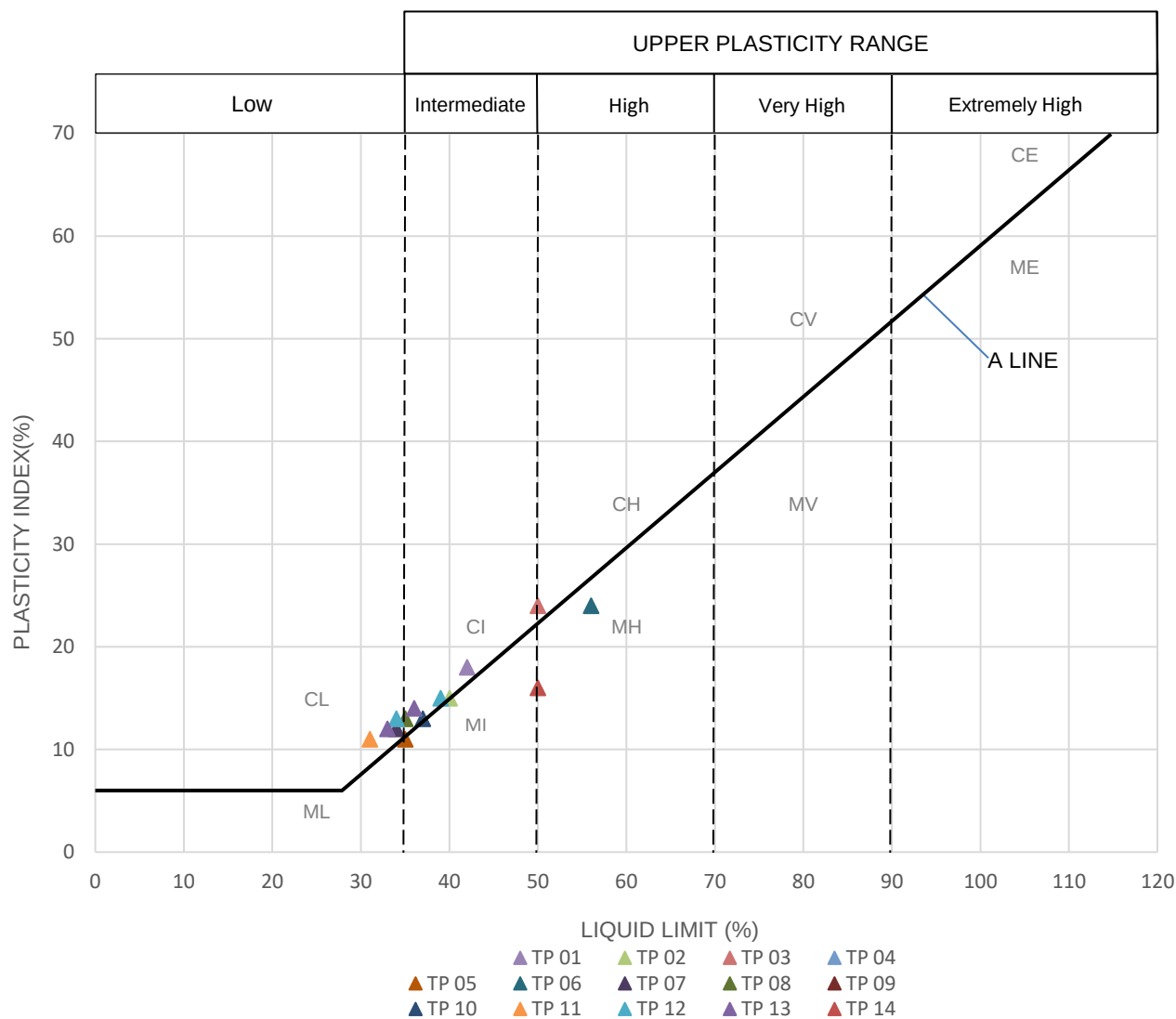






PLASTICITY CHART

Report:
13.10.028b



PLASTICITY CHART

Report:
13.10.028b



Amended Report

Report No.:	23-09871-2	Date of Re-Issue:	30-Mar-2023
Initial Date of Issue:	30-Mar-2023		
Client	Listers Geotechnical Consultants		
Client Address:	Slapton Hill Barn, Blakesley Road Slapton Towcester Northamptonshire NN12 8QD		
Contact(s):	Lee Chippington		
Project	13.10.028b Begelly		
Quotation No.:	Q22-29549	Date Received:	24-Mar-2023
Order No.:	13.10.028b/959	Date Instructed:	24-Mar-2023
No. of Samples:	8		
Turnaround (Wkdays):	7	Results Due:	03-Apr-2023
Date Approved:	30-Mar-2023		
Approved By:			

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: 13.10.028b Begelly

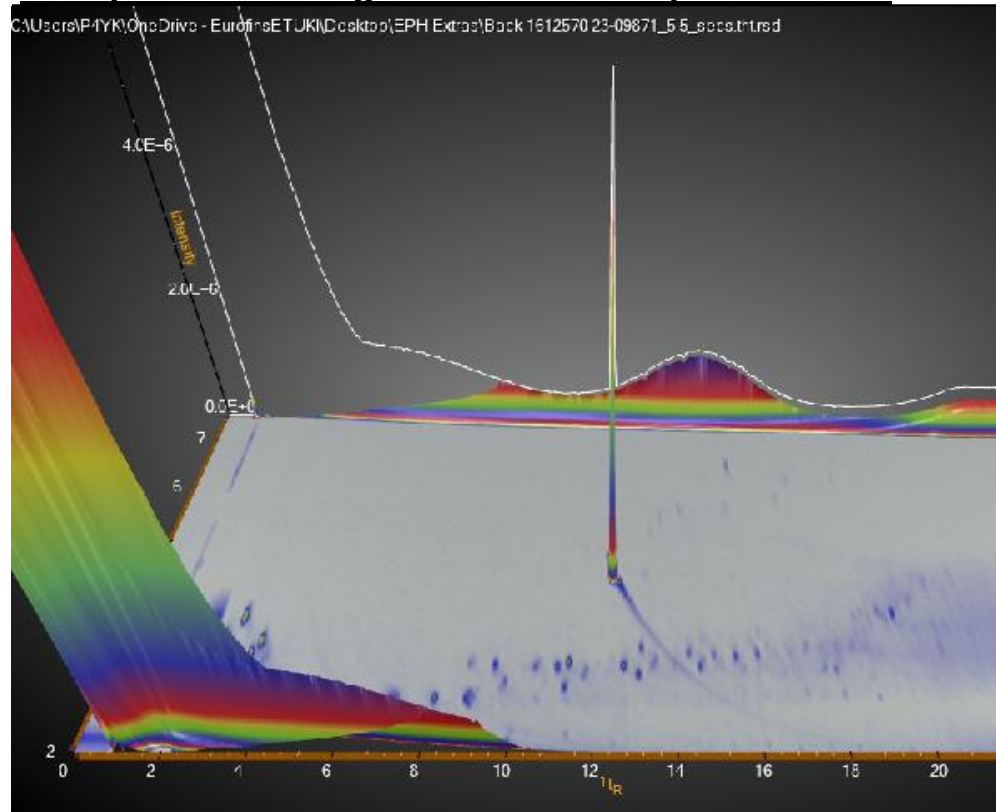
Client: Listers Geotechnical Consultants	Chemtest Job No.:				23-09871	23-09871	23-09871	23-09871	23-09871	23-09871	23-09871	23-09871
Quotation No.: Q22-29549	Chemtest Sample ID.:				1612570	1612571	1612572	1612573	1612574	1612575	1612576	1612577
	Sample Location:				TP01	TP02	TP03	TP04	TP05	TP12	TP13	TP14
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.50	0.10	0.50	0.15	0.50	0.50	0.30
	Date Sampled:				13-Mar-2023	13-Mar-2023	13-Mar-2023	13-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
	Asbestos Lab:				COVENTRY	COVENTRY						COVENTRY
Determinand	Accred.	SOP	Units	LOD								
ACM Type	U	2192		N/A	-	-						-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected						No Asbestos Detected
Moisture	N	2030	%	0.020	16	14	29	17	25	25	24	16
Chromatogram (AA Split)	N			N/A	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
Chromatogram VPH	N			N/A	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
pH	U	2010		4.0	8.2	8.1	6.4	6.7	6.1	6.2	6.3	8.1
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.017	0.017	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
Arsenic	U	2455	mg/kg	0.5	16	7.5	6.6	7.0	5.2	4.8	4.9	7.8
Cadmium	U	2455	mg/kg	0.10	0.12	0.16	0.10	< 0.10	< 0.10	< 0.10	0.13	0.11
Chromium	U	2455	mg/kg	0.5	23	18	9.6	14	11	11	11	10
Copper	U	2455	mg/kg	0.50	36	23	18	13	25	20	24	39
Mercury	U	2455	mg/kg	0.05	0.10	0.08	0.09	0.05	0.07	0.05	0.06	< 0.05
Nickel	U	2455	mg/kg	0.50	18	26	10	6.9	8.2	8.7	18	19
Lead	U	2455	mg/kg	0.50	63	22	30	14	20	16	27	16
Selenium	U	2455	mg/kg	0.25	0.50	0.77	0.58	1.1	1.3	0.74	0.81	0.48
Zinc	U	2455	mg/kg	0.50	110	66	30	26	22	28	40	50
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	0.13	0.13	0.16	0.13	0.15	0.15	< 0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	U	2690	mg/kg	2.00	6.0	6.1	6.2	5.6	6.1	5.9	6.4	5.6
Aliphatic EPH >C12-C16	U	2690	mg/kg	1.00	7.0	6.6	7.6	6.7	7.1	7.0	7.6	5.9
Aliphatic EPH >C16-C21	U	2690	mg/kg	2.00	3.0	2.5	3.4	< 2.0	< 2.0	2.7	2.2	2.2
Aliphatic EPH >C21-C35	U	2690	mg/kg	3.00	< 3.0	3.9	4.4	3.0	3.0	3.4	3.5	< 3.0
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	U	2690	mg/kg	5.00	18	19	22	17	18	19	20	16
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	18	19	22	17	18	19	20	16
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	4.0	3.7	4.0	3.3	3.5	3.0	3.5	3.2
Aromatic EPH >C16-C21	N	2690	mg/kg	2.00	15	12	14	10	11	11	18	13
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	12	8.6	11	6.6	5.0	5.5	5.0	8.5
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	3.5	< 1.0	< 1.0	< 1.0	< 1.0	1.5	< 1.0	< 1.0
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	31	25	29	21	19	20	27	25
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	35	25	29	21	19	22	27	25
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Soil

Project: 13.10.028b Begelly

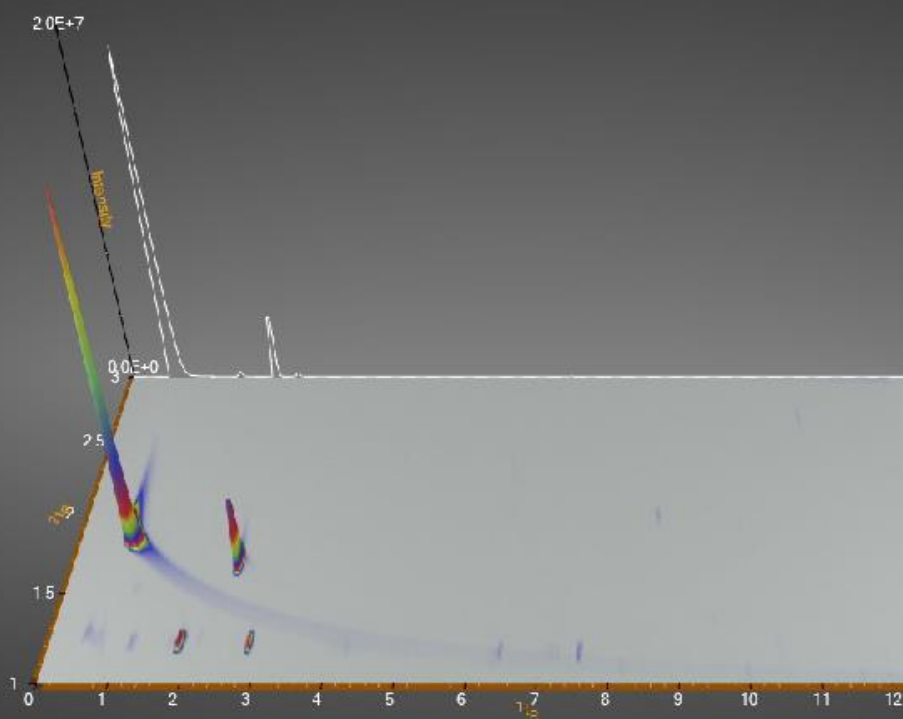
Client: Listers Geotechnical Consultants	Chemtest Job No.:				23-09871	23-09871	23-09871	23-09871	23-09871	23-09871	23-09871	23-09871
Quotation No.: Q22-29549	Chemtest Sample ID.:				1612570	1612571	1612572	1612573	1612574	1612575	1612576	1612577
	Sample Location:				TP01	TP02	TP03	TP04	TP05	TP12	TP13	TP14
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.10	0.50	0.10	0.50	0.15	0.50	0.50	0.30
	Date Sampled:				13-Mar-2023	13-Mar-2023	13-Mar-2023	13-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023	14-Mar-2023
	Asbestos Lab:				COVENTRY	COVENTRY						COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Total EPH >C10-C35	U	2690	mg/kg	10.00	49	44	51	38	38	39	46	40
Total EPH >C10-C40	N	2690	mg/kg	10.00	53	44	51	38	38	41	46	40
Naphthalene	U	2800	mg/kg	0.10	0.16	0.23	0.38	0.42	0.58	0.29	0.35	0.22
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10	< 0.10	< 0.10	0.15	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10	0.18	0.20	0.20	0.14	< 0.10	0.22	< 0.10	0.18
Anthracene	U	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	2800	mg/kg	0.10	0.31	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.15
Pyrene	U	2800	mg/kg	0.10	0.23	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14
Benzo[a]anthracene	U	2800	mg/kg	0.10	0.18	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	2800	mg/kg	0.10	0.24	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	0.31	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10	0.19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	2.3	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

AA-Split Chromatogram on Soil Sample: 1612570

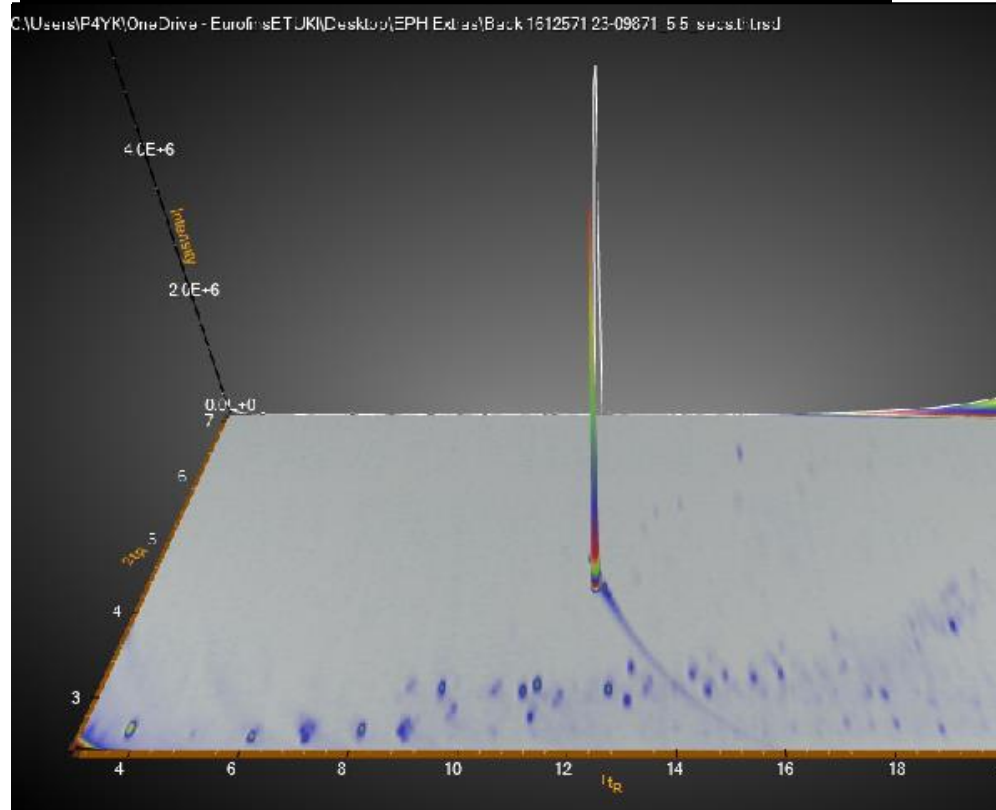


AA-Split Chromatogram on Soil Sample: 1612570

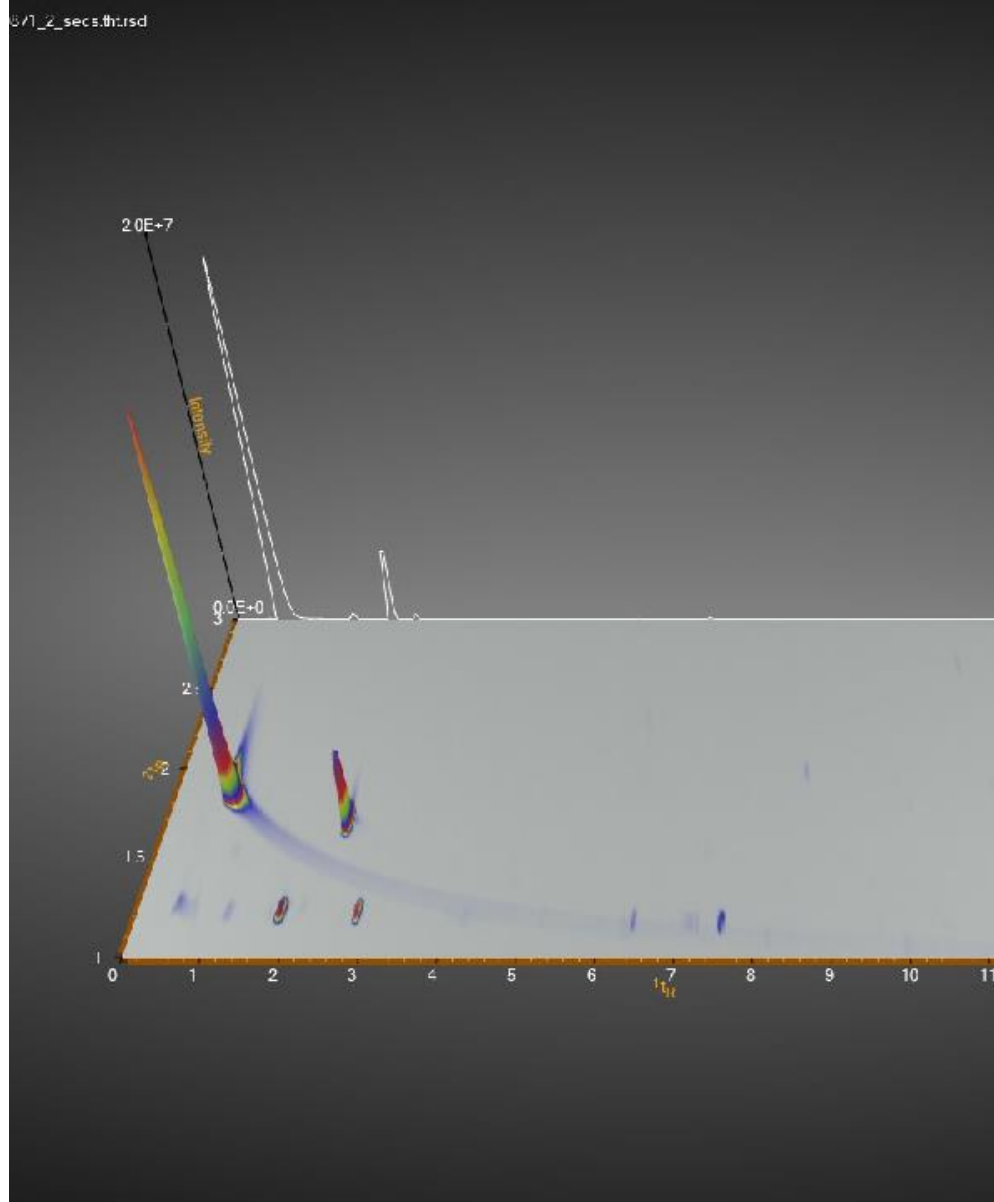
Z_secs.ht:sc



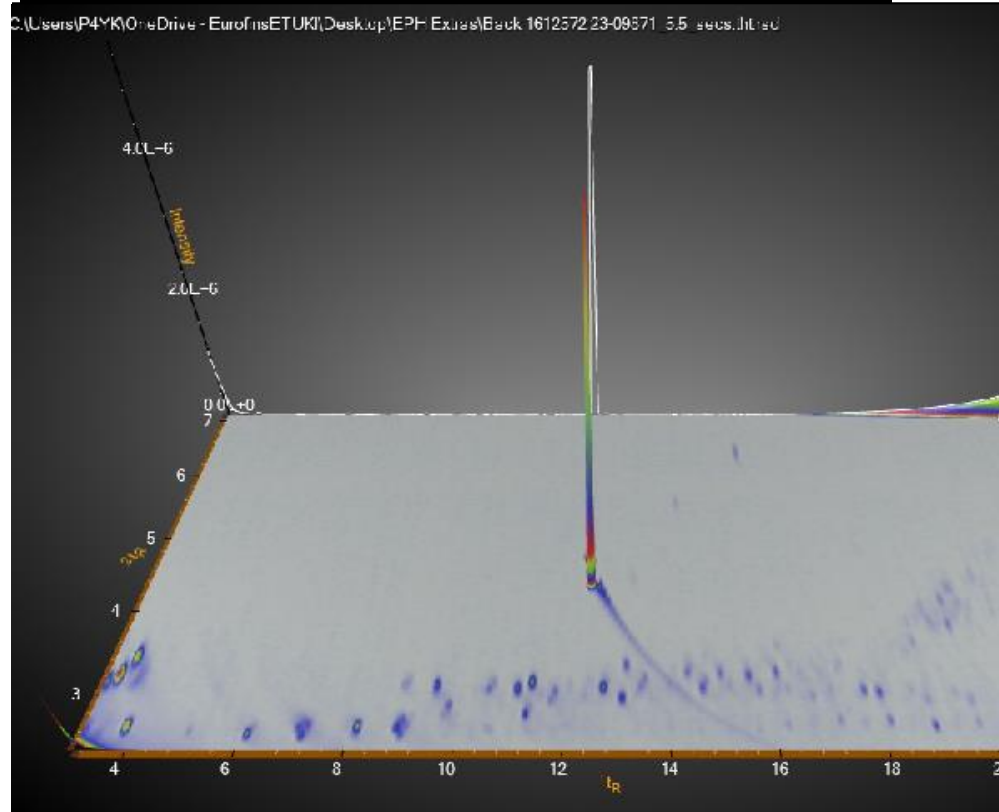
AA-Split Chromatogram on Soil Sample: 1612571



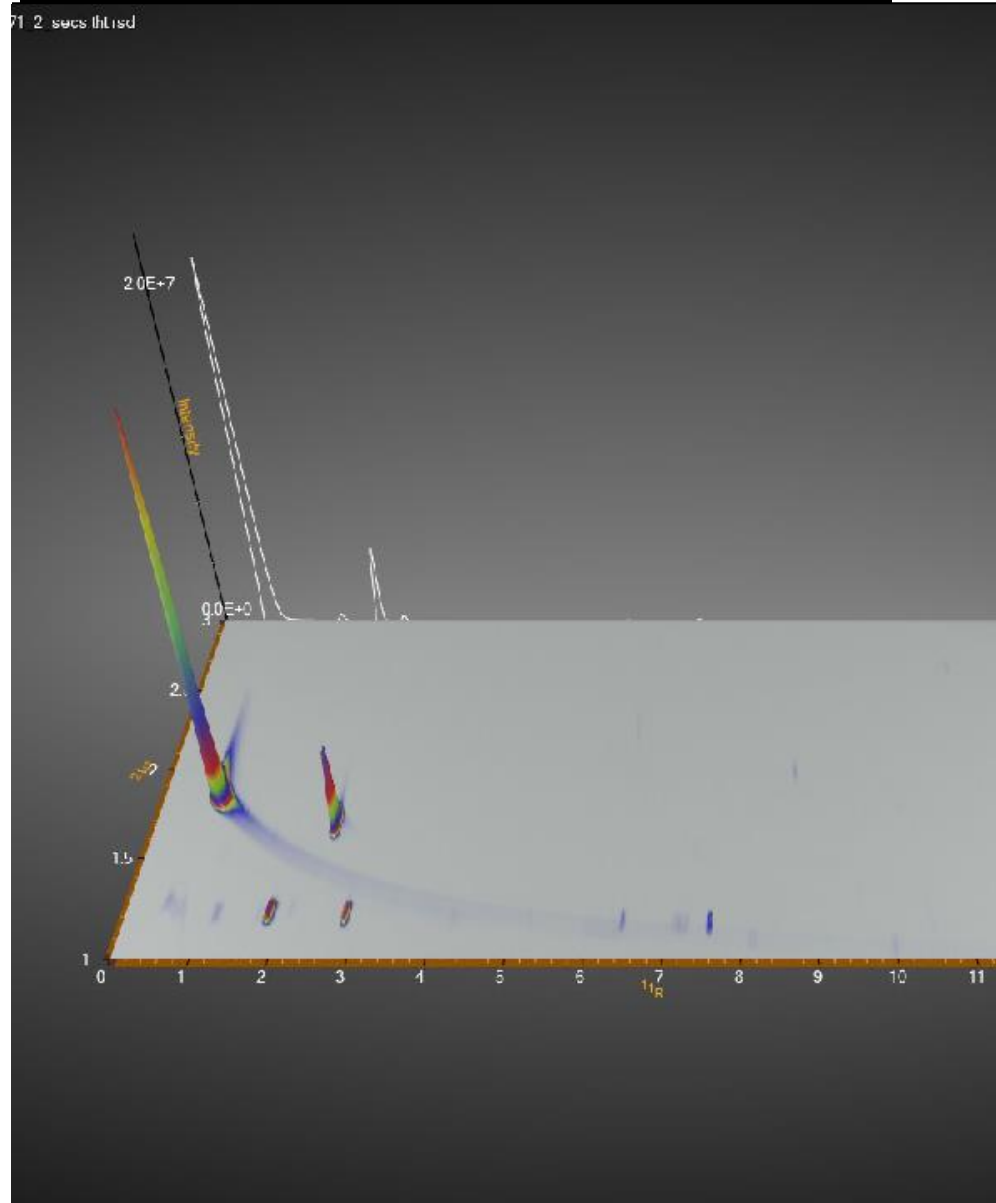
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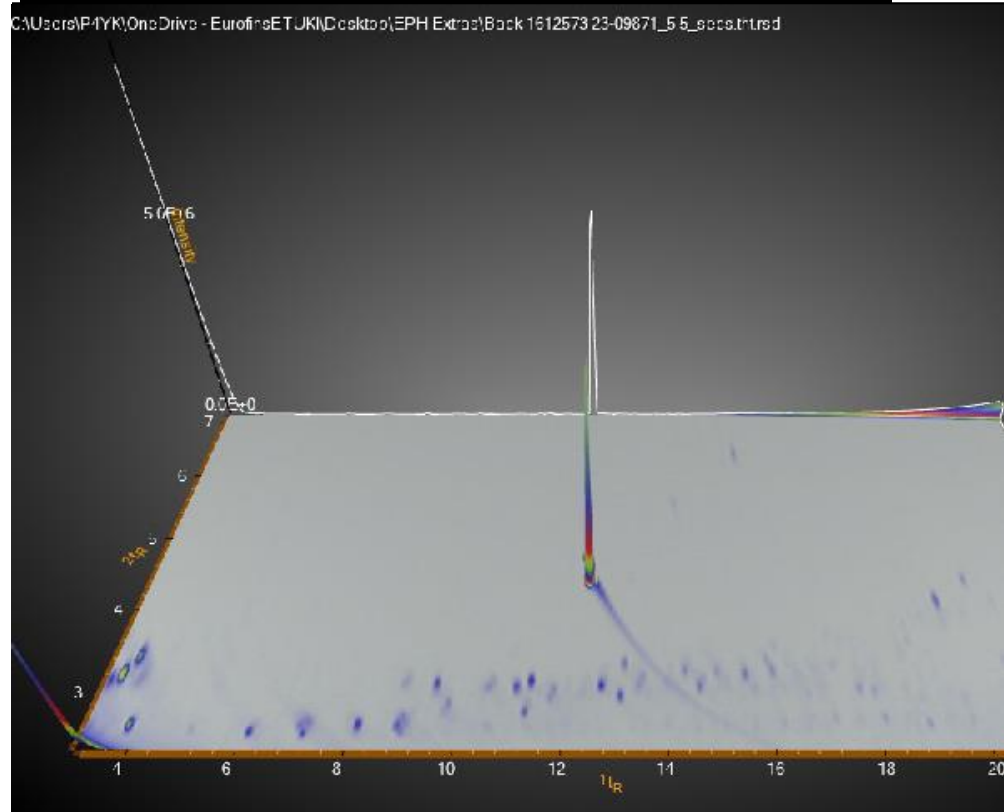
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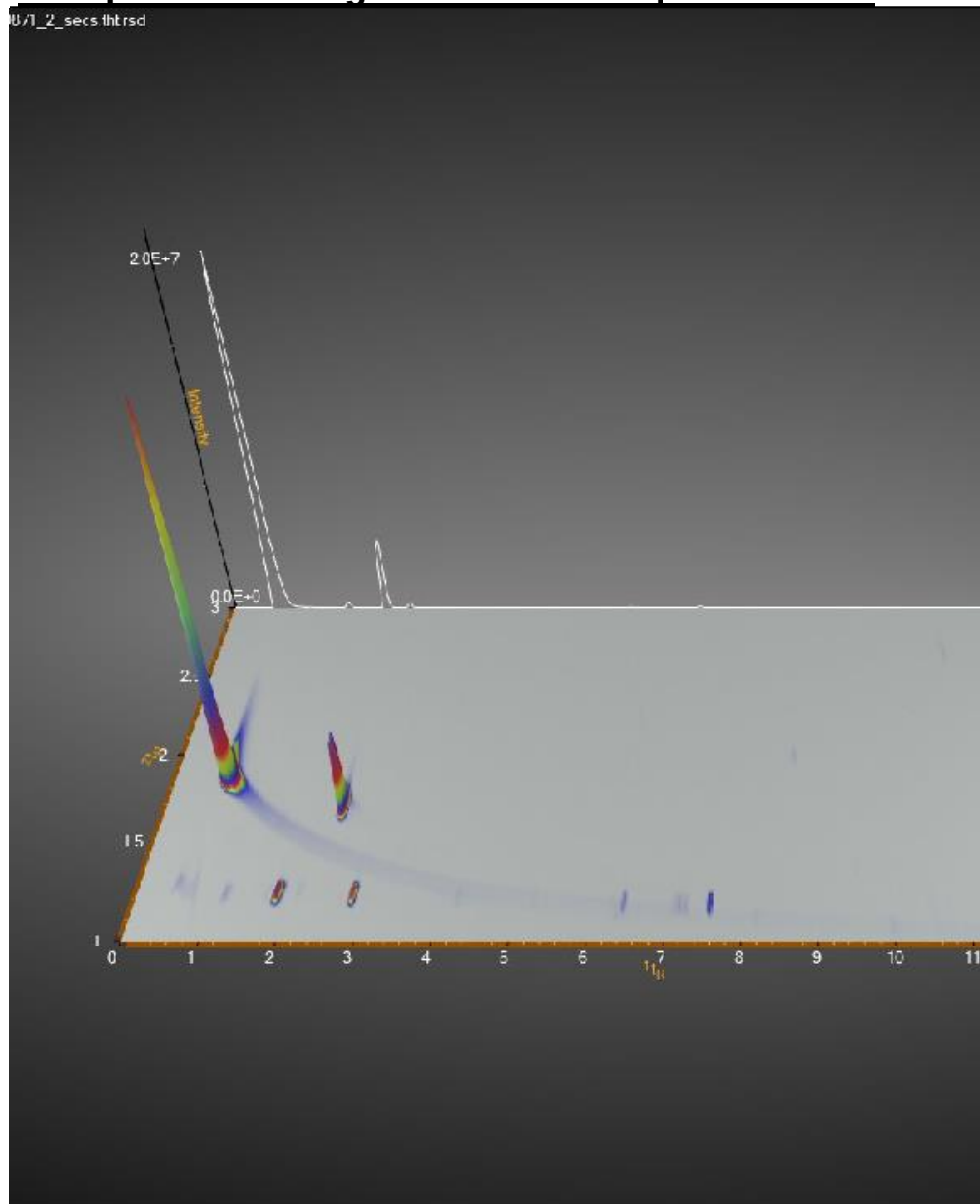
AA-Split Chromatogram on Soil Sample: 1612572



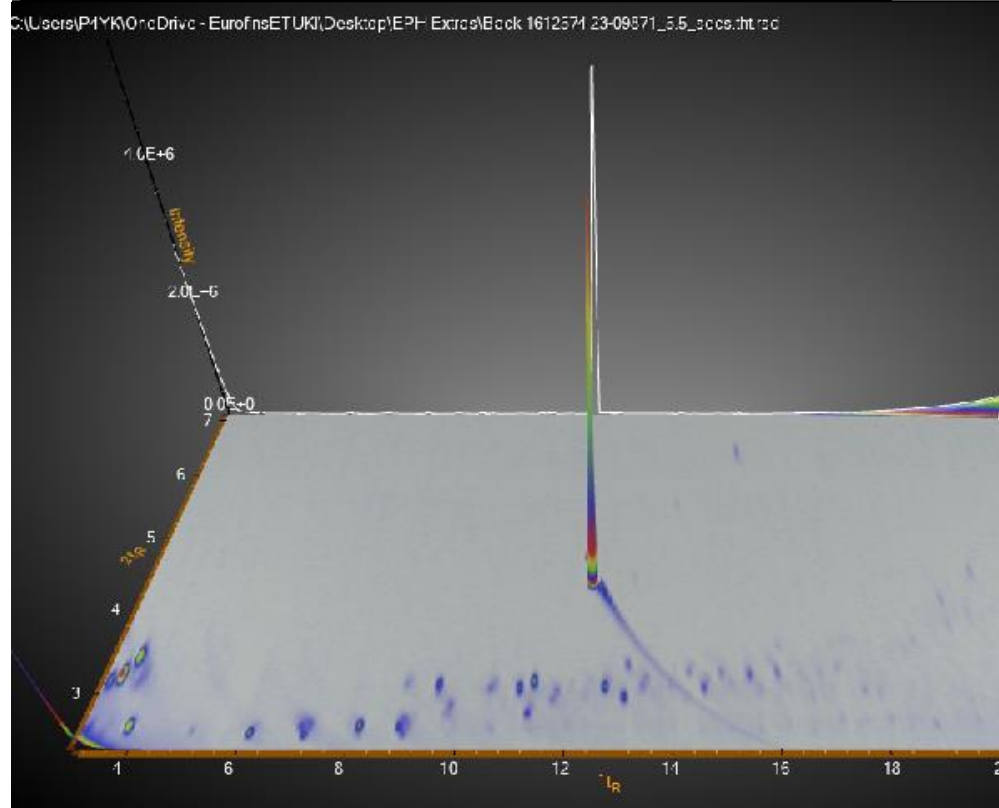
AA-Split Chromatogram on Soil Sample: 1612573



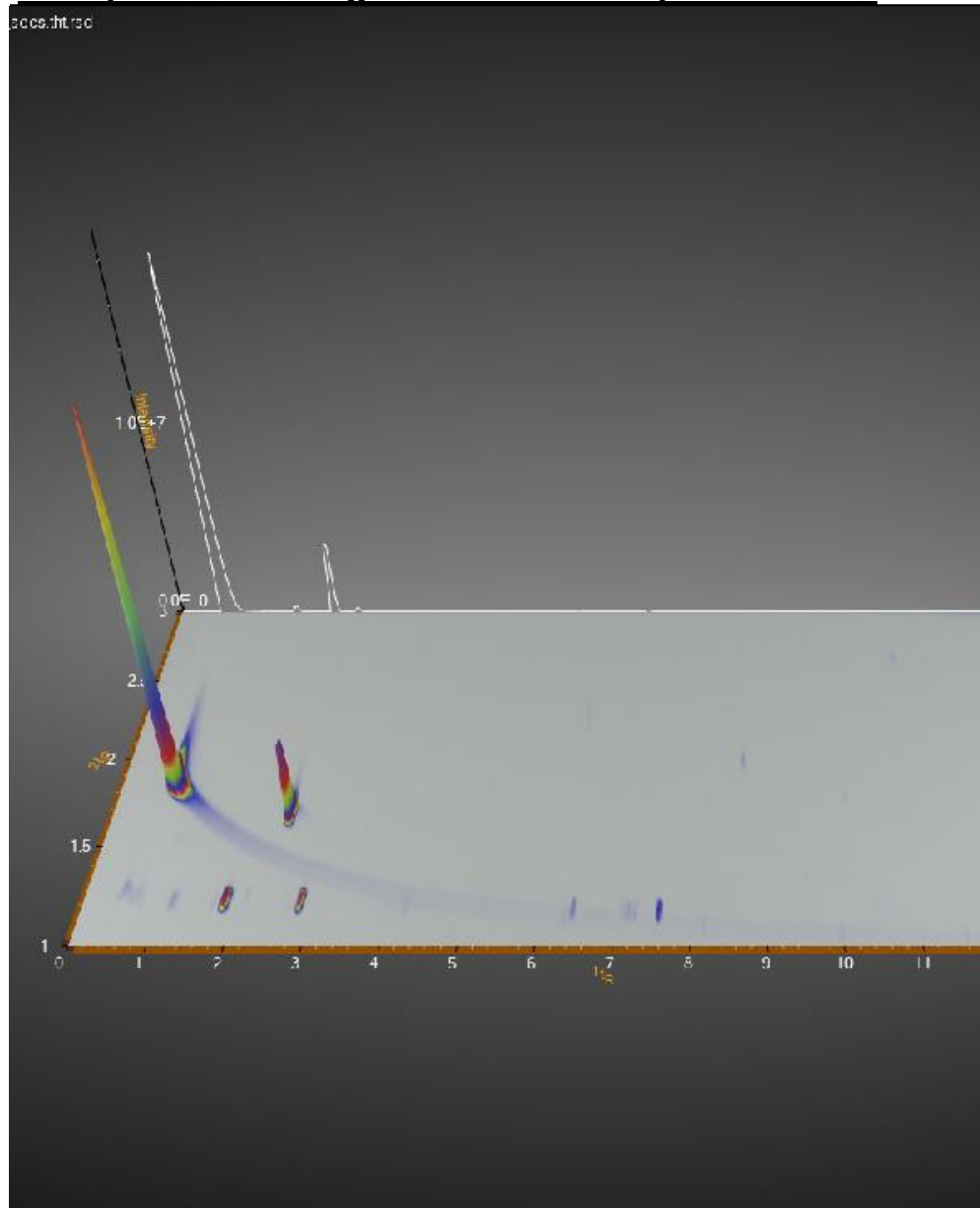
AA-Split Chromatogram on Soil Sample: 1612573



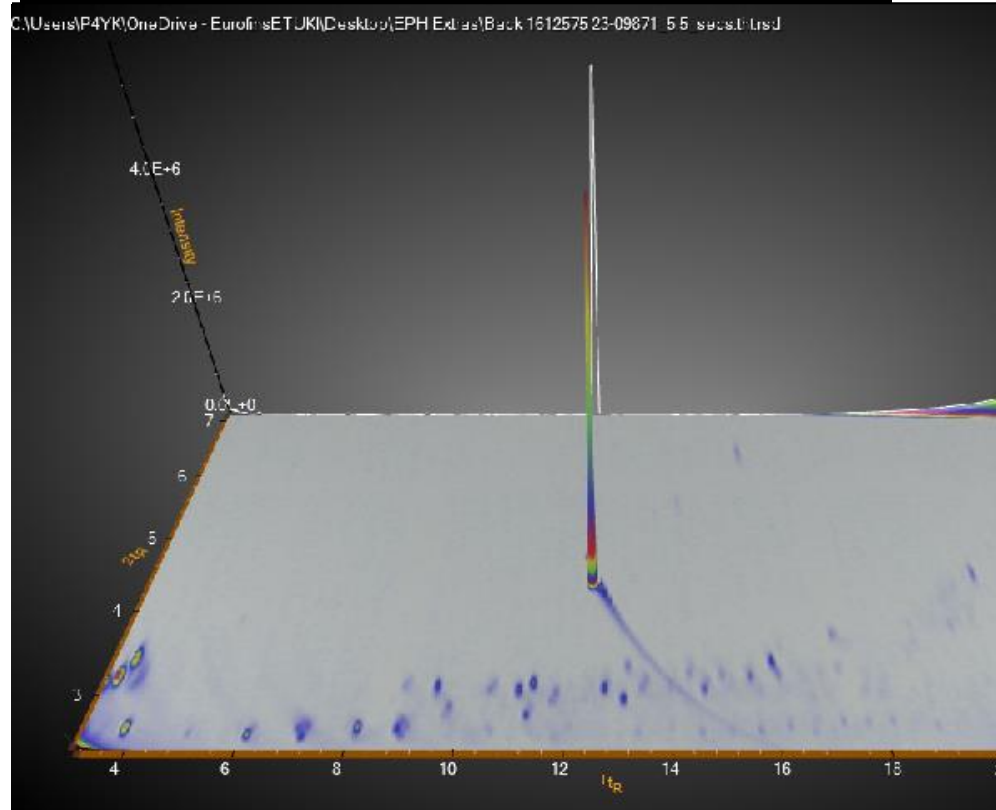
AA-Split Chromatogram on Soil Sample: 1612574



AA-Split Chromatogram on Soil Sample: 1612574

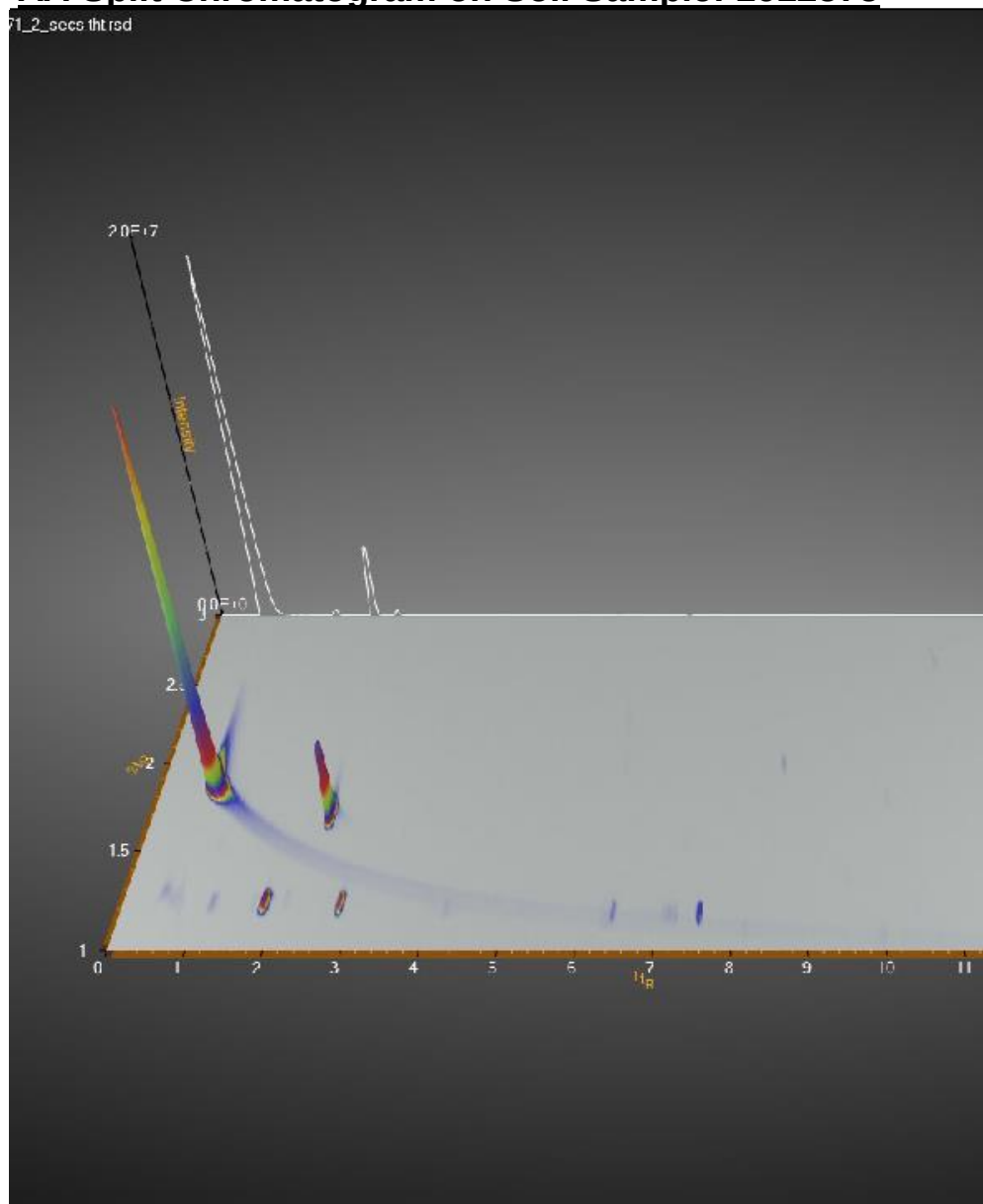


AA-Split Chromatogram on Soil Sample: 1612575

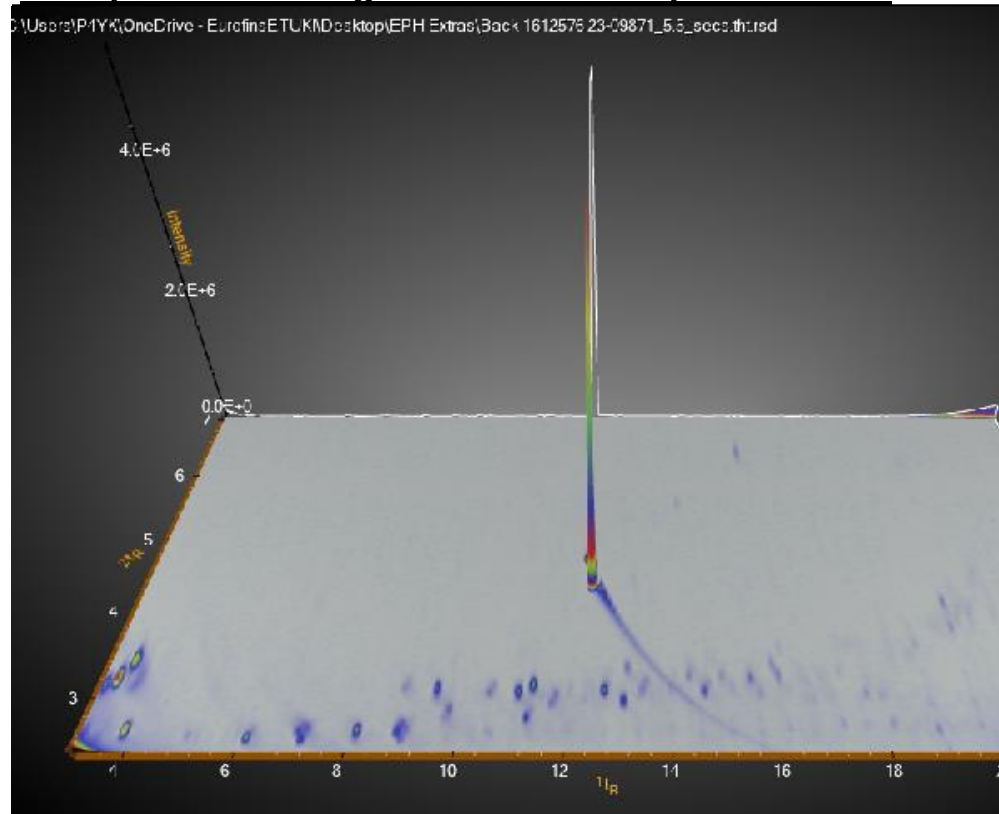


AA-Split Chromatogram on Soil Sample: 1612575

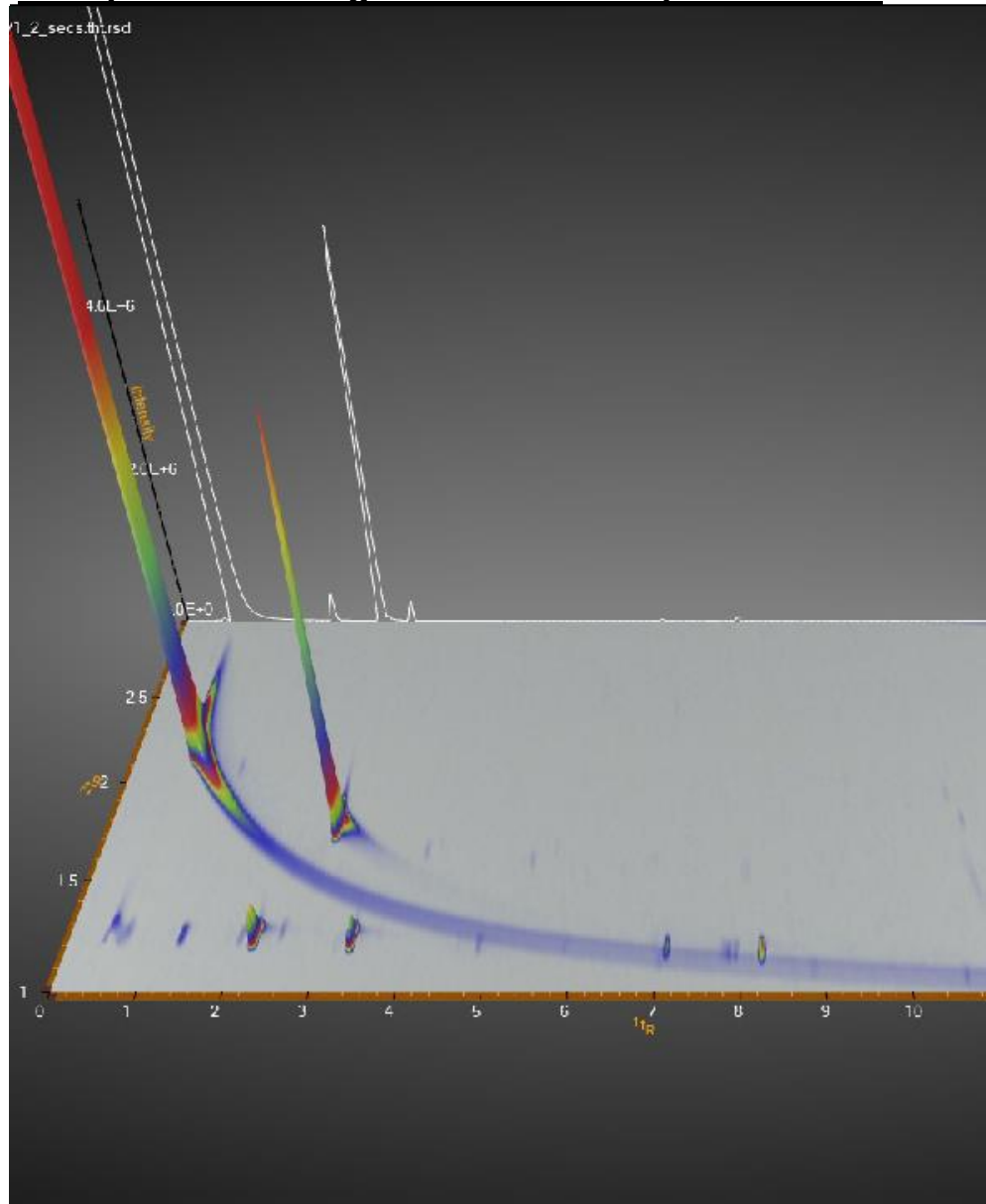
71_2_secs tht red



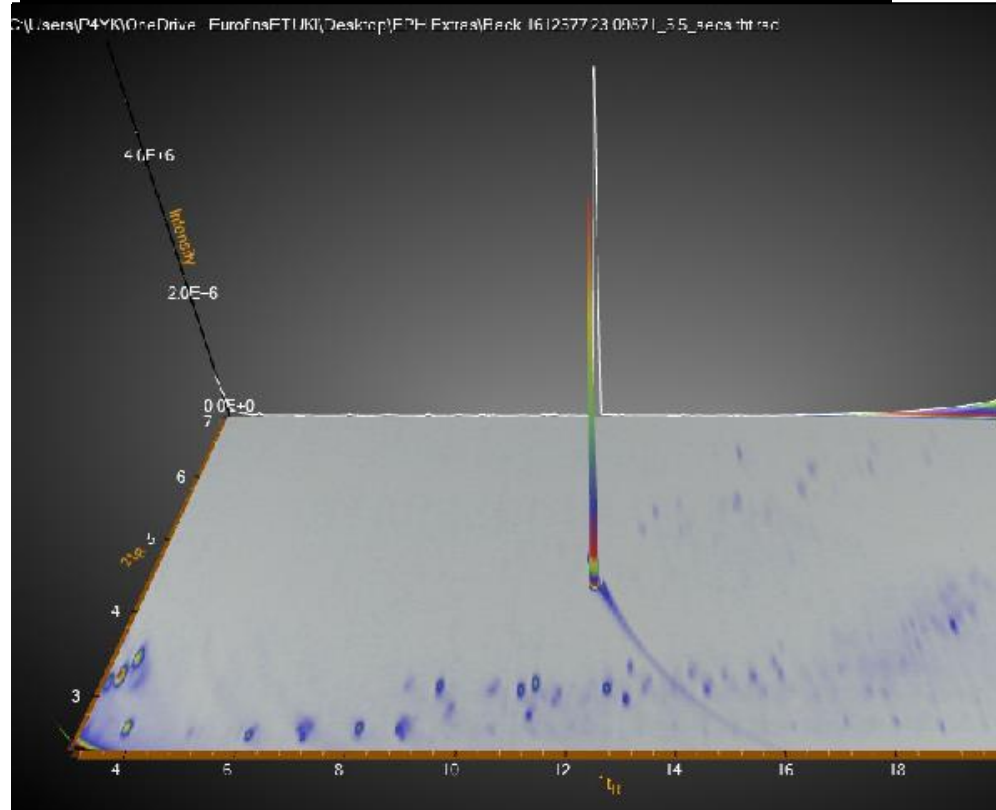
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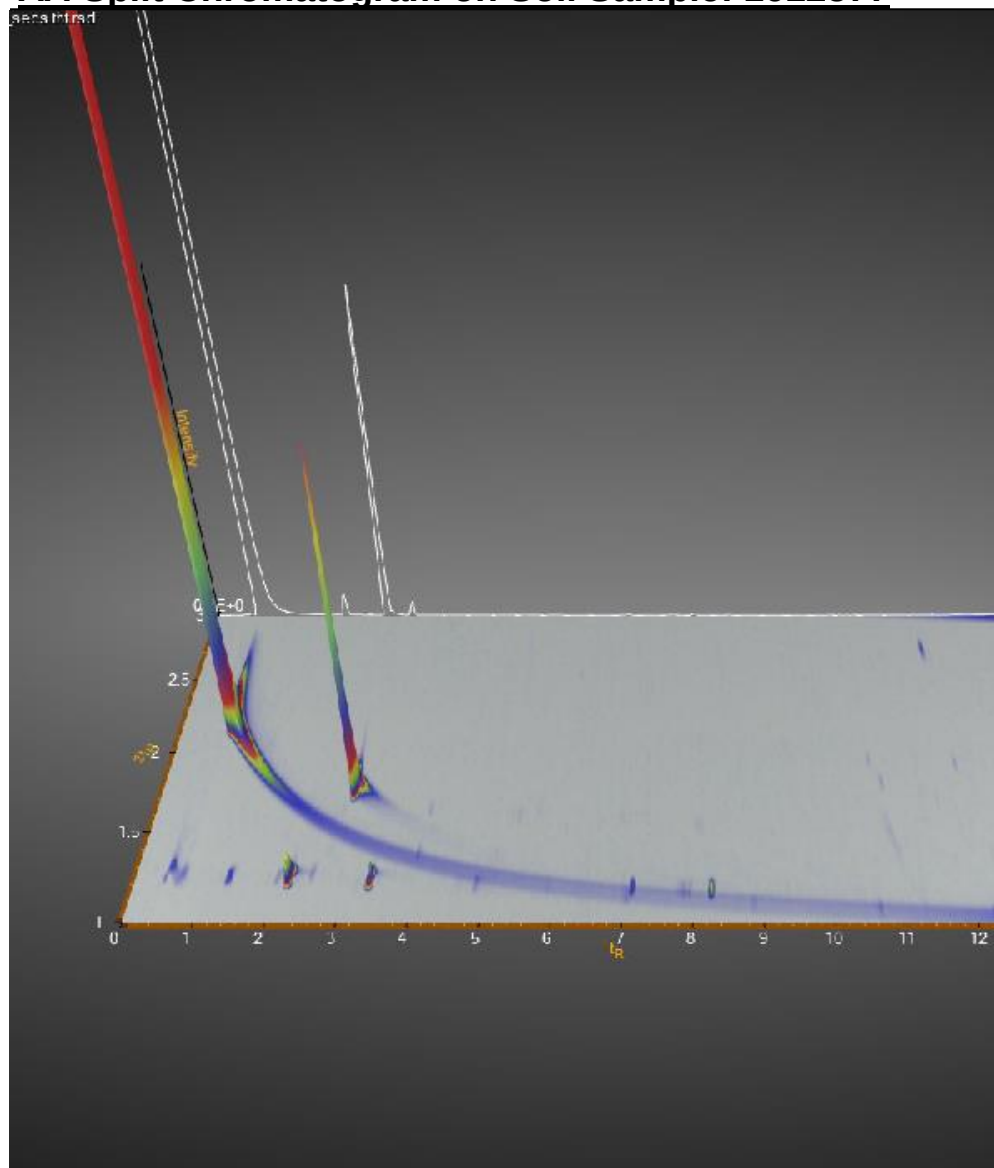
AA-Split Chromatogram on Soil Sample: 1612576



AA-Split Chromatogram on Soil Sample: 1612577



AA-Split Chromatogram on Soil Sample: 1612577



Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	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 <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
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.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8–C10 Aromatics: >C5–C7,>C7–C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS

Report Information

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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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

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 TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°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

Sample Deviation Codes

- 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 - Insufficient Sample (Applies to LOI in Trommel Fines Only)

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

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

APPENDIX D WASTE CLASSIFICATION

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

- understand the origin of the waste
- select the correct List of Waste code(s)
- confirm that the list of determinands, results and sampling plan are fit for purpose
- select and justify the chosen metal species (Appendix B)
- correctly apply moisture correction and other available corrections
- add the meta data for their user-defined substances (Appendix A)
- check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)



IPD51-3I6H7-F61QC

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

Job name

13.10.028b Begelly

Description/Comments

Project

13.10.028b

Site

Begelly Park Gardens, Begelly, Pembrokeshire, SA68 0YH

Classified by

Name: **Lee Chippington**
 Date: **20 Jul 2023 15:42 GMT**
 Telephone: **01327 860060**
 Company: **Listers Geotechnical Consultants**
Slapton Hill Barn
Blakesley Road
Towcester
NN12 8QD

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:

-

Course

Hazardous Waste Classification

Date

-

Purpose of classification

2 - Material Characterisation

Address of the waste

Begelly Park Gardens, Begelly, Pembrokeshire

Post Code SA68 0YH

SIC for the process giving rise to the waste

41201 Construction of commercial buildings

Description of industry/producer giving rise to the waste

Development of a holiday lodge park

Description of the specific process, sub-process and/or activity that created the waste

Groundworks

Description of the waste

Made Ground and natural soils

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP01	0.1	Non Hazardous		3
2	TP02	0.5	Non Hazardous		5
3	TP03	0.1	Non Hazardous		7
4	TP04	0.5	Non Hazardous		9
5	TP05	0.15	Non Hazardous		11
6	TP12	0.5	Non Hazardous		13
7	TP13	0.5	Non Hazardous		15
8	TP14	0.3	Non Hazardous		17

Related documents

#	Name	Description
1	ListersGeo Reduced Suite WM3 v1.2GB	waste stream template used to create this Job

Report

Created by: Lee Chippington

Created date: 20 Jul 2023 15:42 GMT

Appendices	Page
Appendix A: Classifier defined and non GB MCL determinands	19
Appendix B: Rationale for selection of metal species	20
Appendix C: Version	20



Amended Report

Report No.:	23-09873-2	Date of Re-Issue:	03-Apr-2023
Initial Date of Issue:	03-Apr-2023		
Client	Listers Geotechnical Consultants		
Client Address:	Slapton Hill Barn, Blakesley Road Slapton Towcester Northamptonshire NN12 8QD		
Contact(s):	Lee Chippington		
Project	13.10.028b Begelly		
Quotation No.:	Q22-29549	Date Received:	24-Mar-2023
Order No.:	13.10.028b/959	Date Instructed:	24-Mar-2023
No. of Samples:	2		
Turnaround (Wkdays):	5	Results Due:	30-Mar-2023
Date Approved:	31-Mar-2023		
Approved By:			

Details: Stuart Henderson, Technical Manager

Results - Single Stage WAC

Project: 13.10.028b Begelly

Chemtest Job No: 23-09873					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1612579					Limits		
Sample Ref:					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: TP01/TP02/TP14							
Top Depth(m): 0.50							
Bottom Depth(m): 1.00							
Sampling Date: 13-Mar-2023							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	3.9	3	5	6
Loss On Ignition	2610	M	%	11	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	< 0.0002	< 0.0020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	< 0.0005	< 0.0050	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	< 0.0002	< 0.0020	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.013	0.13	0.1	0.5	7
Zinc	1455	U	0.005	0.051	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.099	< 1.0	10	150	500
Sulphate	1220	U	11	110	1000	20000	50000
Total Dissolved Solids	1020	N	37	370	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	19

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 13.10.028b Begelly

Chemtest Job No: 23-09873					Landfill Waste Acceptance Criteria		
Chemtest Sample ID: 1612580					Limits		
Sample Ref:					Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID:							
Sample Location: TP03/TP04/TP05							
Top Depth(m): 0.50							
Bottom Depth(m): 1.00							
Sampling Date: 13-Mar-2023							
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	M	%	1.8	3	5	6
Loss On Ignition	2610	M	%	5.3	--	--	10
Total BTEX	2760	M	mg/kg	< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC	2670	M	mg/kg	< 10	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg	< 2.0	100	--	--
pH	2010	M		6.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.010	--	To evaluate	To evaluate
Eluate Analysis			10:1 Eluate mg/l	10:1 Eluate mg/kg	Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg		
Arsenic	1455	U	< 0.0002	< 0.0020	0.5	2	25
Barium	1455	U	< 0.005	< 0.050	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	< 0.0005	< 0.0050	0.5	10	70
Copper	1455	U	0.0013	0.013	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	< 0.0002	< 0.0020	0.5	10	30
Nickel	1455	U	< 0.0005	< 0.0050	0.4	10	40
Lead	1455	U	< 0.0005	< 0.0050	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.012	0.12	0.1	0.5	7
Zinc	1455	U	0.010	0.097	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.089	< 1.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	4.6	46	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.7	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
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 <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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