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**GEOENVIRONMENTAL APPRAISAL
for land off
28 PADDOCK ROAD, STAINCROSS, BARNSELEY,
SOUTH YORKSHIRE**



Prepared for
Andrew Bailey Architects

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GEOENVIRONMENTAL APPRAISAL
of land off
28 PADDOCK ROAD, STAINCROSS, BARNSELEY, YORKSHIRE

1.0 INTRODUCTION.

G&M Consulting Ltd (G&M) was commissioned by Andrew Bailey Architects, to undertake a geoenvironmental appraisal of land to the rear of and occupied by 28 Paddock Road, Staincross, Barnsley, Yorkshire. It is understood that outline planning approval (2017/1387) has been granted by Barnsley Metropolitan Borough Council for the demolition of the existing dwelling and outbuildings and erection of up to 6 dwellings. This report has been prepared in support of the discharge of Condition No 6 of the above approval.

The location of the site is shown on Drawing No C398/1/1, presented in Appendix A of this report.

1.1 Project Brief.

A number of phases of investigation, including intrusive work, have already been carried out on the site by G&M, which are covered in the following reports;

- Preliminary Investigation of land at 28 Paddock Road, Staincross, Barnsley. Report Ref C398, dated February 2021.
- Soakaway Tests on land off 28 Paddock Road, Staincross, Barnsley. Report Ref C398/02/ATS, dated 15th November 2020.
- Land off Paddock Road, Staincross, Barnsley, South Yorkshire, Mining Investigation Report. Report Ref C398, dated March 2021.

These reports cover a larger area which extends to the south of the site.

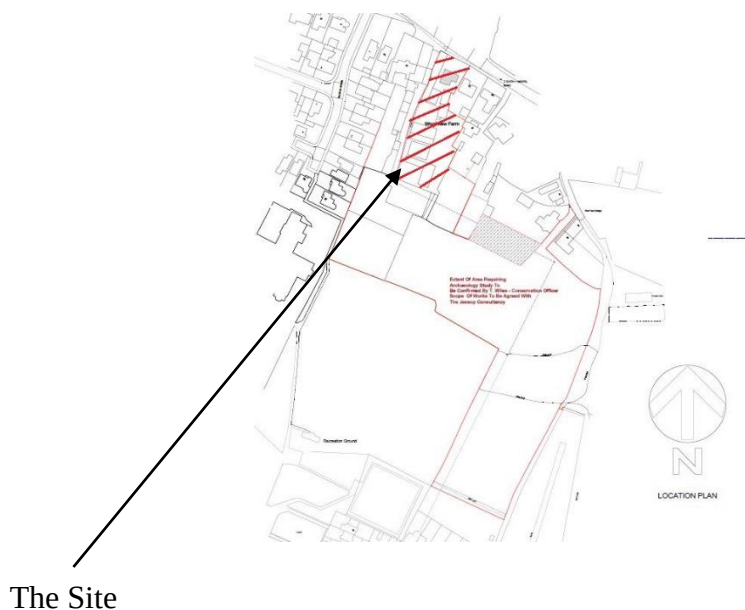
Based on the results of the above reports, it was proposed by G&M to undertake a Phase 2 geoenvironmental intrusive site investigation of the area of development.

This report details the results of the intrusive investigation and makes recommendations with regards to the proposed development. This report should be read in conjunction with the preliminary investigation report, referenced above, which contains a description of the site, environmental setting and initial conceptual site model (CSM) from which the investigation rationale was derived.

Fieldwork was undertaken on the 15th of February and 11th March 2021 and comprised the mechanical excavation of three trial pits and drilling of nine window sample boreholes with the installation of six combined gas and groundwater monitoring wells. Following completion of the fieldwork selected soil samples were scheduled for a range of chemical and geotechnical laboratory tests. At the time of writing of this report, ground gas monitoring of the wells is currently underway.

Currently the site is a roughly rectangular plot of land covering an area of approximately 0.55 hectares. The site as a whole fronts, to the north, on to Paddock Road where it is only a narrow plot of land approximately 20 m wide and running south for approximately 90m widening out after 35 m to a width of about 30 m. The area of the site discussed in this report is currently occupied (at the time of writing of this report) by a residential building with associated outbuildings along the boundary of the site with Paddock Road (from which the site is accessed) the site then broadens out, becoming a set of three terraced levels with a slight slope towards the south of the site. This area is currently the site of small construction stockpiles and laydown areas. The site is bounded to the east and west by residential properties with associated gardens and to the south by open fields.

The area of investigation of this report (area of red hatching), is shown below;



1.2 Limitations.

This investigation report, which is designed to meet the requirements of all relevant current guidance, presents the factual information and interpretation of the data obtained during this appraisal and recommendations relevant to the defined objectives.

The comments and opinions presented in this report are based on the findings of a review of available information and ground conditions encountered during the intrusive investigation work. There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation. Any diagram or opinion of the possible configuration of ground conditions between exploratory holes is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

During the course of the works G&M did not notice the presence of any Japanese Knotweed, or other such invasive plant species. However, it should be noted that G&M are not qualified ecologists and as such cannot guarantee the absence of knotweed or other invasive vegetation. If necessary the possible presence of such vegetation should be confirmed by a qualified ecologist if necessary.

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2.0 GROUND INVESTIGATION.

2.1 Design and Strategy

The Phase 1 desk study prepared previously, referenced above, and which covers a larger area, was used as the basis for the design of an appropriate intrusive ground investigation. The main findings of the desk study as given in the summary to the report were as follows:

1. *Historical maps relating to the site indicate that the northern portion of the land has been occupied since 1850s by a collection of buildings. The building layout and number expanded throughout the sequence of maps. The buildings are inferred to be predominantly agricultural structures, with a residential house being constructed on the northernmost tip of the site facing on to Paddock Road sometime during the mid 20th century. The site was labelled 'Woodview Farm' on a number of map issues.*
2. *Examination of historical maps has revealed the presence of coal mining activity within close proximity to the site. 'North Gawber Colliery' was situated to the south of the site and maps depict significant earthworks on land surrounding the colliery, inferred to be accumulations of mine tailings. Mining activities may have given rise to some localised contamination, including the potential for ground gases to emanate from underlying strata.*

The aim and purpose of the ground investigation was to verify the nature and depth of made ground and shallow subsoils across the site, determine the ground gas regime, to allow informed decisions on potential remediation options that might be required in order to break the direct contact exposure pathways that were identified at the Phase 1 stage.

Exploratory Hole Type	Purpose
Window Sample Boreholes and Machine Excavated Trial Pits	To determine the general nature of shallow soils underlying the site, including the; ◦ Nature, distribution and thickness of any potential made ground. ◦ Nature, degree and extent of ground contamination. ◦ Determination of the presence of shallow underlying natural ground ◦ Install combined gas and groundwater monitoring installations. ◦ To help identify and inform suitable remedial options

The scope of the intrusive investigation is detailed in the next section.

2.2 Scope of Works.

Fieldwork was undertaken on the 4th November 2020, 5th January 2021, 15th February and 11th March 2021, and comprised;

- Drilling of nine window sample boreholes, referenced WS1 to WS9 inclusive, to depths of between 0.90 m to 2.95 m below ground level (bgl), with the installation of six combined gas and groundwater monitoring installations.
- Excavation of three trial pits, referenced TP1, TP02 and TP18, to depths of between 1.50 m and 2.00 m bgl, excavated as part of a separate report investigating historic mining and drainage design on the site.
- Drilling of two rotary open holes, referenced BH1 and BH8, to depths of 7.6 m and 30.0 m bgl respectively, constructed as part of the separate report investigating historic mining.

The investigation was scoped using guidance presented in BS 10175:2011+A2:2017, CIRIA C665:2007, the principals of Land Contamination Risk Management (LCRM) - Environment Agency October 2020 and BS EN 1997:2004 and 2007.

The exploratory hole positions were set out and the fieldwork supervised by a G&M engineering geologist. The locations of the holes are shown on Drawing No C398/1/2, presented in Appendix A of this report.

The window sampling was carried out using a Dando Terrier tracked drilling rig. This uses a drop weight to drive steel sampling tubes with a plastic liner. The diameter of the hole reduces with depth to reduce friction on driving the sampling tubes.

The mechanically excavated trial pits were undertaken using a 3 tonne tracked excavator. The pits were backfilled with arisings, compacted using the bucket, in the approximate order in which they were excavated.

The combined gas and groundwater monitoring installations comprised 50 mm diameter HDPE pipe, consisting of a lower slotted section of casing surrounded by single size non-calcareous gravel. The upper section of the well was constructed from plain casing sealed with a bentonite/cement seal. A flush metal lockable security cover was concreted into place to complete the well installation at the ground surface.

Details of the installations are shown below;

Exploratory Hole No	Drilled Depth (m bgl)	Depth of Monitoring Well (m bgl)
WS1	1.45	1.20
WS3	2.95	1.75
WS6	2.45	1.90
WS7	2.45	2.00
WS8	1.45	1.00
WS9	2.25	2.00

A full set of photographs taken of the trial pits dug during the fieldwork is presented in Appendix E of this report.

2.3 Strata Description.

Depths and descriptions of strata encountered together with details of the samples recovered are presented on the exploratory hole record sheets presented in Appendix B of this report. Procedures and principles contained in BS EN ISO 14688-1 (2002), as amplified by BS 5930 (2015) were followed.

The depths of strata on the record sheets are recorded from current ground levels at each location.

2.4 Sampling

Small disturbed samples of soil were taken for geotechnical testing and placed in plastic tubs.

Undisturbed samples, 70 mm in diameter, (U70) were also taken where ground conditions allowed.

Small disturbed samples of soil for chemical analysis, were also taken and placed in amber glass jars as appropriate. Between boreholes, equipment was thoroughly cleaned and dried.

In accordance with best practice (BS10175:2011) samples for chemical analysis were collected in appropriate containers, kept in a chilled cool box whilst on site, retained in a fridge (below 2°C) until the day of collection, packed in a chilled cool box on the day of collection and transported in this to the laboratory.

2.5 In-Situ Testing

Standard penetration tests (SPT) were carried out in the boreholes in accordance with BS EN ISO 22476-3:(2005+A1:2011).

The undrained strength of soils were measured in-situ, where possible, using a hand shear vane.

The test results are presented on the exploratory hole records presented in Appendix B of this report.

2.6 Laboratory Testing

Schedules for contamination and geotechnical testing were drawn up by G&M.

Selected soil samples were tested for a range of potential contaminants, under a sub-contract with i2 Analytical Ltd (i2), a UKAS/MCERTS accredited laboratory. The analytes tested are listed in Section 4.2 of this report. The results of soil analysis, as received from the laboratory, are presented in Appendix C of this report.

Selected soil samples for geotechnical testing were delivered to Professional Soils Laboratory (PSL) an external accredited geotechnical laboratory. The results of soil analysis, as received from the laboratory, are presented in Appendix C of this report.

The summary of geotechnical tests is presented below;

SUMMARY OF GEOTECHNICAL LABORATORY TESTING			
Number of tests	Test	Test Method	Notes
Classification Tests			
7	Moisture content	BS1377: Part 2.	Including results provided as part of Atterberg and Triaxial testing
4	Liquid and plastic (Atterberg) limits.	BS1377: Part 2.	-
3	Undrained triaxial compression tests.	BS1377: Part 7.	-
Chemical Tests: Soil			
7	Water soluble sulphate and pH value.		Undertaken as part of the contamination testing

3.0 GROUND CONDITIONS AND MATERIAL PROPERTIES

A complete record of all the strata encountered is given on the attached exploratory hole logs. In general, these show made ground over what is presumed to be weathered coal measures strata, underlain by bedrock

3.1 Topsoil/Made Ground

Topsoil comprising soft dark brown slightly gravelly very sandy clay was noted in WS01, WS02 and WS03 close to the residence along Paddock Road, at depths varying between 0.1 m and 0.45 m bgl. The topsoil is underlain by made ground and should therefore also be considered as made ground.

Made ground was proved to depths of between 0.10 m and 0.90 m bgl in both window sample holes and trial pits. The deepest made ground found within the central part of the site in WS03 (0.9m) and TP18 (0.9m).

In general, the made ground comprised a dark brown slightly gravelly locally gravelly very sandy clay. The gravel component comprised concrete, brick, sandstone and mudstone.

In boreholes WS02 and WS07 the made ground comprises a dark brown/black slightly clayey, locally very sandy gravel of concrete, brick and sandstone to depths of between 0.55 m and 0.6 m bgl. In borehole WS03 the made ground proved to a depth of 0.9 m bgl is yellowish brown slightly clayey sandy gravelly cobbles of sandstone. The gravel content is noted to be sandstone and coal.

3.2 Weathered Coal Measures

Material derived in-situ by weathering of coal measure strata will reflect the nature of the underlying bedrock from which it is derived. As the rock types vary across the site so will the nature of the derived material. In general, the weathered material is soil like near the surface, grading with depth into the rock with an increase amount of rock fragments (lithorelicts) with depth. Because the material grades with depth boundaries are often difficult to accurately define.

In boreholes WS03, WS04, WS05 and WS06 the made ground is underlain by slightly gravelly, locally very gravelly sand, to depths of between 0.55 m and 1.6 m bgl. The gravel component was recorded as sandstone. In WS05 a low cobble content of sandstone was noted. In WS01 gravel of sandstone was encountered to a depth of 0.55 m bgl.

The above granular soils in boreholes WS03, WS05 and WS06 and the made ground in boreholes WS07, WS08 and WS09, and trial pits TP1, TP2 and TP18, located in the central and southern parts of the site, was underlain by a gravelly, locally very gravelly clay, with a low cobble content in places. The gravel component was recorded as fine to coarse lithorelicts of mudstone, coal and sandstone. These clays were encountered to depths of between 0.9 m and 2.2 m bgl. The depth of gravelly clay within trial pit TP18, was not proven at the base of the pit at 2.0 m bgl.

3.3 Bedrock

In boreholes WS03, WS05, WS06, WS07 and WS09, the sands and clays were underlain by extremely weak thinly laminated mudstone, at depths of between 0.9 m and 2.2 m bgl; recovered as subangular fine to coarse gravel sized fragments.

Within TP2, WS01 and WS08, the sands and clays are noted to be underlain by a weak to moderately strong yellowish orange thinly laminated sandstone, at depths between 0.55 m and 1.45 m bgl; recovered as gravelly fine to coarse sand. In WS02 the made ground is directly underlain at a depth of 0.55 m bgl by sandstone recovered as gravelly sand. In WS04 an SPT refusal at 0.9 m bgl, is presumed to indicate the bedrock, as no sample at or beyond this depth was recovered.

In TP1 a very weak to weak fractured coal was encountered within the gravelly clay sequence, between 0.8 m and 1.5 m bgl. Within WS05, a 0.45m band of highly weathered extremely weak black coal was noted from 1.5 m to 1.95 m bgl, recovered as a gravelly silt. This coal was identified as the Meltonfield Coal in the mining investigation report, refer to Section 1.1 of this report. The dip is shown to be 5° to the north east, the coal will therefore underlie the northern section of the site at relatively shallow depth.

Within BH01 and BH08, drilled as part of the mining investigation of the site, bedrock was encountered at depths of 1.50m and 2.40m bgl respectively. The bedrock comprises an interbedded sequence of mudstone and sandstone with two coal seams encountered in BH01 and three seams encountered in BH08, as follows;

Borehole Number	Meltonfield Coal	Two-Foot Coal	Abdy Coal
BH01	Not Encountered	10.50-11.00m bgl	21.5-22.4m bgl
BH08	2.40-2.90m bgl	13.1-14.1m bgl	25.5-26.3m bgl

3.4 Geotechnical Properties

Geotechnical laboratory testing was only undertaken on the gravelly clays described above.

The results of the Atterberg limit tests show the clay at shallow depth to be of high to very high plasticity. The results of the tests are summarised below:

Liquid limit	53% to 82%
Plastic Limit	26% to 34%
Plasticity Index	27% to 48%
Natural Moisture Content	23% to 44%

A modified Plasticity Index is calculated in the range 25% to 45% based on the percentage of material passing the 0.425mm sieve. The modified plasticity index indicates the clay to be of medium to high volume change potential as defined in Chapter 4 of the NHBC Standards, Chapter 4.2 “Building Near Trees”. The sample indicating the high-volume change potential was taken from WS06 and may relate to weathered material derived from a seat earth. Seat earths are materials which develop below coal seams, such as that encountered in TP1 and WS05 and are often termed fireclay because they have certain refractory properties, different from other rocks in the coal measure sequence. The samples with the medium volume change potential are from WS07 and WS08, which because of the dip, will be derived from different bedrock material.

Three quick undrained triaxial test were carried out on undisturbed samples of clay recovered from the window sample holes at depths of between 1.00 m and 2.50 m bgl. The tests returned results for the undrained shear strength (Cu) of between 51 kPa and 85 kPa, indicating medium and to high strength clay.

Hand shear vanes carried out in the cohesive subsoils in trial pits and window samples at depths of between 0.70 m and 1.40 m returned average results for Cu of between 50 kPa and 74 kPa indicating medium strength clay.

A single SPT carried out in the granular soil encountered between 0.9 m and 1.6 m bgl in WS03 recorded an N value of 10, indicating a medium dense material.

SPTs were carried out at the base of all window samples, which all met refusal i.e. 50 blows were reached prior to a penetration of 300mm being achieved. The results are given on the relevant window sample log and suggest that bedrock had been encountered based on the lack of penetration achieved.

3.4 Groundwater

No ground water was encountered during site works, however, monitoring visits carried since completion of site works have recorded ground water in the monitoring wells installed by G&M. The table below

summaries the standing groundwater levels recorded. Currently three monitoring visits have been made to site, post fieldwork.

Exploratory Hole No	Drilled Depth (m bgl)	Depth of Monitoring Well (m bgl)	Groundwater Level (m bgl) Visit 1 – 18/03/21	Groundwater Level (m bgl) Visit 2 – 24/03/21	Groundwater Level (m bgl) Visit 3 –09/04/21
WS01	1.45	1.20	Dry	Dry	Dry
WS03	2.95	1.75	0.56	0.61	0.91
WS06	2.45	1.90	1.54	1.43	1.33
WS07	2.45	2.00	1.39	1.44	1.54
WS08	1.45	1.00	0.22	0.35	0.77
WS09	2.25	2.00	1.50	1.50	1.48

It should be borne in mind that water levels are likely to fluctuate with season/rainfall and may therefore be substantially higher at wetter times of year than those found during this investigation.

3.5 Visual / Olfactory Evidence of Contamination

The made ground was found to include varying proportions of brick, coal, concrete, mudstone and sandstone which can produce elevated concentrations of certain contaminants, such as toxic and phytotoxic metals, sulphate and PAH.

3.6 Ground Gas and Vapours

Ground gas monitoring has been carried out on three occasion to date, and the results are summarised below. Full details of the ground gas monitoring are included in Appendix D of this report

Well	Methane (range) % v/v	Carbon Dioxide (range) % v/v*	Oxygen (range) % v/v*	VOC (ppm)	Flow (range) l/hr*
BH01	ND	1.0-1.3	18.9-19.8	0.2	0
BH03	ND	0.1	20.3-20.7	0.1	0
BH06	ND	3.2-8.4	12.1-19.8	0.0	0
BH07	ND	0.7-5.1	16.1-20.1	0.1	0
BH08	ND	0.2-2.1	20.521.6	0	0
BH09	ND	0.2-1.3	20.1-20.9	0	0

ND - Not Detected. NR - * peak reading

Barometric air pressure for the visits was between 996 mb and 1014 mb.

The scheduled programme of monitoring comprises six visits over a three month period. It is proposed to undertake three further monitoring visits, as far as possible/practicable, to coincide with worst case weather/environmental conditions identified in CIRIA C665. On completion of the monitoring, a full set of results will be issued in an addendum report.

4.0 RESULTS OF CHEMICAL TESTING

4.1 General

For this site, measured values were compared to Generic Assessment Criteria (GAC) derived for a residential with plant up take end use.

Chemical analysis was undertaken on representative soil samples recovered from across the site. The determinands were selected to provide information on the distribution of potential contaminants. The general analytical suite was supplemented with additional analysis where former land usage, as determined from the desk study, or visual or olfactory observations suggested the presence of additional contaminants.

The majority of initial screening levels (GAC's) used in the production of this assessment have been taken from the guidelines introduced by:

- DEFRA C4SL's, DEFRA 2015.
- Joint Land Quality Management Ltd (LQM) and Chartered Institute of Environmental Health (CIEH), Generic Assessment Criteria for Human Health Risk Assessment, S4UL's, Land Quality Press 2015.

Usually statistical testing is undertaken for the Planning Scenario by the methods described in CL:AIRE "Professional Guidance: Comparing Soil Contamination Data with a Critical Concentration", September 2020. This statistical testing is undertaken to determine whether there was sufficient evidence that the true mean concentration of each determinand was less than the relevant critical concentration for that component. However, given the fact that a proportion of the sampling was carried out on a targeted basis, detailed statistical assessment of the data has not been conducted, instead individual contaminant concentrations have been compared to their relevant assessment criteria.

4.2 Testing Schedule

Following completion of the fieldwork samples were selected for testing as follows;

Laboratory Analysis	Made Ground	Natural Soils
Total concentrations of arsenic, cadmium, chromium (incl hexavalent), copper, lead, nickel, selenium, zinc, mercury	12	3
Water soluble sulphate, pH	3	4
Phenol	11	1
Speciated PAH	11	2
TPH	3	-
BTEX	3	-
GCMS Pesticide Screen	2	-
SVOC's	1	-
Asbestos	4	-

4.3 Soil Analysis

The chemical analysis results and screening criteria are summarised below. The results for the made ground and natural soils have been combined for an initial assessment.

Summary of Total Soil Concentrations

Determinand	GAC (1% SOM) (mg/kg, unless otherwise stated)	No. of samples above screening value	No. of samples tested	Maximum concentration above GAC (mg/kg, unless otherwise stated)
Metals/Metalloids				
Arsenic	37 ⁽²⁾	2	15	WS04 (0.20m – 330) WS05 (0.10m – 330)
Cadmium	11 ⁽¹⁾	0	15	
Chromium (VI)	21 ⁽²⁾	0	15	
Lead	200 ⁽²⁾	0	15	
Mercury	40 ⁽¹⁾	0	15	
Selenium	250 ⁽¹⁾	0	15	
Copper	2400 ⁽¹⁾	0	15	
Nickel	180 ⁽¹⁾	0	15	
Zinc	3700 ⁽¹⁾	0	15	
Inorganics				
pH	<5	0	7	
Water Soluble Sulphate	0.5 g/l ⁽³⁾	0	7	
Organics				
PAHs				
Acenaphthene	210 ⁽¹⁾	0	13	
Anthracene	2400 ⁽¹⁾	0	13	
Acenaphthylene	170 ⁽¹⁾	0	13	
Benzo(a)anthracene	7.2 ⁽¹⁾	4	13	WS05 (0.10m – 11) WS09 (0.10m – 17) TP18 (0.20m – 7.7) TP18 (0.80m – 12)
Benzo(b)fluoranthene	2.6 ⁽¹⁾	7	13	WS05 (0.10m – 7.4) WS07 (0.20m – 3.9) WS07 (0.50m – 6.8) WS08 (0.20m – 5.5) WS09 (0.10m – 16) TP18 (0.20m – 6.7) TP18 (0.80m – 12)
Benzo(k)fluoranthene	77 ⁽¹⁾	0	13	
Benzo(g,h,i)perylene	320 ⁽¹⁾	0	13	
Benzo(a)pyrene	5.0 ⁽²⁾	6	13	WS05 (0.10m – 8.4) WS07 (0.50m – 6.6) WS08 (0.20m – 5) WS9 (0.10m – 15) TP18 (0.20m – 6) TP18 (0.80m – 11)
Chrysene	15 ⁽¹⁾	0	13	
Dibenz(a,h)anthracene	0.24 ⁽¹⁾	4	13	WS08 (0.20m – 0.71) WS09 (0.10m – 1.9) TP18 (0.20m – 0.95) TP18 (0.80m – 14)
Fluoranthene	280 ⁽¹⁾	0	13	
Fluorene	170 ⁽¹⁾	0	13	
Indeno(1,2,3-cd)pyrene	27 ⁽¹⁾	0	13	
Naphthalene	2.3 ⁽¹⁾	0	13	
Pyrene	620 ⁽¹⁾	0	13	
Phenanthrene	95 ⁽¹⁾	0	13	
TPHs				
Aliphatic EC 5-6	3,200(1)	0	3	
Aliphatic EC >6-8	7,800(1)	0	3	
Aliphatic EC >8-10	2,000(1)	0	3	

Aliphatic EC >10-12	9,700(1)	0	3	
Aliphatic EC >12-16	59,000(1)	0	3	
Aliphatic EC >16-35	160,000(1)	0	3	
Aromatic EC 5-7	26,000(1)	0	3	
Aromatic EC >7-8	56,000(1)	0	3	
Aromatic EC >8-10	3,5000(1)	0	3	
Aromatic EC >10-12	160,000(1)	0	3	
Aromatic EC >12-16	360,000(1)	0	3	
Aromatic EC >16-21	280,000(1)	0	3	
Aromatic EC >21-35	280,000(1)	0	3	
Benzene	27(1)	0	3	
Toluene	5,600(1)	0	3	
Ethylbenzene	570(1)	0	3	
M xylene	62,000(1)	0	3	
O xylene	6,600(1)	0	3	
P xylene	59,000(1)	0	3	
Others				
Monohydric Phenol	120 ⁽¹⁾	0	12	
Asbestos	Fibres present	1	4	WS05 (0.10m – Chrysotile – Loose Fibres)

¹ LQM/CIEH (2015) Generic Assessment Criteria for Human Health Risk Assessment. 2nd Ed. (for a sandy soil with 1% SOM and pH 7.0)

² DEFRA C4SL's, DEFRA 2015

³ BRE (2005) Special Digest 1, 3rd Edition, Concrete in aggressive ground. Upper limits for DS-1 Design Sulphate Class concrete.

Arsenic was found to be elevated in two samples tested from the made ground. The PAH species Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene were found to be elevated in made ground samples across the site.

None of the samples tested from the natural sub-soils recorded concentrations in excess of the relevant screening values detailed above.

Asbestos, noted to be loose fibres of Chrysotile, were recorded to be in the made ground sample at 0.10m in WS05.

As a precautionary measure, and considering the previous agricultural use of the site, a herbicide/pesticide screen was carried out on two samples of made ground, (0.5m in WS02 and 0.3m in WS06). No compounds were recorded in either sample.

5.0 QUALITATIVE RISK ASSESSMENT AND REVISED CONCEPTUAL MODEL

The preliminary conceptual site model, developed from the desk study information, as presented in the G&M report, has been revised in light of the ground investigation and chemical analysis results presented above. The revised conceptual model has been developed for the proposed future land use (Residential). This summarises the understanding of surface and sub-surface features, the potential contaminant sources, transport pathways and receptors

Human Health – further considerations:

- Localised elevated levels of Arsenic, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene.
- Localised asbestos fibres found in WS05.
- Elevated hazardous ground gas, carbon dioxide and radon (desk study).

Summary of Identified Pollutant Linkages

In summary the revised conceptual site model has identified the following potential pollutant which could result in an unacceptable risk to the proposed end-use, denoted as a moderate or higher potential of significant pollutant linkage on the conceptual site model.

Source	Risk	Potential Contaminants	Exposure Pathway	Primary Receptor/s	Complete Pollutant Linkage
Made Ground - on site	Moderate/High	Elevated levels of Arsenic, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene. Localised Asbestos fibres	Skin contact Ingestion	Construction workers, built development, End users of site,	Yes: Residential properties are likely to have gardens and areas of soft landscaping, clean capping of gardens and areas of soft landscaping will be required. Asbestos fibre risk to construction workers to be managed.
Made Ground - on site	High	Ground gas	Migration (lateral and vertical) Inhalation, explosion		Yes: further assessment required; monitoring ongoing (3 further visits over a three-month period) <u>Currently a complete pollutant linkage assumed until monitoring period completed and reported.</u> Basic Radon protective measures are required for the site.

6.0 CONCLUSIONS AND RECOMMENDATIONS.

6.1 General.

G&M Consulting Ltd (G&M) was commissioned by Andrew Bailey Architects, to undertake a geoenvironmental appraisal of a plot of land at 28 Paddock Road, Staincross, Barnsley, Yorkshire. It is understood that outline planning approval (2017/1387) has been granted by Barnsley Metropolitan Borough Council for the demolition of existing dwelling and outbuildings and erection of up to 6 dwellings. This report has been prepared in support of the discharge of Condition No 6 of the above approval.

The location of the site is shown on Drawing No C398/1/1, presented in Appendix A of this report.

It has been assumed that ground levels will not change significantly from those described in this report, or that the proposed end use of the site will not change from that detailed above. If this is not the case, then amendments to the interpretation and conclusions in this report may be required.

At the time of writing details of the proposed foundation loadings have not been issued to the writer, the following discussions are therefore based on general assumptions and should be reassessed in view of the final development.

6.2 Geotechnical Considerations

Foundations

Made ground is considered unsuitable for foundations due to its potential variability. Foundations should therefore be taken to below the made ground.

Foundations taken to the underlying natural soils using traditional spread foundations could be adopted for the development. As the ground conditions vary across the site the depth of foundation will differ depending on the underlying materials. Where rock is shallow then foundations should be taken into the rock. Where clay is present then normally its volume change potential will control the depth of foundation. However, in places over deepening of the foundations to accommodate the volume change potential may take foundations into different materials, even to rock, which then negates the requirement of the volume change potential. It is therefore recommended that the foundations of each property should be assessed individually.

Where clay is present, based on the worst case of high volume change potential, foundations should be placed at a minimum depth of 1.0 m bgl where constructed outside the influencing distance of trees. If trees are proposed to be planted or retained as part of the development then the foundations should be taken deeper. The depth of foundation would depend on the species of the trees planted/retained and distance from the buildings. Guidance on foundation depths is given in the NHBC Standards.

It is suggested that the design of foundations placed in the cohesive soils at the suggested depth detailed above, use an undrained shear strength of 50 kPa.

Based on the undrained shear strength for the clay a net safe bearing capacity of 100 kPa is estimated for preliminary design purposes, with settlement estimated to be less than 25 mm for the likely loads from housing. Foundations taken deeper or placed in the shallow rock could utilise a high bearing capacity.

It is recommended that the footings are suitably reinforced to take into account the variability of the weathering and strength characteristics of the cohesive subsoils.

The bearing capacity of soil below a foundation is a function of the undrained shear strength of the soil, together with the type of foundation, including its depth and width. The bearing capacity should therefore be checked once foundation designs are finalised.

Floor Slabs and Pavements

Ground bearing floor slabs with a suitable sub-base layer may be adopted if the material is re-engineered or replaced. If not, then suspended floor slabs would be required.

All formation level soils should be proof-rolled and all loose, soft, organic or otherwise unsuitable materials should be removed and replaced with a suitable, well-compacted granular fill. Hard spots such as old foundations should also be removed.

Excavations

The shallow soils encountered are considered suitable for excavation by standard mechanical plant such as a wheeled backhoe excavator. The use of hydraulic or pneumatic breakers will most likely be required when dealing with any relict foundations, walls etc. or if excavations are taken in to rock.

If coal is encountered in excavations it should be blinded with lean mix concrete to prevent the possibility of spontaneous combustion. Also if encountered at foundation depth the excavation should be taken deeper to place the foundations below the coal.

No groundwater was encountered in the exploratory holes during the fieldwork, however, standing water has been recorded at high levels in the monitoring wells and may therefore be encountered in excavations. It is likely that if ground water control is required this could be done by pumping from sumps. Any water arising from the site should be disposed of in accordance with current regulatory guidelines. It should be noted that groundwater levels may change due to seasonal or other variations. Surface water run-off from rainfall may also enter excavations. Advice on suitable dewatering techniques is given in CIRIA Report C515 Groundwater Control – design and practice.

All excavations should be planned and due consideration should be given to providing temporary support or suitable battering. Excavations should be regularly inspected by a competent person to ensure continued safety. Further advice on the safety of excavations is given in *Health and Safety in Construction*.

Whilst no historical mining is recorded in the immediate vicinity of the site, a coal seam outcrops through the centre of the site, therefore there is a potential for crop workings in the vicinity. It is therefore recommended that a watching brief should be maintained on excavations and if deep or disturbed made ground is encountered then the advice from a suitably qualified consultant should be sought prior to continuing with further work. Further information on mining is given in the mining investigation report, referenced in Section 1.1 of this report.

Buried Concrete

This assessment of the potential for chemical attack on buried concrete is based on current guidance contained in BRE Special Digest 1 ('SD1', 2005) *Concrete in Aggressive Ground Part 1: Assessing the aggressive chemical environment*. Third Edition.

Soil pH values recorded in seven samples of made ground and natural soils range from 6.2 to 9.1 with corresponding water-soluble sulphate (SO₄) results in the range 0.013 g/l to 0.26 g/l. From these results a 'Characteristic Value' of 6.2 is derived for pH and 0.26 g/l for water soluble sulphate. Assuming brownfield conditions and using Table C2 from SD1, a Design Sulphate Class for the site of DS-1 is indicated with an ACEC class of AC-1 assuming mobile ground water conditions and AC-1s for static groundwater conditions.

6.3 Contamination Constraints to Development

Risk Evaluation for Proposed Land Use

Localised elevated levels of Arsenic, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene were identified within the made ground/topsoil. Loose Chrysotile Asbestos fibres were also found in the shallow made ground soils in WS05. Based on the contaminant > pathway > receptor philosophy, areas of hardstanding i.e. building footprints, roadways, surfaced parking etc. will remove any pathways and therefore no further remediation would be required in these areas. In the areas of gardens and soft landscaping a clean cap will be required to break any pathways for exposure of end users to residual contamination, where made ground materials remain on site.

It is possible that areas of unidentified contamination or made ground may be encountered during the development works. If any visible fragments of asbestos, areas of noxious, odorous, fibrous or liquid etc. contamination are encountered, then works should stop immediately and further advice sought from a suitably experienced and qualified consultant. It is recommended that a watching brief be maintained during the development work for this purpose.

Future site users

The development proposals indicate the future end use of the site to be residential with areas of private gardens and soft landscaping. This is considered to represent a high sensitivity end use.

Based on the source>pathway>receptor philosophy and the chemical results obtained as part of this investigation, it is considered that the made ground tested generally pose a moderate/high risk to end users through ingestion, dermal contact or inhalation and that remedial action will be required to break this linkage.

Due to the presence of contamination in the made ground and because of its unsuitability as a growing medium, if made ground is left on site in areas of private gardens or soft landscaping, there will be a need to import clean cover soils. This is to provide a healthy medium for plant growth and to remove any remaining pathways for exposure of end users to residual contaminants. It is recommended that a minimum of 600mm of clean capping soils (including 150mm of topsoil) are placed or if made ground is thinner than this clean material is placed to the top of the natural soils. This thickness is subject to regulatory approval.

Prior to demolition of the existing buildings present on site, an asbestos survey should be carried out by a suitably experienced contractor/consultant to assess the extent of any building materials containing asbestos.

If any asbestos containing materials are found to be present on site, should be removed in a controlled manner, and disposed of to a suitably licenced facility. Disposal of these materials should be in accordance with Section 6.5 of this report.

Controlled Waters Receptors

Considering the fact that the results from the made ground are predominantly underlain by cohesive subsoils, that would limit any lateral or vertical migration of mobile contaminants, and that the made ground soils will be either removed or capped with hard stand or clean capping soils (thereby effectively eliminating surface water infiltration and leachate generation), it is considered that the soils are considered to pose a negligible/low risk to controlled waters and that no further remediation is considered necessary. This opinion is subject to regulatory approval.

Construction and Maintenance Workers

It is considered that there is a high short term risk during the ground works to construction and maintenance workers. The primary exposure pathways are considered to be dermal contact and soil ingestion arising from dust and asbestos fibres found in WS05.

Based on the current information it is recommended that good health and safety procedures should be adopted by ground workers, including no eating or smoking on site, designated clean and wash areas and protective clothing, e.g. overalls, gloves, dust masks etc. Good working and soil management practices including dampening down areas to prevent dust and sheeting of any stockpiles, should also be implemented.

Any potential risks must be specifically assessed as part of the health and safety evaluation for the works to be performed in accordance with prevailing legislation. Site practices must conform to the specific legislation requirements and follow appropriate guidance (e.g. HSE, 1991; CIRIA 1996).

Adjacent site users

Provided good ‘housekeeping’ practices are observed during the ground works, health and safety compliance is achieved, and wastes are appropriately handled, stored and disposed, then it is considered that there is a low short term risk to adjacent site users during the works.

Utilities

The results of the chemical testing and details of the proposed enabling works should be provided to the appropriate utility companies to determine the necessity for service protection

Built Development

This assessment of the potential for chemical attack on buried concrete is based on current guidance contained in BRE Special Digest 1 (‘SD1’, 2005) Concrete in Aggressive Ground Part 1: Assessing the aggressive chemical environment. Third Edition.

Soil pH values recorded in seven samples of made ground and natural soils range from 6.2 to 9.1 with corresponding water-soluble sulphate (SO₄) results in the range 0.013 g/l to 0.26 g/l. From these results a ‘Characteristic Value’ of 6.2 is derived for pH and 0.26 g/l for water soluble sulphate.

Based on the results, using Table C2 (SD1) for brown field sites the results for the water soluble sulphate indicate a Design Sulphate Class for the site of DS-1, with an ACEC class of AC-1s for static groundwater conditions and AC-1 assuming mobile ground water conditions.

6.4 Ground Gas (Interim Findings)

Gas monitoring has only been undertaken on three occasion to date, therefore the following comments are only a preliminary assessment. A full assessment will be made once monitoring is complete and an addendum report will be issued.

Guidance on the assessment of ground gas is given in CIRIA C665 (2007) ‘*Assessing Risks Posed by Hazardous Ground Gases to Buildings*’ and BS8485:2015+A1:2019 ‘*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*’.

The gas monitoring carried out to date has recorded no methane and a peak carbon dioxide concentration of 8.4%, with no gas flow. A worst case gas screening value (GSV) of 0.0084 l/hr has been calculated for carbon dioxide. As no gas flow was recorded the limit of detection of 0.1 l/hr of the gas monitor used, has been used to calculate the GSV.

Based on the above GSV, the ground gas regime for the proposed structure would initially be assessed as Characteristic Situation CS1, based on Table 8.5 and 8.6 of CIRIA C665. However, as the carbon dioxide concentrations recorded in WS6 and WS7 are above 5%, then in accordance with the above standards the CS value is increased by one band to CS2 (Refer to Table 8.5, CIRIA C665). CS2 would require basic gas protection measures to be installed in the building. Guidance on the appropriate gas protection measures are given in BS8485:2015+A1:2019. The measures used are generally a combination of a ventilation layer, floor slab or raft foundation and gas roof membrane, the options used would depend to some extent on the foundation construction adopted.

According to the desk study basic radon protection measures are required for the protection of the proposed building at this location.

6.5 Disposal of Soils

The removal of any hazardous materials from the site should be undertaken in accordance with the Control of Asbestos Regulations (2012), Health and Safety at Work etc. Act 1974 (and all regulations made under the Act), the Control of Substances Hazardous to Health Regulations 2002 (SI 2002/2677)

and Waste Regulations including Duty of Care Regulations 1991. There will also be a requirement to classify the waste in accordance with the European Waste Catalogue.

6.6 Regulatory Approval

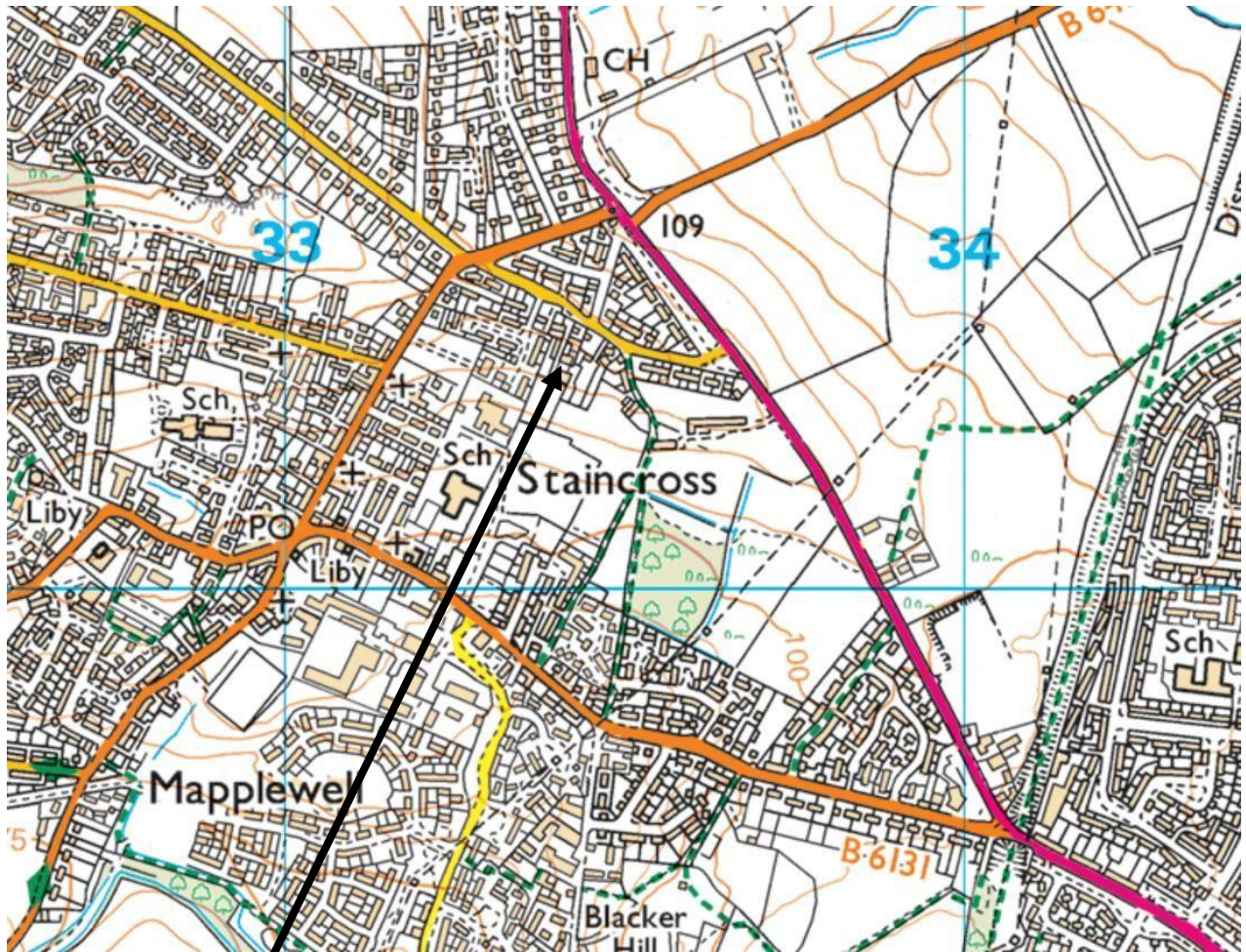
The conclusions and recommendations presented above are considered practical based on the findings of this investigation. The conclusions and recommendations cannot, however, be guaranteed to gain regulatory approval, and therefore this report should be submitted to the regulators for their comment/approval as part of any planning approval.

The above recommendations comprise a general outline of possible or likely works. A remediation strategy report should be produced and agreed with the regulatory authorities prior to development.



APPENDIX A

DRAWINGS



The Site

Site Location Plan Drawing No C398/1/1

Map reproduced from Ordnance Survey. On behalf of the
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Architectural Design Consultant Ltd.

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Mobile: 07973 251730

e-mail: peter-thompson@hotmail.co.uk

PROPOSED RESIDENTIAL DEVELOPMENT

28 PADDOCK ROAD

STAINCROSS

LOCATION PLAN

1:1250@A4

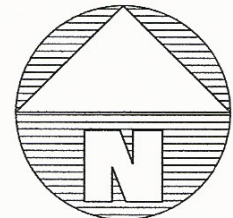


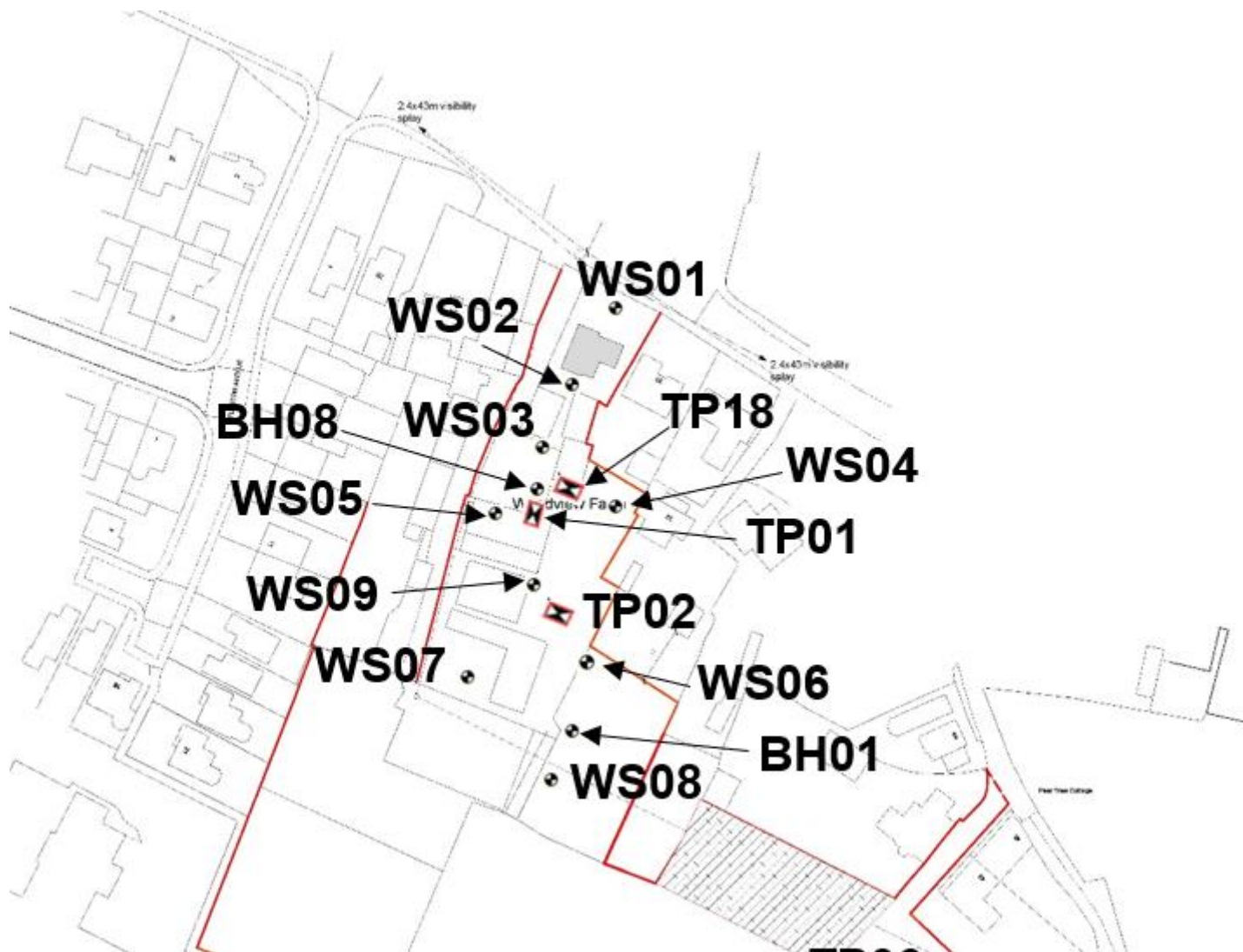
Linwood

Barnsley Road

Dodworth

Barnsley S75 3JR





Drawing No: C398/1/2		Scale NTS	
Contract	C398 – Paddock Road, Staincross	Drawn AS	Approved GS
		Drawing Name – Exploratory Hole Location Plan	
Client – Andrew Bailey Architects			



APPENDIX B

EXPLORATORY HOLE RECORDS

Window Sampling Borehole				BH No		WS01
				Contract No		C398
Method:		Site		Date		23/11/20
Windowless sampling borehole using a Dando Terrier		28 Paddock Road, Staincross		Scale		01:25
		Client		Logged By		AS
Sample Details						
Type	Depth To-from (m)	Records	Description	Depth (m)	Level (mAOD)	Legend
ES	0.20	N=>54 (5,8,10,12,15,17)	TOPSOIL: Soft dark brown slightly gravelly very sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of sandstone. Occasional plant rootlets.	0.35		
ES	0.50			0.40		
			MADE GROUND: Brick footings	0.55		
			Light grey slightly clayey very sandy subangular fine to coarse GRAVEL of sandstone with a low cobble content. Sand is fine to coarse. Cobbles are subangular of sandstone.			
SPT	1.00-1.45		Weak yellowish orange very thinly laminated SANDSTONE. Recovered as gravelly fine to coarse sand. Gravel is subangular fine to coarse.			
			Window sample hole complete at 1.45m			

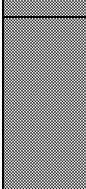
Remarks
Monitoring well installed 0.5m plain 0.70m slotted
No groundwater encountered.

Sample Types
D - Disturbed
U - Undisturbed
W - Water



Sheet 1 of 1

[illegible]

Window Sampling Borehole					BH No		WS03			
Method:	Windowless sampling borehole using a Dando Terrier		Site	28 Paddock Road, Staincross		Contract No		C398		
						Date		23/11/20		
						Scale		01:25		
						Logged By		AS		
Sample Details			Client	Andrew Bailey Architects						
Type	Depth To-from (m)	Records				Description		Depth (m)	Level (mAOD)	Legend
ES1	0.30	N=10 (4,4,3,3,2,2)	TOPSOIL: Soft Dark brown slightly gravelly very sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of sandstone. Occasional plant rootlets.		0.10					
ES2 SPT	0.90 1.00-1.45		MADE GROUND: Yellowish brown slightly clayey sandy gravelly COBBLE sized fragments of sandstone. Sand is fine to coarse. Gravel sized fragments are subangular fine to coarse of sandstone and rare coal.		0.90					
			Medium dense greenish grey slightly gravelly silty fine to coarse SAND. Gravel is subangular fine to coarse of sandstone.		1.60					
D U70	1.90 2.00-2.50		Stiff dark grey locally black very gravelly CLAY. Gravel is subangular fine to coarse of mudstone and coal.		2.20					
SPT	2.50-2.95	N=91(6,6,10,14,17,50)	Extremely weak thinly laminated dark grey MUDSTONE: Recovered as subangular fine to coarse gravel.							
			Window sample hole complete at 2.95m							
Remarks									Sample Types	
No groundwater encountered.									D - Disturbed W - Water	
Monitoring well installed 0.50m plain 1.25m slotte U - Undisturbed										
										
									Sheet 1 of 1	

[illegible]

Window Sampling Borehole				BH No		WS06	
				Contract No		C398	
Method: Windowless sampling borehole using a Dando Terrier		Site		Date		23/11/20	
		28 Paddock Road, Staincross		Scale		01:25	
		Client		Logged By		AS	
Sample Details		Andrew Bailey Architects					
Type	Depth To-from (m)	Records	Description	Depth (m)	Level (mAOD)	Legend	
ES1	0.30	55,52,50	MADE GROUND: Soft dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of brick and sandstone.	0.40			
			Brownish grey gravelly fine to coarse SAND. Gravel is subangular fine to coarse of sandstone with a low cobble content. Cobbles are subangular of sandstone.	0.55			
D	0.80						
HV	0.80						
ES2	0.90						
U70	1.00-1.50		Firm, brownish yellow locally mottled light grey slightly gravelly silty CLAY. Gravel is subangular fine to coarse of sandstone and mudstone.	1.70			
SPT	2.00-2.45	N=87(4,6,10,12,15,50)	Extremely weak thinly laminated dark grey MUDSTONE: Recorded as subangular fine to coarse gravel.				
Window sample hole complete at 2.45m							

Remarks
 No groundwater encountered.
 Monitoring well installed 0.50m plain 1.40m slotted.

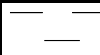
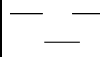
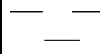
Sample Types
 D - Disturbed
 U - Undisturbed

W - Water

Sheet 1 of 1

[illegible]

[illegible]

Trial Pit Record				TP No		1				
				Contract No		C398				
Method:		Machine excavated trial pit using a 3 tonne rated tracked excavator		Date		04/11/20				
		Site		28 Paddock Road, Staincross		Scale		1:25		
Sample Details				Client		Andrew Bailey Architects		Logged By		ATS
Type	Depth To-from (m)	Vane kN/m ²	Description			Depth (m)	Level (mAOD)	Legend		
			MADE GROUND: Soft dark grey very gravelly CLAY. Gravel is subangular fine to coarse of brick, concrete and rare coal.			0.20				
			Firm locally stiff pale yellow mottled light grey silty gravelly CLAY. Gravel is subangular fine to coarse of mudstone lithorelicts.			0.80				
			Very weak to weak black vitreous extremely closely fractured COAL. Occasional brown iron staining noted along fracture surfaces Recovered as: Black slightly clayey sandy subangular fine to coarse gravel sized fragments.			1.50				
			Firm light grey very gravelly CLAY. Gravel is subangular fine to coarse of mudstone lithorelicts.							
			Trial pit complete at 1.60m							

Trial Pit Record				TP No	2	
				Contract No	C398	
Method:	Machine excavated trial pit using a 3 tonne rated tracked excavator		Site	28 Paddock Road, Staincross		
			Date	04/11/20		
			Scale	1:25		
Sample Details			Client	Andrew Bailey Architects		
			Logged By	ATS		
Type	Depth To-from (m)	Vane kN/m ²	Description	Depth (m)	Level (mAOD)	Legend
Hv		72,74,68	MADE GROUND: Dark brown very clayey gravelly fine to coarse SAND with a low cobble content. Gravel sized fragments are subangular fine to coarse of brick and mudstone. Cobbles are subangular of concrete and sandstone.	0.65		
			Firm locally stiff pale yellow mottled light grey silty gravelly CLAY. Gravel is subangular fine to coarse of mudstone lithorelicts.	1.45		
			Moderately strong thinly laminated to very thinly bedded SANDSTONE. Recovered as slightly gravelly subangular cobbles.			
			Trial pit complete at 1.50m			

Remarks Faces stable during excavation No groundwater encountered Pit dimensions 0.50x1.40m Trial Pit backfilled upon completion Hv - Hand Vane	Sample Types D - Disturbed W - Water B - Bulk ES - Environmental	
---	---	---

Trial Pit Record				TP No		18	
				Contract No		C398	
Method:		Machine excavated trial pit using a 3 tonne rated tracked excavator		Site		28 Paddock Road, Staincross	
				Date		15.02.21	
				Scale		1:25	
				Client		Andrew Bailey Architects	
Sample Details				Logged By		ATS	
Type	Depth To-from (m)	Vane kN/m ²	Description	Depth (m)	Level (mAOD)	Legend	
ES	0.20	68,62,74	MADE GROUND: Firm, dark grey very gravelly CLAY with a high cobble content. Gravel is subangular fine to coarse of sandstone and brick. Cobbles are subangular of sandstone and brick.	0.90			
ES	0.80						
D	1.20		Stiff, black grey mottled light brown slightly gravelly locally gravelly silty CLAY with a low cobble content. Gravel is subangular fine to coarse of mudstone and sandstone. Cobbles are subangular to subrounded of sandstone and ironstone.				
HV	1.40						
Trial pit complete at 2.0m							
Remarks							
Sides unstable from 0-0.90m No groundwater encountered Pit dimensions 2.50m-0.40m Pit backfilled upon completion							
Sample Types D - Disturbed W - Water B - Bulk ES - Environmental							
							

Client: G & M Consulting Ltd	Site: Land at 28. Paddock Road Staincross, Barnsley. S75 6LG	Cape Site Services Ltd Unit 2, Rear of castle buildings, Carlton Road, Barnsley, South Yorkshire, S71 3HX	
Date: 05/01/2021	METHOD Rotary air mist		

Measurements In Meters

BH no	FROM	TO	THICKNESS	Description
1				
	0.0	0.5	0.5	Fill
	0.5	1.5	1.0	Clay yellow brown sandy
	1.5	5.0	3.5	Sandstone grey brown silty with odd mudstone bands
	5.0	7.8	2.8	Mudstone grey silty
	7.8	10.5	2.7	Mudstone black
	10.5	11.0	0.5	Coal dirty
	11.0	11.5	0.5	Mudstone light grey silty
	11.5	21.5	10.0	Sandstone grey silty mudstone bands
	21.5	22.4	0.9	Coal
	22.4	30.0	7.6	Mudstone grey silty
				No gases recorded Water strike around 20.0m
2				
	0.0	0.7	0.7	Clay yellow brown
	0.7	2.5	1.8	Mudstone grey brown silty
	2.5	3.0	0.5	Coal
	3.0	3.5	0.5	Mudstone light grey silty
	3.5	7.0	3.5	Sandstone grey brown with mudstone bands
	7.0	13.6	6.6	Mudstone grey silty with odd sandstone bands
	13.6	14.4	0.8	Coal
	14.4	20.0	5.6	Mudstone grey silty
				No gases recorded Water strike around 12.0m
3				
	0.0	0.8	0.8	Clay yellow grey
	0.8	4.9	4.1	Mudstone grey silty
	4.9	5.4	0.5	Coal dirty
	5.4	6.0	0.6	Mudstone light grey silty
	6.0	16.3	10.3	Sandstone grey silty with mudstone bands
	16.3	17.1	0.8	Coal
	17.1	20.0	2.9	Mudstone grey silty odd sandstone band
				No gases recorded Water strike around 18.0m

Driller I Wiles	Driller's Assistant R Hawkins & S Fish
Driller's Signature <i>I Wiles</i>	Page ...1..... of 3.....



APPENDIX C

LABORATORY TEST RESULTS

**Andrew Swinbourne**

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e: graeme@soilexperts.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 21-57208

Project / Site name:	Paddock Road, Barnsley	Samples received on:	16/02/2021
Your job number:	C398	Samples instructed on/ Analysis started on:	17/02/2021
Your order number:		Analysis completed by:	25/02/2021
Report Issue Number:	1	Report issued on:	25/02/2021
Samples Analysed:	10 soil samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772494	1772495	1772496	1772497	1772498
Sample Reference				TT01	TT02	TT02	TP13	TP14
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	0.30	0.10	0.30
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	23	20	20	18
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	7.8	8.3	7.4
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.021	0.029	0.095

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.2	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	2.8	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	2.6	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.7	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.0	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.7	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.65	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.86	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	12.5	< 0.80	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	17	13	9.3	6.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	0.4	0.3	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Copper (aqua regia extractable)	mg/kg	1	MCERTS	140	40	49	18	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	130	76	43	28	13
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	18	19	15	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.4	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	230	80	73	65	68

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772494	1772495	1772496	1772497	1772498
Sample Reference				TT01	TT02	TT02	TP13	TP14
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	0.30	0.10	0.30
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

SVOCs

Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772494	1772495	1772496	1772497	1772498
Sample Reference				TT01	TT02	TT02	TP13	TP14
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.10	0.30	0.10	0.30
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05

SVOCs TICs

SVOCs TICs Compound Name		N/A	NONE	-	ND	-	-	ND
SVOC % Match	%	N/A	NONE	-	0	-	-	0

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

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772499	1772500	1772501	1772502	1772503
Sample Reference				TP15	TP16	TP17	TP18	TP18
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.20	0.20	0.80
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	23	18	16	16
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5	0.5	0.5

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	5.5	6.2	-	8.1
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.021	0.063	-	0.15

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.28	0.68
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.56
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	3.9	7.5
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.95	2.0
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	11	19
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	9.1	16
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	7.7	12
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	3.9	8.0
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	6.7	12
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	3.0	4.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	6.0	11
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	2.9	4.9
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.95	1.4
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	3.3	5.3

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	59.3	105
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	12	12	16	9.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.3	0.3	0.7	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Copper (aqua regia extractable)	mg/kg	1	MCERTS	34	30	19	24	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	39	41	29	54	36
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	19	14	16	20
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	79	74	66	60	64

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772499	1772500	1772501	1772502	1772503
Sample Reference				TP15	TP16	TP17	TP18	TP18
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.20	0.20	0.80
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
SVOCs								
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	< 0.1	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.28	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	3.9	-
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.95	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	< 0.2	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	< 0.3	-
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	11	-

Analytical Report Number: 21-57208
Project / Site name: Paddock Road, Barnsley

Lab Sample Number				1772499	1772500	1772501	1772502	1772503
Sample Reference				TP15	TP16	TP17	TP18	TP18
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.20	0.20	0.80
Date Sampled				15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	9.1	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	7.7	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	3.9	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	6.7	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	3.0	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	6.0	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	2.9	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	0.95	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	3.3	-

SVOCs TICs

SVOCs TICs Compound Name		N/A	NONE	-	ND	-	ND	-
SVOC % Match	%	N/A	NONE	-	0	-	0	-

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

Analytical Report Number : 21-57208

Project / Site name: Paddock Road, Barnsley

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1772494	TT01	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
1772495	TT02	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
1772496	TT02	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
1772497	TP13	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
1772498	TP14	None Supplied	0.3	Brown clay and sand.
1772499	TP15	None Supplied	0.2	Brown clay and loam with vegetation.
1772500	TP16	None Supplied	0.2	Brown clay and sand with vegetation and gravel
1772501	TP17	None Supplied	0.2	Brown clay and sand with vegetation and gravel
1772502	TP18	None Supplied	0.2	Brown clay and sand with gravel and vegetation.
1772503	TP18	None Supplied	0.8	Brown clay and sand with gravel and vegetation.

Analytical Report Number : 21-57208

Project / Site name: Paddock Road, Barnsley

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Tentatively identified compounds (SVOC) in soil	Determination of semi-volatile organic compounds total ion count in soil by extraction with dichloromethane and hexane followed by GC-MS followed by a full library scan.	In-house method based on USEPA 8270	L064-PL	D	NONE

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

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

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

**Andrew Swinbourne**

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Analytical Report Number : 21-62503

Project / Site name:	28 Paddock Road, Barnsley	Samples received on:	12/03/2021
Your job number:	C398	Samples instructed on/ Analysis started on:	12/03/2021
Your order number:		Analysis completed by:	23/03/2021
Report Issue Number:	1	Report issued on:	23/03/2021
Samples Analysed:	18 soil samples		

Signed: *Karolina Marek*

Karolina Marek
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802278	1802279	1802280	1802281	1802282
Sample Reference				WS01	WS01	WS02	WS02	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10	0.50	1.00
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	9.4	17	17	11
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	-	-	6.6
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	-	-	0.013

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.41	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.42	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.24	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	0.21	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.20	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.16	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.20	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	1.84	-	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	6.2	16	14	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	49	16	53	34	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	9.3	91	110	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	26	14	32	18	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	37	130	140	-

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802278	1802279	1802280	1802281	1802282
Sample Reference				WS01	WS01	WS02	WS02	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10	0.50	1.00
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-

Pesticide and Herbicide Screen

GCMS Pesticide Screen		N/A	NONE	-	-	-	None Detected	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802283	1802284	1802285	1802286	1802287
Sample Reference				WS03	WS03	WS04	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	0.20	0.50	0.10
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	17	15	14	9.5	15
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	Chrysotile - Loose Fibres
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	-	Detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	-	-	8.1	9.1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.033	-	-	0.13	0.079

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	0.26
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	1.4
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	1.5
Phenanthrene	mg/kg	0.05	MCERTS	0.67	-	-	< 0.05	9.9
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	2.9
Fluoranthene	mg/kg	0.05	MCERTS	1.4	-	-	< 0.05	19
Pyrene	mg/kg	0.05	MCERTS	1.3	-	-	< 0.05	17
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.77	-	-	< 0.05	11
Chrysene	mg/kg	0.05	MCERTS	0.88	-	-	< 0.05	6.2
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.84	-	-	< 0.05	7.4
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.67	-	-	< 0.05	6.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.83	-	-	< 0.05	8.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	3.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05	4.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	7.36	-	-	< 0.80	98.5
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	23	7.4	330	-	330
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.2	< 0.2	< 0.2	-	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	-	< 4.0
Copper (aqua regia extractable)	mg/kg	1	MCERTS	47	15	260	-	250
Lead (aqua regia extractable)	mg/kg	1	MCERTS	93	15	130	-	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	30	13	35	-	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	35	240	-	230

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802283	1802284	1802285	1802286	1802287
Sample Reference				WS03	WS03	WS04	WS04	WS05
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	0.20	0.50	0.10
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	7.6	-	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	11	-	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	33	-	-	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	51	-	-	-	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	-	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	-	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	-	-	-	19
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	-	-	-	60
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	16	-	-	-	120
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	23	-	-	-	200

Pesticide and Herbicide Screen

GCMS Pesticide Screen		N/A	NONE	-	-	-	-	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802288	1802289	1802290	1802291	1802292
Sample Reference				WS05	WS06	WS07	WS07	WS07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.30	0.20	0.50	1.00
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	15	14	15	11
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	-	Not-detected	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	-	8.7	-	6.6
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	-	0.26	-	0.057

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	0.13	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	0.17	0.46	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	0.18	0.44	-
Phenanthrene	mg/kg	0.05	MCERTS	-	1.4	2.1	3.5	-
Anthracene	mg/kg	0.05	MCERTS	-	0.43	0.53	1.2	-
Fluoranthene	mg/kg	0.05	MCERTS	-	3.7	8.2	5.3	-
Pyrene	mg/kg	0.05	MCERTS	-	3.4	7.5	5.4	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	2.3	4.8	6.7	-
Chrysene	mg/kg	0.05	MCERTS	-	1.9	2.5	4.9	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.5	3.9	6.8	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	1.2	2.3	4.8	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	2.3	4.0	6.6	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.98	1.7	2.9	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	1.2	2.1	3.6	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	21.3	39.8	52.7	-
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	21	-	33	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	-	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	54	-	77	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	22	120	-	58	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	-	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	20	-	38	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	< 1.0	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	38	190	-	480	-

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802288	1802289	1802290	1802291	1802292
Sample Reference				WS05	WS06	WS07	WS07	WS07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	0.30	0.20	0.50	1.00
Date Sampled				11/03/2021	11/03/2021	11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Monoaromatics & Oxygenates								
Benzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	2.1	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	10	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	33	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	46	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	28	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	61	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	89	-	-

Pesticide and Herbicide Screen

GCMS Pesticide Screen		N/A	NONE	-	None Detected	-	-	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802293	1802294	1802295
Sample Reference				WS08	WS08	WS09
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10
Date Sampled				11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	13	15
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	6.2	-
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.17	-

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	1.7	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.48	-	0.27
Acenaphthene	mg/kg	0.05	MCERTS	1.7	-	0.58
Fluorene	mg/kg	0.05	MCERTS	1.8	-	0.51
Phenanthrene	mg/kg	0.05	MCERTS	11	-	7.9
Anthracene	mg/kg	0.05	MCERTS	2.3	-	2.3
Fluoranthene	mg/kg	0.05	MCERTS	13	-	25
Pyrene	mg/kg	0.05	MCERTS	11	-	24
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.1	-	17
Chrysene	mg/kg	0.05	MCERTS	3.9	-	11
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.5	-	16
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.7	-	11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.0	-	15
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.1	-	7.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.71	-	1.9
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.4	-	9.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	71.4	-	148
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	-	14
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	0.7
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0
Copper (aqua regia extractable)	mg/kg	1	MCERTS	170	-	73
Lead (aqua regia extractable)	mg/kg	1	MCERTS	160	-	120
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	-	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	270	-	260

Analytical Report Number: 21-62503
Project / Site name: 28 Paddock Road, Barnsley

Lab Sample Number				1802293	1802294	1802295
Sample Reference				WS08	WS08	WS09
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.50	0.10
Date Sampled				11/03/2021	11/03/2021	11/03/2021
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Monoaromatics & Oxygenates						
Benzene	µg/kg	1	MCERTS	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-

Pesticide and Herbicide Screen

GCMS Pesticide Screen		N/A	NONE	-	-	-
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U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-62503

Project / Site name: 28 Paddock Road, Barnsley

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1802278	WS01	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
1802279	WS01	None Supplied	0.5	Brown sandy clay with gravel.
1802280	WS02	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
1802281	WS02	None Supplied	0.5	Brown sandy clay with gravel and vegetation.
1802282	WS02	None Supplied	1	Brown sandy clay with gravel.
1802283	WS03	None Supplied	0.3	Brown loam and clay with gravel and vegetation.
1802284	WS03	None Supplied	0.9	Brown sandy clay with gravel.
1802285	WS04	None Supplied	0.2	Brown loam and clay with gravel and vegetation.
1802286	WS04	None Supplied	0.5	Brown sandy clay with gravel.
1802287	WS05	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
1802288	WS05	None Supplied	0.7	Brown sandy clay with gravel and brick.
1802289	WS06	None Supplied	0.3	Brown clay and loam with gravel and vegetation.
1802290	WS07	None Supplied	0.2	Brown clay and loam with gravel and vegetation.
1802291	WS07	None Supplied	0.5	Brown loam and sand with gravel and vegetation.
1802292	WS07	None Supplied	1	Brown sandy clay with gravel.
1802293	WS08	None Supplied	0.2	Brown clay and loam with gravel and vegetation.
1802294	WS08	None Supplied	0.5	Brown sandy clay with gravel.
1802295	WS09	None Supplied	0.1	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 21-62503

Project / Site name: 28 Paddock Road, Barnsley

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
GC Pesticide Screen (TIC)	Analysis of unknown pesticides by GCMS	GC Pesticide Screen (TIC)	L064B	D	NONE

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

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

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

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



LABORATORY REPORT



4043

Contract Number: PSL21/1405

Report Date: 24 February 2021

Client's Reference: C398

Client Name: G&M Consulting Ltd
Howard House
Lowfields Road
Leeds
West Yorkshire
LS12 6BS

For the attention of: Graeme Swinbourne

Contract Title: Paddock Road, Staincross

Date Received: 16/2/2021

Date Commenced: 16/2/2021

Date Completed: 24/2/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Senior Technician)

S Eyre
(Senior Technician)


T Watkins
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

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4043

PSL
Professional Soils Laboratory

Paddock Road, Staincross

Contract No:

PSL21/1405

Client Ref:

C398

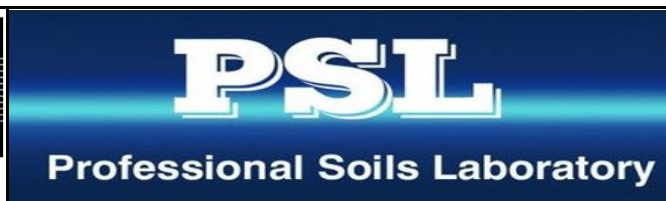
SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m ³ Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP13		D	1.00		28			60	29	31	100	High Plasticity CH
TP14		D	0.50		20							
TP14		D	1.00		24			82	36	46	100	Very High Plasticity CV
TP15		D	0.60		20			40	22	18	100	Intermediate Plasticity CI
TP16		D	0.50		20			44	23	21	100	Intermediate Plasticity CI
TP17		D	0.50		30			53	27	26	100	High Plasticity CH
TP18		D	1.20		28			56	29	27	100	High Plasticity CH

SYMBOLS : NP : Non Plastic

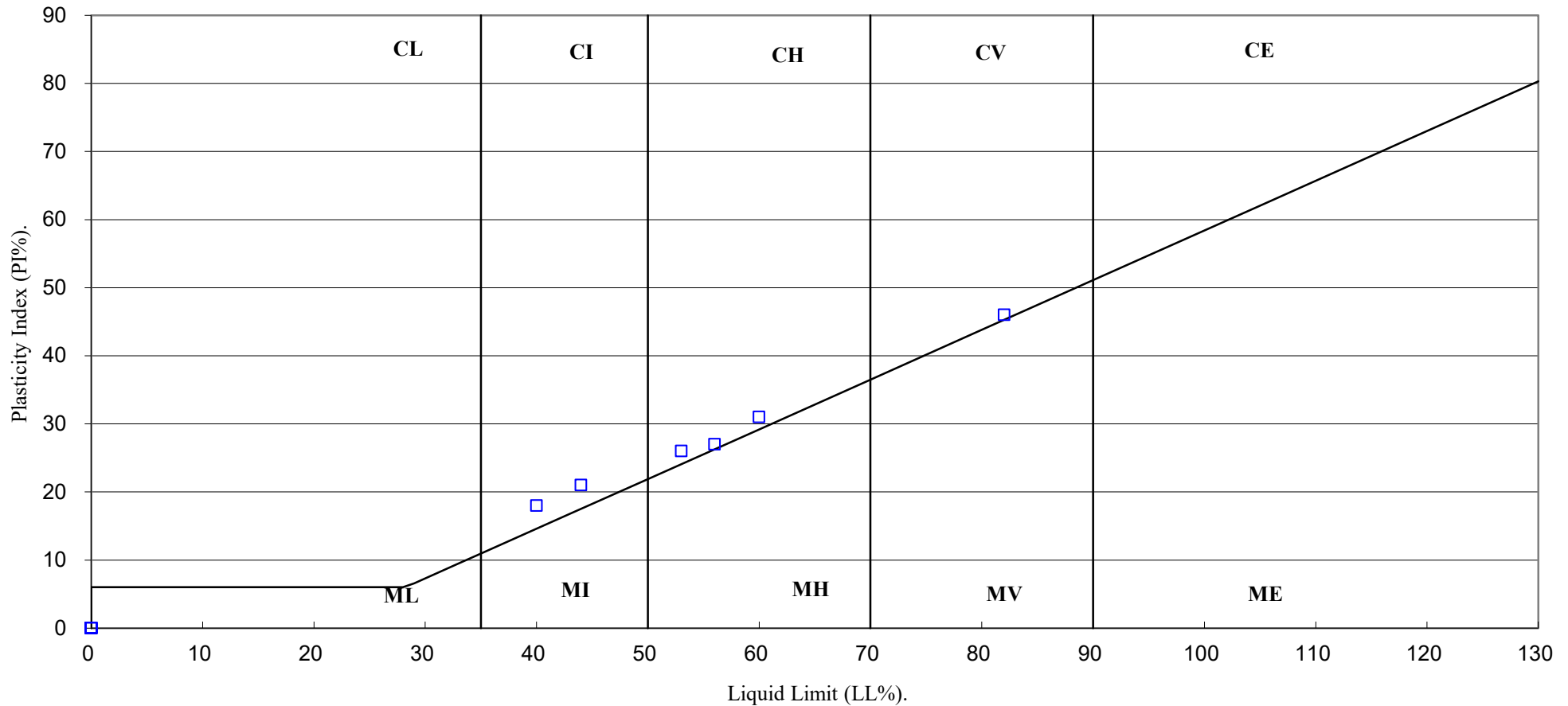
* : Liquid Limit and Plastic Limit Wet Sieved.



Paddock Road, Straincross

Contract No:
PSL21/1405
Client Ref:
C398

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

Paddock Road, Straincross

Contract No:

PSL21/1405

Client Ref:

C398



LABORATORY REPORT



4043

Contract Number: PSL21/2184

Report Date: 23 March 2021
Client's Reference: C398
Client Name: G&M Consulting Ltd
Howard House
Lowfields Road
Leeds
West Yorkshire
LS12 6BS

For the attention of: Graeme Swinbourne

Contract Title: 28 Paddock Road, Barnsley
Date Received: 15/3/2021
Date Commenced: 15/3/2021
Date Completed: 22/3/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Senior Technician)


S Eyre
(Senior Technician)

H Daniels
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

28 Paddock Road, Barnsley

Contract No:

PSL21/2184

Client Ref:

C398

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



4043

PSL

Professional Soils Laboratory

28 Paddock Road, Barnsley

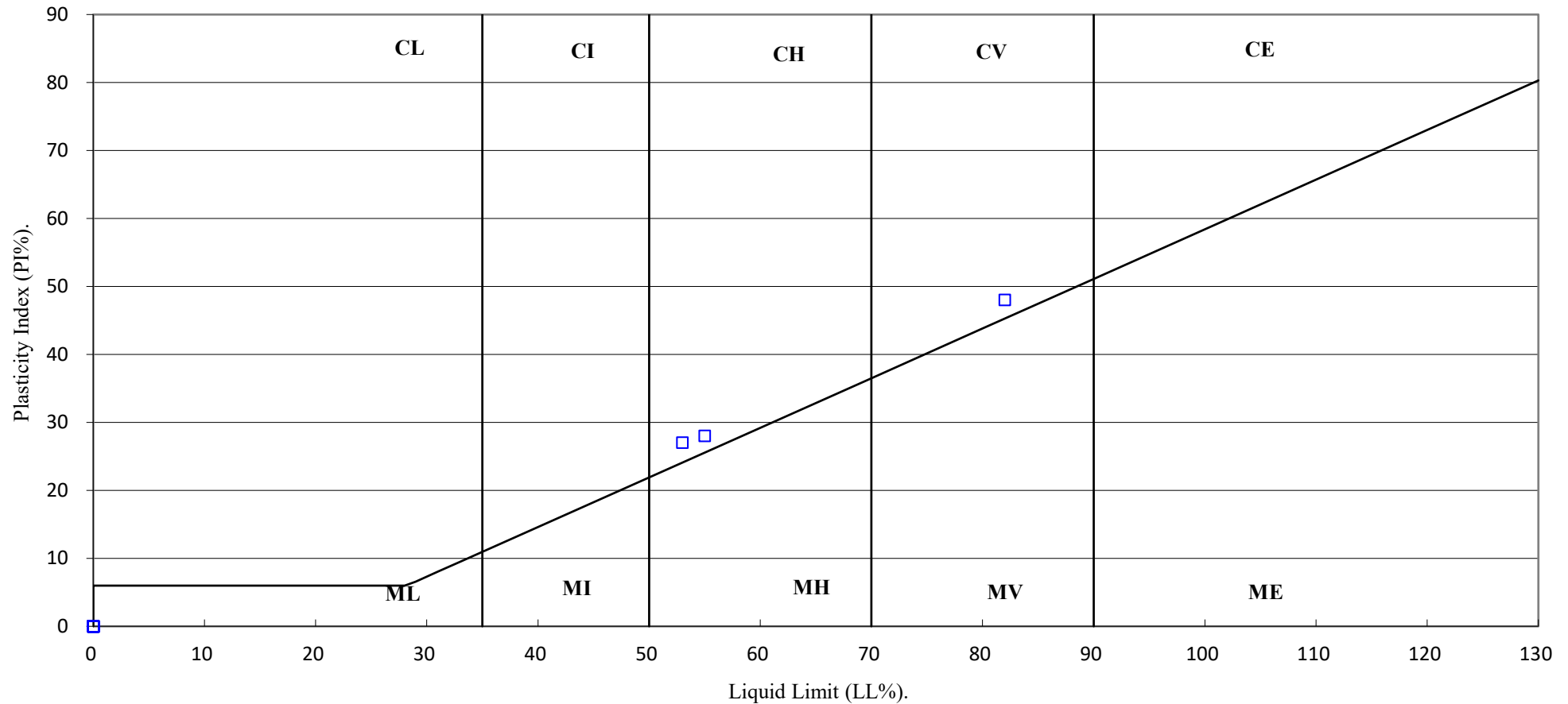
Contract No:

PSL21/2184

Client Ref:

C398

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

28 Paddock Road, Barnsley

Contract No:

PSL21/2184

Client Ref:

C398

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

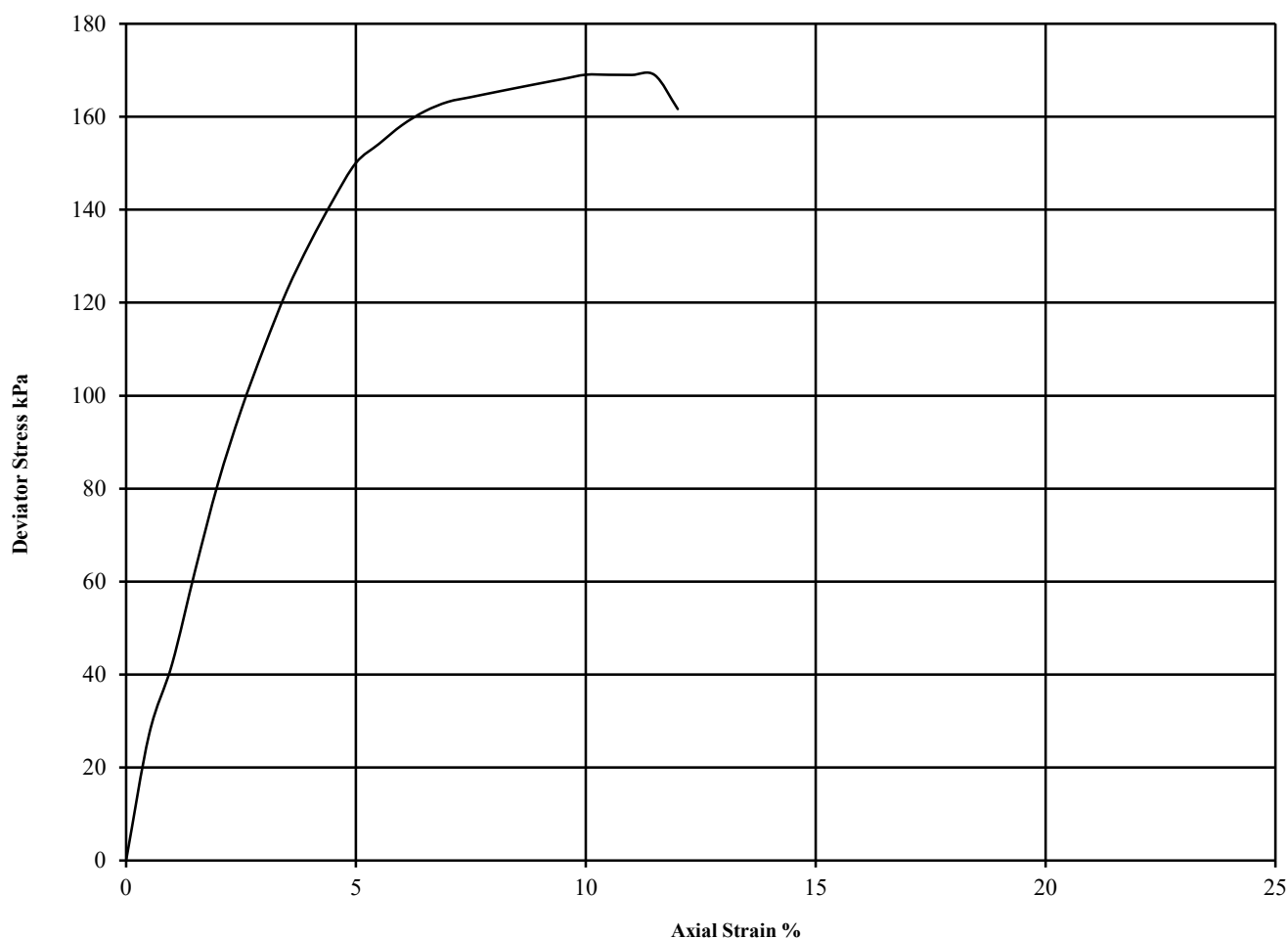
Hole Number: WS3

Top Depth (m): 2.00

Sample Number:

Base Depth (m): 2.50

Sample Type U70



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.50 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	28	1.93	1.50	50	169	85	10.0	Brittle	



4043

PSL

Professional Soils Laboratory

28 Paddock Road, Barnsley

Contract No:

PSL21/2184

Client Ref:

C398

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

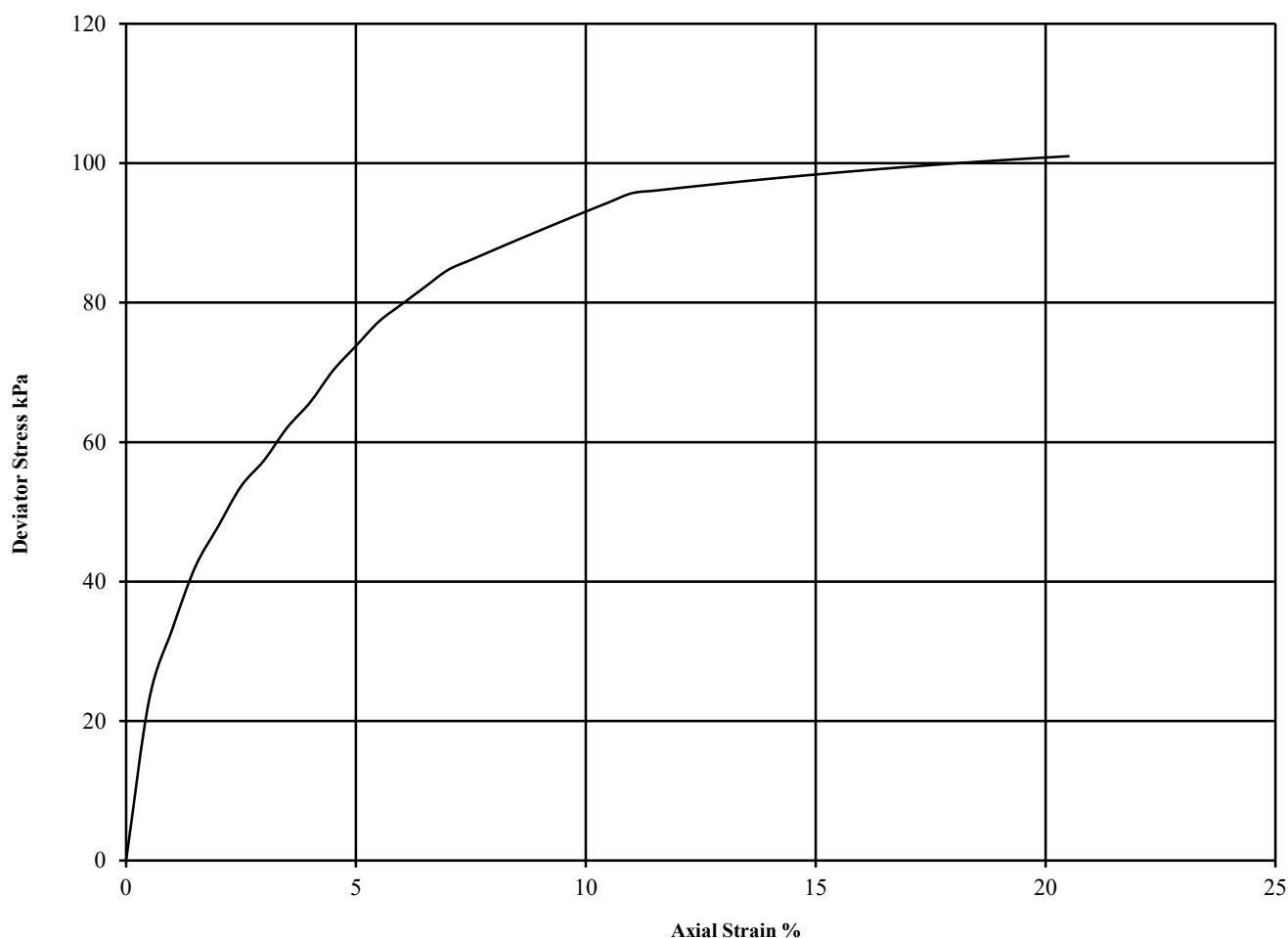
Hole Number: WS5

Top Depth (m): 1.00

Sample Number:

Base Depth (m): 1.50

Sample Type U70



Diameter (mm):		70		Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure		Undisturbed Sample
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				Sample taken from top of tube
										Rate of strain = 2 %/min
										Latex Membrane used 0.2 mm thick,
										Correction applied 0.46
1	36	1.71	1.26	25	101	51	20.5	Plastic		See summary of soil descriptions



4043

PSL

Professional Soils Laboratory

28 Paddock Road, Barnsley

Contract No:

PSL21/2184

Client Ref:

C398

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

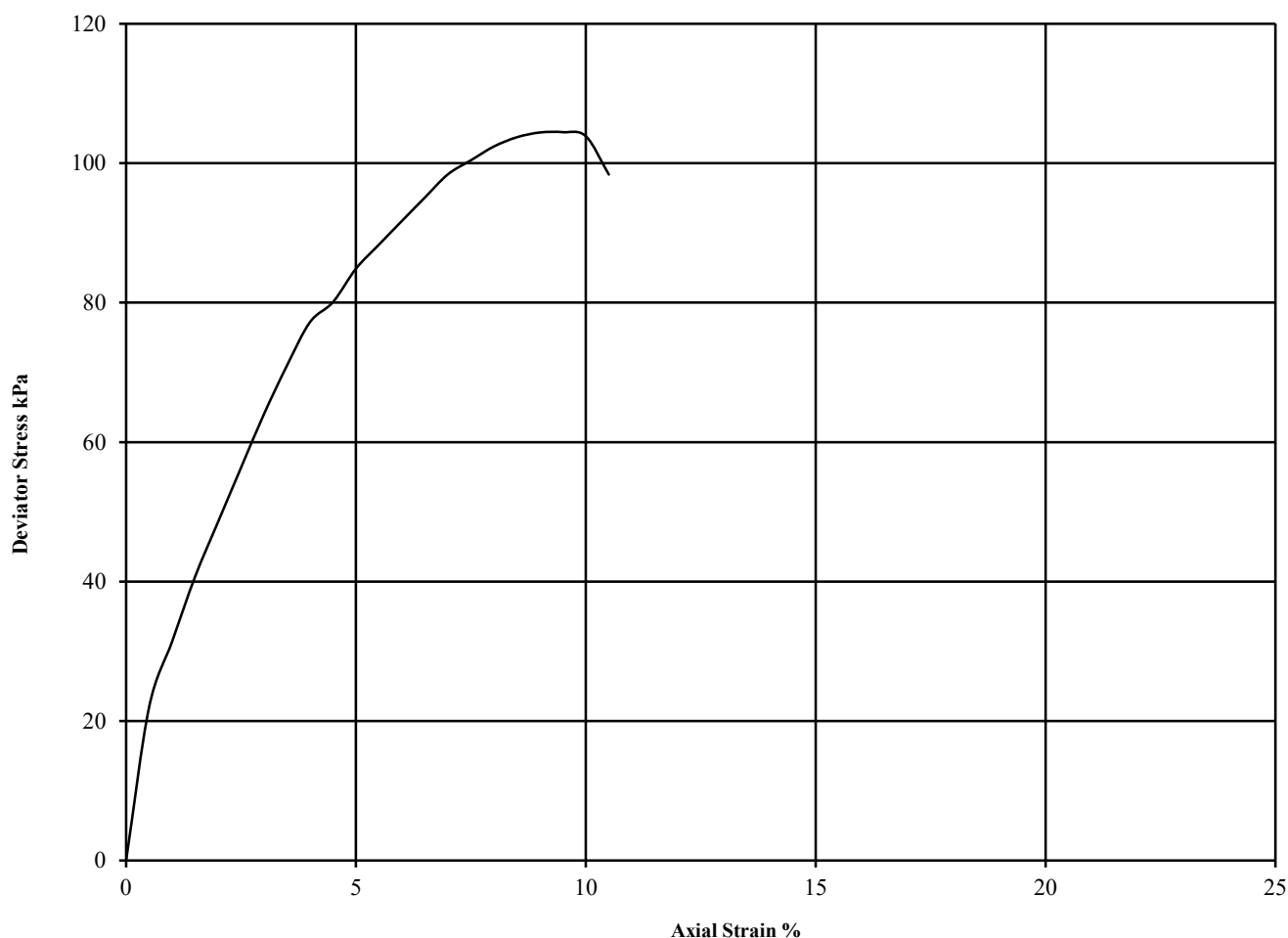
Hole Number: WS6

Top Depth (m): 1.00

Sample Number:

Base Depth (m): 1.50

Sample Type U70



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.50 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	32	1.81	1.37	25	104	52	9.5	Brittle	



4043

PSL

Professional Soils Laboratory

28 Paddock Road, Barnsley

Contract No:

PSL21/2184

Client Ref:

C398



APPENDIX D

GAS MONITORING RESULT SHEETS



APPENDIX E

PHOTOGRAPHS



Figure 2 - TP01 - 1.60m



Figure 1 - TP02 - 1.50m



Figure 3 - TP18 - 2.00m