Phase I & II Geoenvironmental Site Assessment

Site: Trub Farm, Castleton
Reference: 17-524-R1
Date: June 24

e3p

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

+ 44 (0) 161 707 9612
https://e3p.co.uk

Registered in England
CRN: 08725262

QUALITY ASSURANCE

Report reference	17-524-R1

REV REF:	DESCRIPTION	AUTHOR	CHECKED	AUTHORISED	DATE
R1-1	First issue	JB	MSD	SC	07/06/24

This report has been prepared for the sole benefit, use, and information of the client. The liability of Environmental Engineering Partnership Limited T/A E3P with respect to the information contained in the report will not extend to any third party. This report has been prepared by the qualified persons as listed below.

WRITTEN BY	QUALIFICATIONS	POSITION
Jonathan Beer	BSc (Hons), MSc, FGS	Consultant

REVIEWED BY	QUALIFICATIONS	POSITION
Matthew Dee	MESci (Hons), FGS, MIEnvSc	Senior Consultant

AUTHORISED BY	QUALIFICATIONS	POSITION
Stephanie Cox	BSc (Hons). FGS, MIEnvSc, PIEMA, CEnv	Director

EXECUTIVE SUMMARY

Site Address	Land at Trub Farm, Manchester Road, Rochdale, OL11 2XG
Grid Reference	E 388226 N 410043
Site Area	4.98 Ha
Proposed Development	M.C.I Developments Ltd intend to construct a residential development comprising low rise residential housing and two apartment blocks with associated gardens, estate roads and infrastructure.
Current Site Use	The site is a generally flat, roughly rectangular shaped parcel of land located in Castleton, southwest of Rochdale town centre. The site is bound in the east by the Rochdale Canal and in the west by the train line. The site is currently undeveloped and utilised as agricultural land. A Cadent gas pipe runs through the site along the southern boundary.
Site History	Wham farm was recorded to be present within the centre of the site, along with a well, in the 1851 mapping; both features were absent in all subsequent mapping records, from 1890. The majority of the site has been undeveloped throughout the historical mapping records with minor field boundary changes noted throughout.

ENVIRONMENTAL SETTING

Geology	**Drift Geology**	Glaciofluvial deposits of SAND and GRAVEL in the east Lacustrine Deposits – CLAY and PEAT mapped along the west.
	Bedrock Geology	Pennine Lower Coal Measures (Mudstone, Sandstone and Siltstone).
	Faults	An unnamed normal fault trending northwest—southeast through the north of the site
Geomorphology	Due to the undeveloped nature of the site, it has not been subject to significant anthropogenic changes with the current site topography broadly representing the natural landform. The exception(s) to this relate to the artificial embankment in the north east, likely associated with the adjacent canal, and the raised area through the centre of the site relating to the installation of combined sewage infrastructure.	
Hydrogeology	Secondary A superficial aquifer overlying a Secondary A Bedrock Aquifer.	
	No groundwater abstraction licenses are located within 1 km of the site. The site in not located within a groundwater source protection zone.	
Hydrology	The Rochdale Canal is located immediately adjacent to the eastern boundary. Trub Brook is present on the southern boundary of the site; this water course is culverted along the southern boundary.	
	The site is not located in an area affected by river flooding (Flood Risk Zone 1). However, the Groundsure report states there is a moderate potential for groundwater flooding across the majority of the site.	

Utility Locations	A formal drainage survey has not been completed, however, statutory utility plans for the site have been reviewed. A Cadent high pressure gas main has been identified along the southern boundary of the site (within the site boundary). A combined sewer is located in the centre of the site transecting north to south. In the south of the site this is diverted to the south western boundary. A further combined public sewer is located along the southern boundary. A surface water sewer is present in the centre of the site transecting south and then diverting west to the south western boundary. A further surface water sewer is present in the north of the site crossing east to west.
Landfill Sites and Waste Sites	There are no landfills located within a 250 m radius of the site, with the closest EA recorded landfill present over 500 m from the site at Newhey Farm to the southeast, listed as receiving inert materials. Due to the distance from the site, it is considered that this will not pose a risk of hazardous ground gases to the subject site.
Radon	The site is not located within an area affected by radon – (1-3% homes above action level). As such, radon protection measures will not be required to new structures.
Unexploded Ordnance	Low Risk
PFAS	No potential current or historical sources of PFAS have been identified on site. No further risk assessment required.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.

PREVIOUS REPORTS

The following previous reports have been completed for the site:

- **REC**; Geo-environmental Site Investigation, Trub Farm; Report ref: 44975P1R2; dated June 2014

A summary is provided in section 3.6.

E3P GROUND INVESTIGATION

Ground Investigation Works	E3P completed an intrusive ground investigation in April 2024 comprising: - 28 x mechanically excavated trial pits, - 3 x BRE365 soakaway tests, - 12 x window sample boreholes, - 3 x cable percussive boreholes, - Construction of environmental 12 monitoring installations.
Ground Conditions	**Made Ground – 0.0 m bgl to 1.20 m bgl** Made Ground was encountered within seven of the 33 exploratory locations on site to a maximum depth of 1.20 m bgl (TP127).

Ground and Groundwater Conditions

Made Ground was encountered in the north of the site within TP119 to a recorded proven depth of 0.60 m bgl, in one location at the centre of the site (TP123) to a depth of 0.60 m bgl and along the central eastern boundary in TP109, TP110, TP114, TP127 and WS103, to a maximum depth of 1.20 m bgl, but more generally encountered to depths < 1.00 m bgl.

In all locations, Made Ground comprises a reworked topsoil from ground level to a maximum depth of 0.30 m bgl, underlain by a reworked clayey gravelly fine to medium SAND with gravel inclusions of sandstone, mudstone and brick.

Natural Topsoil 0.0 m bgl to 0.40 m bgl.

Natural topsoil was encountered within the remaining 26 location that did not contain Made Ground. The thickness of topsoil varied from 0.20–0.40 m bgl.

Two distinct types of topsoil were encountered; within TP106, TP107, TP112, TP126, WS104, WS109, WS110 and CP101 topsoil deposits comprised dark brown sandy CLAY with rootlets and across the remaining boreholes natural topsoil comprised a dark brown clayey fine to medium SAND with rootlets.

Drift – 0.20 m bgl to >15.0 m bgl

Drift deposits were encountered within all exploratory locations and are variable across the site comprising interbedded layers of CLAY, SAND and PEAT. Drift deposits were encountered from 0.20 to a maximum proven depth of 15.00 m bgl.

Where encountered, cohesive deposits were encountered as brown soft to stiff, silty sandy CLAY. Granular deposits were encountered as light brown very loose to dense fine to medium SAND.

From depths of 3.00 m bgl and below the sands were encountered as 'blowing sand' within window sample and cable percussive boreholes, likely associated with the high water table.

PEAT was encountered within 22 of 33 locations. In the south of the site brown pseudo-fibrous PEAT was encountered within TP101, TP104, TP106-TP109, TP11, TP112, TP126, WS102, WS110-WS112 and CP101 at depths between 0.30 m and 3.00 m bgl, with a thickness ranging from 0.10 m (TP104) to 2.50 m (WS112). In the north of the site brown pseudo fibrous PEAT was encountered within TP103, TP115-TP118, WS10, WS106 and CP103 at depths between 0.25 m and 4.90 m, with a thickness ranging from 0.20 m (TP103) to 3.60 m (CP103).

Additionally, rare plant debris was noted within SAND and CLAY deposits in 10 locations (TP113, TP116-TP118, TP120, TP126, TP128, WS101, WS105 and WS109) at depths between 0.30 m and 2.60 m bgl.

No PEAT or plant debris was encountered within the central eastern sector of the site. With strata in this area of the site comprising interbedded brown slightly clayey gravelly fine to medium SAND and firm to stiff brown mottled grey gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded of mudstone.

Solid – N/A

The solid geology was not encountered during the site investigation.

	Groundwater Groundwater strikes were encountered across the site at depths between 0.50 m and 13.20 m. Generally, a high water table was encountered with saturated soil arisings noted across the site. Return monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results record a high water table with groundwater encountered between 0.21 m and 1.14 m bgl during the monitoring period undertaken to date.

CONTAMINATED LAND ASSESSMENT

Human Health	The Tier II human health risk assessment has identified the presence of one isolated exceedance of dibenzo(a,h)anthracene within TP107 at 0.40 m bgl. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals, non-volatile PAH compounds and long chain hydrocarbons can be mitigated through the installation of a suitable cover system in all proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils. Where hardstand is proposed (roads, plots and driveways) this will cut the contamination pathway and remove the risk to human health. Alternatively, due to the isolated nature of the exceedance, during a process of cut/fill enabling works, hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity. No significant concentrations of SVOCs or VOCs were identified in the soils submitted for chemical analysis. No asbestos has been identified in any of the tested samples. Chemical analysis of the natural clay drift deposits and topsoil has identified these soils to be acceptable for use as subsoil within the proposed garden areas; however, further chemical validation samples may be required to meet regulatory sampling frequency.
Controlled Waters	Trub Brook, is considered the primary controlled water receptor. The controlled waters risk assessment identified minor exceedances of heavy metal compounds (copper, lead, nickel and zinc) within leachate, groundwater and Trub Brook surface water samples when compared to the EQS values. No comparison was made to the DWS values due to the lack of viable pathway to the underlying bedrock aquifer. No current or historical on-site point source has been identified. Analysis of samples from Trub Brook recorded elevated copper and zinc in comparison to EQS values, as such, an M-BAT assessment was undertaken and confirmed that zinc and copper are not bio-available in Trub Brook. Additionally, copper and zinc exceedances were recorded both upstream and downstream of the site and therefore cannot be attributed to the site.

	The heavy metal compounds are of low solubility and low mobility and therefore migration to the adjacent watercourse is considered to be a low likelihood. Given the low mobility, lack of on-site contamination sources and above conclusions drawn from the surface water sampling/assessments, E3P do not consider the site to pose an unacceptable level of risk to surface waters.
Ground Gas	Two gas monitoring visits have been completed to date. Due to the high water table on site resulting in flooded wells, much of the current data collected is unreliable. The high water table is likely to trap any ground gas within shallow soils meaning the site is at a greater risk from hazardous ground gas. Given the presence of organic soils and PEAT across large areas of the site and sub cropping Arley coal seam (at depth), at this stage precautionary CS2 measured should be allowed for. The full ground gas protection regime will be decided upon completion of the ground gas monitoring. Radon protection measures are not required for any proposed dwellings on site.
Potable Water Infrastructure	No elevated contaminants have been identified at pipeline depth (0.75–1.35 m bgl). Based on the assessment of current site conditions it is likely that PE pipe can be used at the proposed development. However, the importation of materials may affect the UKWIR Risk Assessment which should be updated after completion of enabling works.

COAL MINING ASSESSMENT

Preliminary Assessment	The Coal Authority (CA) search indicated the site is in an area that may be affected by ground instability attributed to coal mining. Review of historical mapping dating back to 1851 did not identify any evidence of coal mining on site or in the immediate surrounding area. A review of the 1:10,560 geological mapping shows the Arley seam trending northwest--southeast through the centre of the site. A fault is present trending northwest--southeast through the north of site, with the Arley Seam noted to sub-crop again 35 m north--east. Analysis of the surrounding geology shows the seam is likely dipping southwest, however, given the local faulting, the geology is likely to be complex. The CA interactive viewer has identified that the site is within the coal authority reporting area, with a small portion of the centre of the site in a development high risk area, relating to a sub-cropping Arley coal seam. As such, E3P obtained a CA consultant coal mining report (ref: 51003423575001). Review of the CA report confirmed the presence of the Arley seam below the site at workable thickness, however, the report confirmed no known mine workings, entries or probable past unrecorded workings beneath the site.
Previous Reports/Investigations	REC Ltd have previously undertaken a coal mining risk assessment for the subject site (Report Ref: 44975p1r2, dated April 2014) which has identified the presence of the Arley seam sub-cropping in a northwest--south east trend through the central sector. Due to the fact that the Arley seam is a known worked seam, REC completed an intrusive coal mining Ground Investigation.

	Rotary boreholes were advanced to 15.00 m bgl and no bedrock was encountered, with nearby BGS boreholes indicating that there is circa 50 m bgl of drift in the locality. REC determined that given the significant depth of drift deposits along with the high water table, shallow mining in this area would not be feasible. REC consulted the Coal Authority on their risk assessment, of which they informally agreed upon and considered there would be no requirement for mitigation measures in relation to the proposed development. E3P would suggest caution be exercised; it is likely that the Coal Authority will require deep boreholes to discount the potential for workings in the Arley Coal Seam.
Recommendations	E3P have contacted the Coal Authority in regard to consultation for any further investigation requirements. E3P have received the below response Coal Authority: *"Our Planning Team has a dedicated Pre-app service, however, due to resource issues it is not currently available. They are hoping that it will be up and running again in June 2024."* Should the coal authority deem that further assessment is required, rotary open holes will be primarily advanced to investigate ground conditions, permit in-situ geotechnical testing and confirm the nature of underlying geology and the potential presence of shallow historical workings within the coal crop and area of 'Development High Risk'

GEOTECHNICAL ASSESSMENT

Underground Obstructions & Subterranean hazards	No obstructions were encountered during the ground investigation and are unlikely to be encountered during turnover works due to the largely undeveloped nature of the site. If present, obstructions are anticipated beneath the former Wham Farm structures.
Allowable Bearing Capacity	Ground conditions were very variable across the site with much of the site recording loose sands, soft alluvial silts/clays and organic peat deposits. Compressible PEAT deposits on site are not considered a suitable founding stratum and therefore net Allowable Bearing Pressure (ABP) calculated from CPT/SPT values from peat stratum have been discounted. From 1.00–3.45 m bgl, the underlying natural clay drift deposits have been evaluated and found to generally be firm low strength to stiff medium strength, with a net Allowable Bearing Capacity (ABC) ranging from 42 kN/m^2 at 1.00 m bgl to 116 kN/m^2 at 3.00 m bgl. Two localised areas of very soft extremely low strength clay with a net ABC ranging from 8.94–18.78 kN/m^2, have been identified in CP101 at 2.00 m bgl and CP102 at 3.00 m bgl. From 4.00–6.45 m bgl the natural clay drift deposits are generally stiff medium strength with a net ABC ranging from 96–143 kN/m^2. From 9.00 m bgl the clay deposits are very stiff high strength with an ABC of 166 kN/m^2 which generally increases with depth to 284 kN/m^2.

	Where peat deposits are not present on site, the underlying natural sand deposits are generally loose with a net ABC ranging from 55–74 kN/m^2 from 1.00–2.45 m bgl. Natural sand directly underlying peat deposits (3.00–5.45 m bgl) were found to be very loose with a net ABC ranging from 8.45–16.90 kN/m^2 From 3.00 m bgl the natural sands are generally medium dense to dense with a minimum ABC of 100.49 kN/m^2 which generally increases with depth.
Foundation Options	Ground conditions were very variable across the site with much of the site recording loose sands, soft alluvial clays and organic peat deposits. Peat deposits were generally identified within the western sector of the site where mapped by the BGS and were found to be present from the near surface to <3.00 m bgl. Peat deposits were therefore unconsolidated and will require excavation from beneath the entire development footprint to ensure no differential settlement to the plots, gardens and external infrastructure. Peat deposits may be stockpiled and following validation, are likely to be suitable for use within a blended topsoil in the proposed garden areas. The site will require extensive earthworks to cut/fill and most likely significantly uplift the site to create a developable platform. The shallow groundwater strikes will require consideration during the earthworks as a degree of dewatering is likely to be required. Furthermore, due to the shallow groundwater, any earthworks to be undertaken will need to be completed during the drier summer months when wet materials will be easier to manage. The site is mostly low lying and is known to be wet at the surface with very shallow water strikes. It is therefore likely that the proposed development levels will be set at a higher topographical level than the site is currently. Due to the significantly loose sands and soft silts displaying generally low ABCs at shallow depth, coupled with the fact that the site is likely to require raising, will mean that the majority of plots are likely to require a driven pile foundation with the possibility of a mass trench fill solution further south where founding stratum was found to be shallower and ground conditions displayed greater ABCs.
Foundations Near Trees	Foundation depths within the conjectured influence of former, existing or proposed trees will need to be deepened to ensure that structural loading bears within the underlying target founding stratum, which cannot be subject to volumetric instability associated with fluctuation in moisture content.
Heave Precautions Near Trees	Given that the underlying clay is of low volume change potential, heave precautions will not be required to the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.
Building Floor Slabs	Suspended floor slabs are likely to be required.
Soakaway Drainage	Due to shallow groundwater on site all soakaway tests failed, as such, soakaway drainage is not considered to be feasible for the proposed development.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
Highway & Infrastructure Construction	Unsuitable materials have been identified where a proposed highway or infrastructure is to be constructed in these areas, remediation works will be required to ensure the site is engineered to a suitable geotechnical design specification. A programme of remediation and enabling works will be required to remediate the proposed road sub-grade in accordance with the requirements of the highways design manual (series 600) for a Method Compaction.

	It is considered that the material can be re-engineered to a method to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Enabling Earthworks	Peat and organic soils beneath the development will require removal with the resulting void infilled with suitable compacted engineered fill. It is recommended that sufficient allowance is made for the inspection and validation of PEAT removal. Existing services should be located, and the suitable easement should be marked out before development begins. Assessment should be made to ensure no disturbance to the adjacent rail and canal infrastructure. Dependant on final levels, a slope stability assessment may be required on the slope along the eastern boundary. Development levels are unknown at this time; however, significant cut-and-fill works primarily involving the removal of compressible peat deposits and raisings of site levels will be required to prepare the development platform. As part of the earthworks design, materials should be assessed and characterised prior to re-use in the construction of upfill to a geotechnical design. Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub formations to foundations and pavement construction. It is considered that dewatering is likely to be required, especially following periods of heavy rainfall. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond. All future earthworks should be completed in accordance with a geotechnical design report.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified the presence of unstable organic and granular soils which will impact the excavation materials to form sewerage and drainage infrastructure and foundations. Assessment should be made to ensure no disturbance to the adjacent rail and canal infrastructure. Excavations were completed with relative ease using standard machinery.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: *Waste Classification – Guidance on the classification and assessment of waste*.

RECOMMENDATIONS

Based on the findings of the Geoenvironmental site assessment and the various conclusions drawn, the following additional works are recommended to be completed in due course:

- Plot-specific foundation schedule (upon receipt of the final development levels).
- Arboricultural survey.
- Settlement Analysis for earthworks design.
- Geotechnical Design Report (GDR)
- Geotechnical Earthworks Strategy (infrastructure).
- Remediation and enabling works strategy.

TABLE OF CONTENTS

1. INTRODUCTION 14
1.1. Background 14
1.2. Proposed Development 14
1.3. Objectives and scope 15
1.4. Sources of Information 15
1.5. Scope of Works 16
1.6. Limitations 16
1.7. Risk Classification 16
1.8. Confidentiality 17

2. SITE SETTING 18
2.1. Site Details 18
2.2. Current Site Use 18
2.3. Surrounding Area 22

3. SITE HISTORY 23
3.1. On-Site Historical Development 23
3.2. Summary of On-Site Historical Development 28
3.2.1. Potential Historical Contamination Issues 28
3.2.2. Potential Historical Geotechnical Issues 28
3.3. Off-Site Historical Development 28
3.4. Planning History 29
3.5. Anecdotal Information 29
3.6. Previous Reports 30

4. ENVIRONMENTAL SETTING 32
4.1. Geology 32
4.2. Hydrogeology 32
4.3. Hydrology 33
4.4. Radon Risk Potential 34
4.5. Landfill Sites 34
4.6. Waste Management Licenses and Environmental Permits 34
4.7. Unexploded Ordnance 34
4.8. Industrial Land Uses 36
4.9. Site Sensitivity Assessment 36
4.10. Regulatory Database 37

5. PRELIMINARY MINING ASSESSMENT 39
5.1. Coal Mining 39
5.2. Coal Mining Information 39
5.3. Coal Authority Plan 41
5.4. Coal Mining Geology 42
5.5. Open Cast Mining 42
5.6. Preliminary Mine Gas Assessment 43
5.7. Coal Mining Risk Assessment 44

6. PRELIMINARY GEOTECHNICAL ASSESSMENT 45
6.1. Geotechnical Data 45
6.2. Artificial Landform and Geomorphology 45
6.3. Ground Cavities and Sink Holes 46
6.4. Preliminary Geotechnical Assessment 46

7. INITIAL CONCEPTUAL SITE MODEL 47

8. E3P GROUND INVESTIGATION 51
8.1. General Overview 51
8.2. Scope of Investigation 51
8.3. In-Situ Standard Penetration Testing (SPT) 52
8.4. Permeability Tests 52
8.5. Laboratory Analysis 53
8.6. Storage, Preservation and Transport of Samples 53

9. GROUND AND GROUNDWATER CONDITIONS 55
9.1. Summary of Ground Conditions 55
9.2. Made Ground 56
9.3. Natrual topsoil 56
9.4. Drift Deposits 56
9.5. Solid Geology 57
9.6. Groundwater 57
9.7. Visual and Olfactory Evidence of Contamination 58
9.8. Obstructions 58

10. TIER 2 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT 59
10.1. Deviating Samples 59
10.2. Sample Analysis Population 59
10.3. Human Health Risk Assessment 59
10.3.1. Exposure pathways 61
10.3.2. Human Health Risk Assessment and Mitigation 61
10.4. Controlled Waters Risk Assessment 62
10.4.1. Controlled Water Risk Assessment and Mitigation 69
10.4.2. m-BAT Assessment 69
10.4.3. Discussion of Controlled Waters Risk Assessment 70
10.5. Ground Gas Risk Assessment 70
10.5.1. Rationale 70
10.5.2. Sources And Pathways Of Ground Gas 71
10.5.3. Monitoring Frequency 72
10.5.4. Ground Gas Risk Assessment Methodology 72
10.5.5. Monitoring Methodology 73
10.5.6. Summary of Monitoring Results 73
10.5.7. Groundwater 75
10.5.8. Barometric pressure 75
10.5.9. Gas Flow 75
10.5.10. Gas Concentrations 75
10.5.11. Radon Risk 75
10.5.12. Conclusion 76
10.6. Potable Water Supply 76
10.7. Developed Conceptual Site Model 78

11. GEOTECHNICAL ASSESSMENT 84
11.1. Soil Consistency 84
11.2. Side Stability and Ease of Excavation 90
11.3. Consolidation 90
11.4. Particle Size Distribution 90
11.5. Soil Density/Moisture Content Relationship 90
11.6. Soil Infiltration 91
11.7. Soil Plasticity 91
11.8. pH and Sulphate 92
11.8.1. Highways and concrete 93
11.9. Groundwater 93

11.10. Site Preparation 94
11.11. Foundation Conditions and Assessment of Potential Bearing Capacities 94
11.12. Foundations Options Appraisal 95
11.13. Ground Floor Slabs 96
11.14. Settlement 97
11.14.1. PRIMARY, CONSOLIDATION SETTLEMENT 98
11.15. Heave Precautions 98
11.16. Highways Construction 99
11.17. Drainage 99
11.18. Excavations 100
11.19. Construction Activity and Inspection 100
11.20. Developed Geotechnical Risk Register 102
11.21. Further Works 105

APPENDIX I LIMITATIONS 106

APPENDIX II GLOSSARY 112

APPENDIX III RISK CLASSIFICATION 115

APPENDIX IV DRAWINGS 117

APPENDIX V PHOTOGRAPHS 119

APPENDIX VI HISTORICAL MAPS 123

APPENDIX VII EXPLORATORY HOLE LOGS 124

APPENDIX VIII CHEMICAL TESTING RESULTS 125

APPENDIX IX GEOTECHNICAL TESTING RESULTS 126

APPENDIX X ORIGIN OF CHEMICAL ASSESSMENT CRITERIA 127

APPENDIX XII FALLING HEAD PERMEABILITY TESTS 129

APPENDIX XIII COAL AUTHORITY REPORT AND MINING INFORMATION 130

APPENDIX XIV M-BAT ASSESSMENT 131

Drawing List

17-524-R1-001 - Site Location Plan
17-524-R1-002 - Proposed Development Plan
17-524-R1-003 - Historical Features Plan
17-524-R1-004 - Site Features Plan
17-524-R1-005 - Exploratory Hole Location Plan
17-524-R1-006 - Depth of Made Ground Plan
17-524-R1-007 - Depth of Topsoil
17-524-R1-008 - Depth to Founding Strata Plan
17-524-R1-010 - Conceptual Site Model
17-524-R1-014 - Depth & Thickness of Peat Plan
17-524-R1-015 - Development Constraints Plan

1. INTRODUCTION

1.1. BACKGROUND

M.C.I Developments (the client) commissioned E3P to undertake a Phase I and II Geoenvironmental Site Assessment at land at Trub Farm, Rochdale OL11 2XG.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a residential development.

1.2. PROPOSED DEVELOPMENT

M.C.I Developments intends to construct a residential development comprising low rise residential dwellings and two multi-storey apartment blocks with associated gardens, estate roads and infrastructure. Drawing 17-524-002 (APPENDIX IV) identifies the proposed development layout.

A snapshot of the proposed development layout is indicated in Figure 1.

Figure 1 Snapshot of Proposed Development

1.3. OBJECTIVES AND SCOPE

The objectives of the geoenvironmental investigation are as follows:

- Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available to complete a desk study in line with Environment Agency (EA) document Land Contamination: Risk Management (LCRM) (updated June 2023).
- Undertake a phase of sampling and analysis to provide an overview of the environmental issues identified.
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site concerning the site's future use and off-site receptors.
- Assess the geotechnical information and provide recommendations concerning foundations, pavement construction and floor slabs.
- Assess the coal mining-related information and provide recommendations regarding any future treatment; and,
- Provide recommendations regarding future works required.

1.4. SOURCES OF INFORMATION

Background information was sought from the following sources:

- Groundsure Enviro+Geo Insight Search Reference GS-1YL-PUL-168-ETB;
- Historical mapping dated 1851 to 2024. A selection of historical maps is reproduced in APPENDIX VI;
- Online planning records held by Rochdale Metropolitan Borough Council;
- Coal Authority Consultant Coal Mining Report Reference 51003423575001;
- Magic Map Groundwater Vulnerability Map;
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007);
- British Geological Survey Map;
- Groundsure IO database;
- https://zeticauxo.com/downloads-and-resources/risk-maps/;
- https://flood-map-for-planning.service.gov.uk
- Search results | Catchment Data Explorer | Catchment Data Explorer

1.5. SCOPE OF WORKS

The scope of works includes the elements included in Table 1.

Table 1 Scope of Works

PRELIMINARY REPORTING
Phase 1 Geoenvironmental Assessment
GROUND INVESTIGATION
Design of suitable ground investigation
Window sample probeholes with the construction of environmental monitoring installations
Deep cable percussive boreholes
Mechanically excavated trial pits
Soil and groundwater sampling
TESTING AND MONITORING
In-situ geotechnical testing
BRE 365 Soakaway Permeability Testing
Chemical and geotechnical analysis
Groundwater monitoring
Ground gas monitoring
ASSESSMENT AND REPORTING
Factual and interpretative reporting
Contamination risk assessment and conceptual site model
Geotechnical assessment and interpretation

1.6. LIMITATIONS

The limitations of this report are presented in APPENDIX I.

1.7. RISK CLASSIFICATION

The description of risk classification and the likely action required as set out in CIRIA C552 are included in APPENDIX III.

1.8. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed or with whom an assignment has been agreed. Should any third party wish to use or rely upon the report's contents, written approval must be sought from E3P; a charge may be levied against such consent.

2. SITE SETTING

2.1. SITE DETAILS

Table 2 Site Details

Site Address	Land at Trub Farm, Manchester Road, Rochdale, OL11 2XG
National Grid Reference	E 388226 N 410043
Site Area	4.98 Ha

The Glossary presented in APPENDIX II defines all acronyms used within this report.

A site location map is presented in APPENDIX IV as Drawing 17-524-001

2.2. CURRENT SITE USE

A site walkover was completed by an E3P representative on 22 March 2024, with the full details included in Table 3.

Table 3 Site Description

FEATURE	DESCRIPTION	PHOTOGRAPHIC EVIDENCE
Occupancy/Use	The site is a generally flat, roughly rectangular shaped parcel of land located in Castleton, southwest of Rochdale town centre. The site is bound in the east by the Rochdale Canal and in the west by the train line. The site is currently undeveloped and utilised as agricultural land. During the site walkover livestock (sheep) were present across the site grazing. A Cadent gas pipe runs through the site along the southern boundary. The Rochdale Canal is located immediately adjacent to the eastern boundary.	
Structures	The site is agricultural land and as such no structures are present on site.	
Retaining Structures	No retaining structures have been identified on site.	
Access	Pedestrian access and vehicular access to the site can be gained via the gated entrance in the southeast off the hardstanding tack. Access to the track is gained via a bridge off Trub Road to the east. No overhead restrictions were noted on the access.	

FEATURE	DESCRIPTION	PHOTOGRAPHIC EVIDENCE
Slope	The entrance to the site in the southeast is at a higher elevation to the rest of the site. A slope is present along the eastern boundary sloping westward to typical site level. The remainder of the site is relatively flat with a gentle slope upwards to the east. A raised section associated with the combined sewer runs north–south through the centre of the site. Photograph: Slope up to the eastern boundary.	
Vegetation/Ecology	The site is covered by relatively short grass with patches of rough scrub vegetation throughout. Particularly dense rough scrub is present in the northwest and northeast corners. Dense mature trees are present running along the southwest boundary and sporadic mature and semi-mature trees are present along the central eastern boundary. Photograph: Looking south. Short grass, rough scrub vegetation and trees on eastern boundary.	
Hazardous Material Storage	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.	
Asbestos-Containing Material (ACM)	No evidence of ACM was noted across the site.	
Polychlorinated Biphenyls (PCBs)	No equipment that may contain PCBs, such as transformers or electric substations, are identified on the site.	

FEATURE	DESCRIPTION	PHOTOGRAPHIC EVIDENCE
PFAS/PFOA	No historical activity on site is likely to result in the production of PFAS/PFOA and no evidence was noted during the site walkover.	
Waste Storage	No hazardous materials storage was observed during the site walkover.	
Drainage/Utilities	A formal drainage survey has not been completed, however, statutory utility plans for the site have been reviewed. A high-pressure gas main has been identified along the southern boundary. A combined sewer is located in the centre of the site transecting north to south. In the south, this is diverted to the south western boundary. A further combined public sewer is located along the southern boundary. A surface water sewer is present in the centre of the site transecting south and then diverting west to the south western boundary. A further surface water sewer is present in the north crossing east to west.	

2.3. SURROUNDING AREA

The immediate surrounding area land uses are summarised in Table 4.

Table 4 Surrounding Land Uses

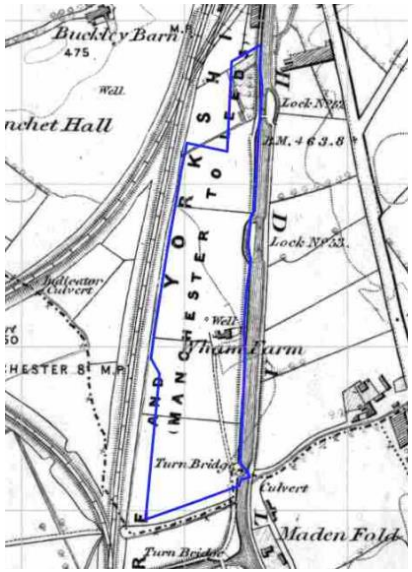
DIRECTION	LAND USE
North	Railway land
East	Rochdale canal, residential units
South	M62 motorway, agricultural land
West	Railway

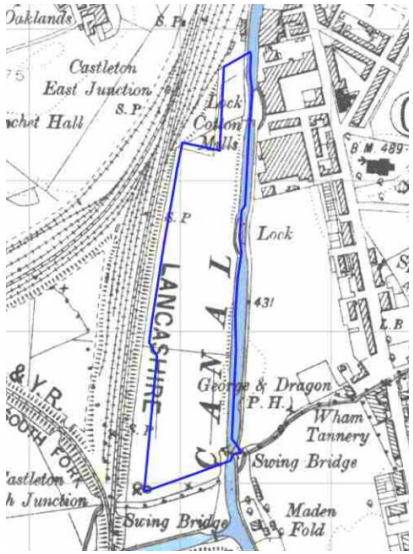
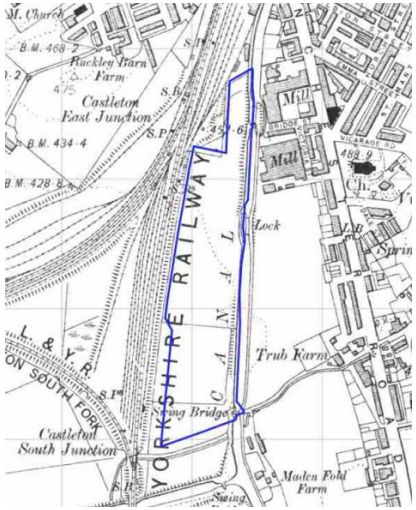
3. SITE HISTORY

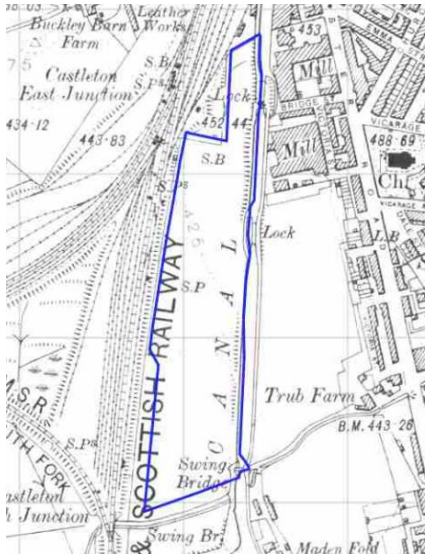
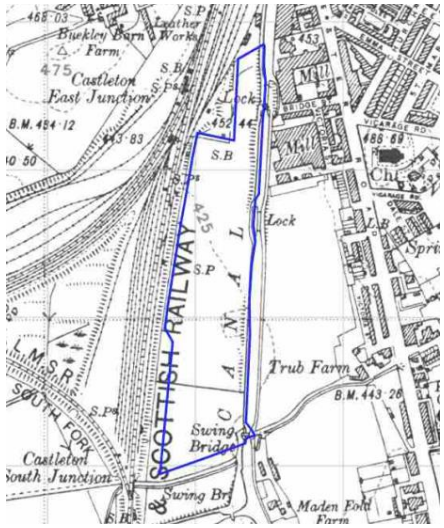
3.1. ON-SITE HISTORICAL DEVELOPMENT

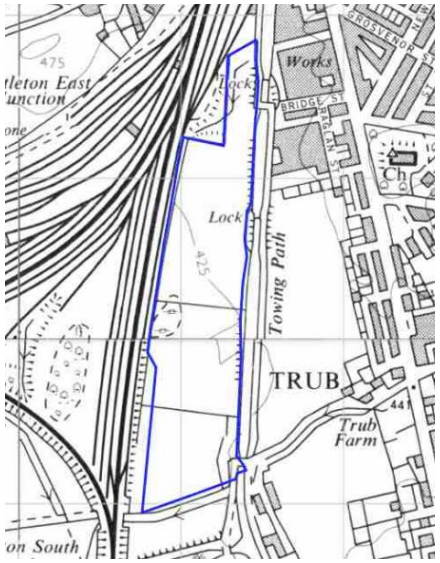
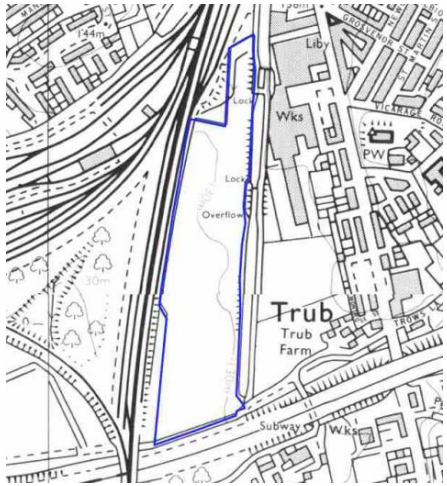
A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 5. In addition, historical site features are presented in Drawing No 17-524-003 in APPENDIX IV.

Table 5 Historical Development

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1851 **1:10,000**	Wham Farm is recorded on site comprising a single farm building and well in the centre east of the site. A track is recorded running from the southeast corner to the farm building. Four field boundaries are present across the site running east—west. An embankment is record along the eastern boundary, likely associated with the Rochdale canal. A wooded area is noted in the very north.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1890 **1:10,000**	Wham Farm is no longer recorded on site. The well is no longer present. The northern area of the site is no longer recorded as wooded. Field boundaries in the north are no longer recorded in the central and northern areas.	
1909 **1:10,000**	There are no significant changes to the subject site.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1928 **1:10,000**	No field boundaries are recorded.	
1938 **1:10,000**	A field boundary is recorded running east—west through the south of the site.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1965 **1:10,000**	A second field boundary is recorded running east—west through the centre of the site. An area of marsh is recorded in the central western area of site.	
1987 **1:10,000**	Both field boundaries have been infilled and are no longer recorded. The marsh is no longer recorded. The site has remained in the same configuration to the present day.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
2000 **Aerial Images Google Earth**	Historical aerial photography from 2000 shows the site to comprise agricultural fields of maintained grassland. No field boundaries, structures or ponds are noted.	
2005 **Aerial Images Google Earth**	No significant on site changes. The adjacent Rochdale Canal has been diverted with the historic branch of the canal still present along the south eastern boundary. No significant changes have occurred on site since 2005.	

3.2. SUMMARY OF ON-SITE HISTORICAL DEVELOPMENT

Wham Farm was recorded to be present within the centre of the site, along with a well, in the 1851 mapping; both features were absent in all subsequent mapping records, from 1890.

The majority of the site has been undeveloped throughout the historical mapping records, with the only changes the infilling of field boundaries.

3.2.1. POTENTIAL HISTORICAL CONTAMINATION ISSUES

- Made Ground from demolished buildings – Heavy metals, non-volatile PAHs, ACM, ground gas.
- Infilled well and field boundaries – Heavy metals, non-volatile PAHs, heavy-end TPH ground gas.

3.2.2. POTENTIAL HISTORICAL GEOTECHNICAL ISSUES

- Demolition and infilling of wells and field boundaries – loosely compacted Made Ground unsuitable for use as a founding stratum.
- Area of marsh recorded – potential for organic soils and saturated ground.
- Embankment along the eastern boundary may require slope stability assessment.
- Presence of trees in north of site and along site boundaries. Foundation design should consider the effect of trees on cohesive soils where encountered.

3.3. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 100 m radius of the site is summarised in Table 6.

Table 6 Surrounding Historical Development

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Railway and associated railway land	0 m	Pre 1851–Present	West
Westbrook Mill (Cotton) Then: Chimney marked Then: Yates Mill (Cotton) with chimney Then: Yates Mill (Disused). Chimney removed Then: Mill Then: Works Then: No longer marked	10 m	Pre 1890–Pre 1910 Pre 1910–Pre 1937 Pre 1937–Pre 1955 Pre 1955–Pre 1963 Pre 1963–Pre 1975 Pre 1975–Pre 2013 Pre 2013–Present	East
Albion Mills (Cotton) Then: Chimney marked Then: Albion Mill (Leather) with sewage tanks Then: Electrical Engineering works with tanks Then: Tanks removed Then: Works Then: No longer marked	12 m	Pre 1890–Pre 1910 Pre 1910–Pre 1929 Pre 1929–Pre 1937 Pre 1937–Pre 1955 Pre 1955–Pre 1963 Pre 1963–Pre 2013 Pre 2013–Present	East
Tannery Then: Engineering works and warehouse Then: Electrical Engineering Works Then: Works	15 m	Pre 1890–Pre 1910 Pre 1910–Pre 1929 Pre 1929–Pre 1975 Pre 1975–Pre 2010	Northeast

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Then: No longer marked		Pre 2010–Present	
Goods Shed Then: No longer marked	95 m	Pre 1890–Pre 1990 Pre 1990–Present	North

3.4. PLANNING HISTORY

E3P has reviewed online planning records held by Rochdale Metropolitan Borough Council; the following environmentally pertinent information has been obtained for the site.

Table 7 Planning History

PLANNING REFERENCE	PLANNING APPLICATION	PERTINENT DOCUMENTS
15/00312/OUT	Erection of 167 dwellings with associated parking, landscaping etc at OL11 2XG	Flood Risk Assessment Habitats Assessment Invasive Plant Species Report Air Quality Assessment Archaeological Evaluation Report Ecological Appraisal Phase I and II Site Investigation
22/00143/SO	Request for screening opinion in relation to a proposed residential development of up to 173 dwellings with parking, landscaping etc at OL11 2XG	EIA Screening report

3.5. ANECDOTAL INFORMATION

A web-based search of the subject site has recovered the following photographs, courtesy of Historic England.

Table 8 Summary of Anecdotal Information

PLATE 01 – Aerial Photo 1948

Full site in use as agricultural land. No vegetation or trees noted along field boundaries. No structures recorded on site.

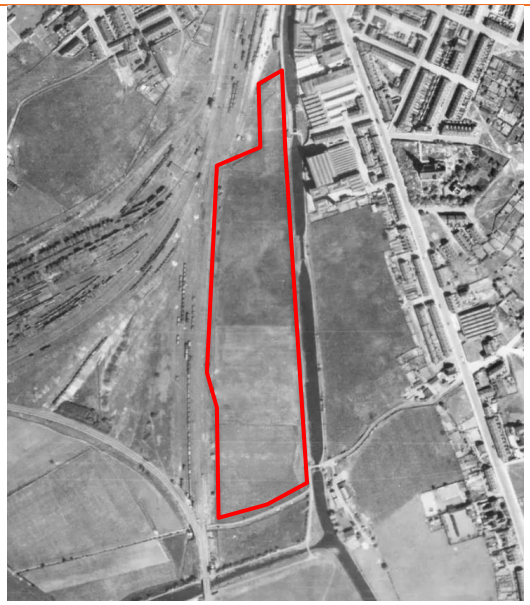
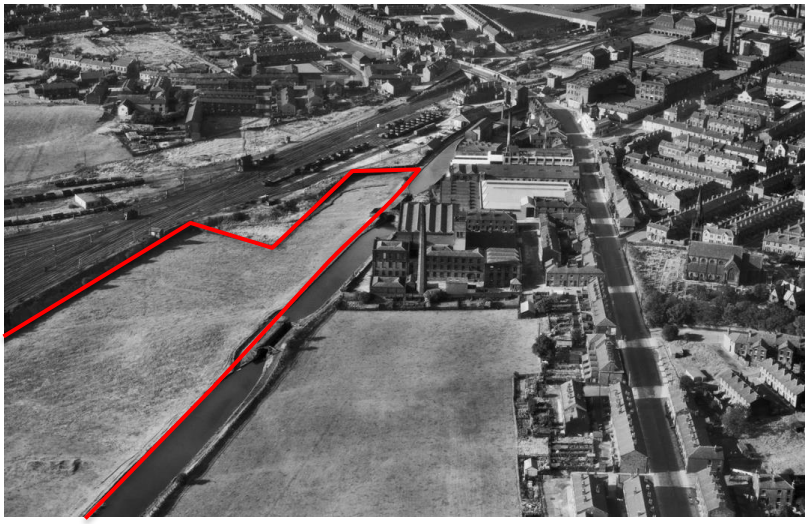


PLATE 02 – Aerial Photo 1947

North of site in use as agricultural land. No field boundaries, structures, vegetation or trees noted.



3.6. PREVIOUS REPORTS

The following previous site investigation reports have been provided to E3P for review:

Table 9 Previous Reports

AUTHOR	TITLE / REFERENCE	CLIENT	DATE
REC	Geo-environmental Site Investigation, Trub Farm; Report ref: 44975P1R2	Roman Summer	June 2014

The key findings of the previous site investigation reports are summarised below, and where necessary, data has been used to support the E3P geoenvironmental site assessment.

- Ground conditions across the site are variable, comprising brown silty gravelly SAND with occasional clay in the east, and soft to firm CLAY interbedded with SILT, SAND and PEAT in the west.
- The thickness of peat ranges from absent to a maximum of 2.10 m and recorded a maximum depth of peat of 3.15 m bgl.
- The Tier 1 human health risk assessment identified asbestos within one Made Ground sample on site and one exceedance of arsenic within natural peat deposits.
- The Tier 1 assessment for controlled waters identified contaminants significantly above the EQS screening values.
- The ground gas assessment indicates CS2 protection measures for plots above lacustrine deposits (CLAY, SILT, SAND and PEAT) and CS1 (no protection measures) for plots above glaciofluvial sheet deposits (gravelly sand).
- Due to variable superficial deposits, including soft clays and loose sands associated with a high water table, it is recommended that a piled foundation design is utilised throughout the proposed development for the plots.
- The Arley coal seam is recorded beneath the site, sub-cropping in a northwest—southeast trend through the central sector of the site. The Arley seam is a known worked seam.

- Rotary boreholes were advanced to 15.00 m bgl and no bedrock was encountered, with nearby BGS boreholes indicating that there is circa 50 m bgl of drift in the locality. REC determined that given the significant depth of drift deposits along with the high water table, shallow mining in this area would not be feasible. REC consulted the Coal Authority on their risk assessment, of which they informally agreed upon and considered there would be no requirement for mitigation measures in relation to the proposed development.

4. ENVIRONMENTAL SETTING

4.1. GEOLOGY

The British Geological Survey (BGS) map (Sheet 85) for the Site (1:50,000, Solid and Drift editions) and online records indicate the area is underlain by the geological sequence presented in Table 10.

Table 10 Summary of Underlying Geology

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	Majority of the site: Glaciofluvial Deposits Western boundary: Lacustrine Deposits	SAND, and GRAVEL CLAY	Secondary A aquifer
Solid	Pennine Lower Coal Measures Formation	MUDSTONE, SILTSTONE, SANDSTONE	Secondary A aquifer

E3P has reviewed the BGS database, which identified a borehole in close proximity, from which to compare the published geology above.

The borehole logs are summarised in Table 11.

Table 11 Summary of BGS Borehole Records

LOCATION	DEPTH	MADE GROUND	DRIFT	SOLID
Onsite (SW) BGS Reference : SD80NE120	4 m	GL - 0.60 m	Peaty Sand to 0.60 – 4.00 m	Not encountered
Onsite (Southern boundary) BGS Reference : SD80NE118	4.50 m	GL – 0.50 m	Clay, Sand, Peat and Gravel 0.50 – 4.50 m	Not encountered
Onsite (SE) BGS Reference : SD80NE117	6.50 m	GL – 1.30 m	Gravel 1.30 – 6.50 m	Not encountered

The BGS mapping also identifies the location of faults, as presented in Table 12.

Table 12 Faulting

LOCATION	DESCRIPTION
On site	Unnamed normal fault trending northwest—southeast through north of the site

4.2. HYDROGEOLOGY

The Groundsure report indicates that the site is not located within a groundwater source protection zone. Furthermore, there are no groundwater/potable abstractions within 1 km of the site.

Based on the local topography, it is likely that shallow groundwater, if present, will flow in a south-westerly direction following the topographical gradient.

4.3. HYDROLOGY

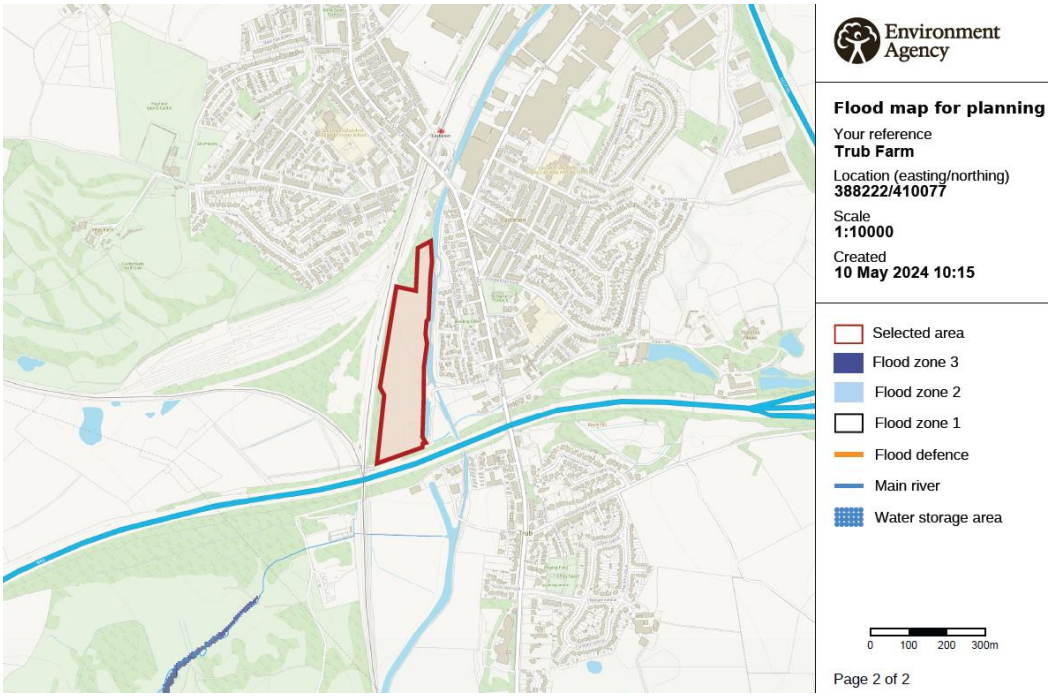
Surface water features within 50 m of the subject site are summarised in Table 13.

Table 13 Surface Water Features

SURFACE WATER FEATURE	EA CLASSIFICATION	QUALITY	DISTANCE (M)	DIRECTION
Rochdale Canal	Canal	Moderate	0 m	East
Trub Brook	Inland river not influenced by normal tidal action.	N/A	5 m	South

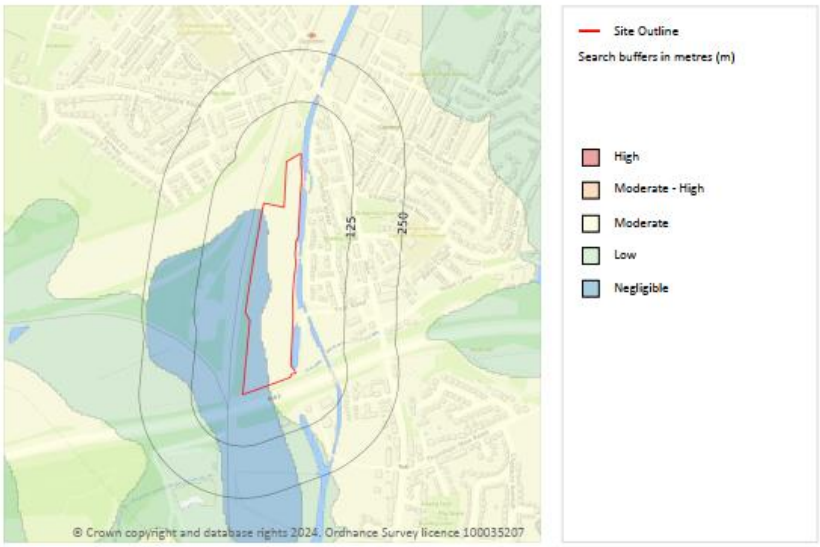
The site is located within a currently defined "Flood Risk Zone 1", defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (< 0.1%) and, as such, is considered to be unaffected by river flooding. However, the Groundsure report states there is a moderate potential for groundwater flooding across the majority of the site. The Environment Agency (EA) Flood Risk Map is presented in Figure 2 and the Groundsure groundwater flood risk map is presented as Figure 3.

Figure 2 EA Flood Risk Map – Surface Water



Source - https://flood-map-for-planning.service.gov.uk/

Figure 3 Groundsure Floor Risk Map - Groundwater



Source – Groundsure mapping

4.4. RADON RISK POTENTIAL

BGS Radon mapping has identified that the site lies within an area where 1-3% of homes are above the "Action Level", and as such, full radon protective measures are not necessary for the construction of new dwellings or extensions.

4.5. LANDFILL SITES

No active or historic landfills are located within 250 m of the site.

4.6. WASTE MANAGEMENT LICENSES AND ENVIRONMENTAL PERMITS

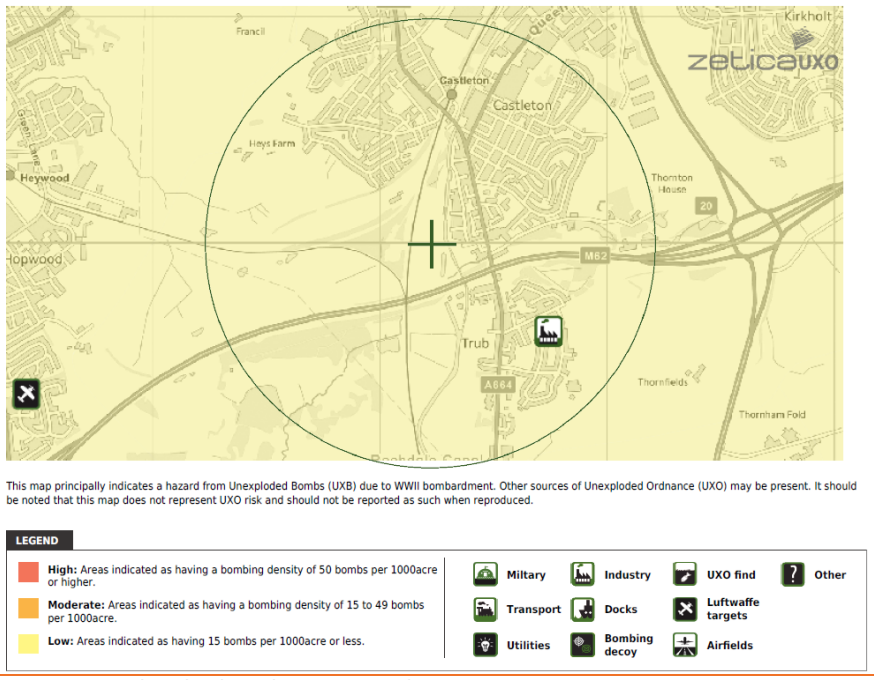
No Waste Management Licenses or Environmental Permits have been identified in the environmental database for the site and surrounding area.

4.7. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the Site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War. The Zetica UXO Risk Map is presented in

Figure 4.

Figure 4 Zetica UXO Risk Map



Source - https://zeticauxo.com/downloads-and-resources/risk-maps/

4.8. INDUSTRIAL LAND USES

The site is located within a predominantly rural area, therefore no industrial land uses have been identified within a 100 m radius of the site.

4.9. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a "Low/Moderate" sensitivity setting, as discussed in Table 14.

Table 14 Site Sensitivity Assessment

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a groundwater source protection zone or a drinking water safeguard zone.	Low
Distance to the Closest Groundwater Abstraction Point	There are no groundwater abstraction points within 1km of the site.	Low
Aquifer Classification in Superficial Drift Deposits	Secondary A aquifer.	Moderate
Aquifer Classification in Bedrock	Secondary A aquifer.	Moderate
Is the Site Underlain by Low-Permeability Drift to Depths in Excess of 10 m?	The site is likely underlain by mixed superficial geology comprising clay, sand and peat. Previous site investigation shows that >15 m of drift deposits are likely overlying the bedrock. Where impermeable clay is present this will inhibit the migration of mobile contamination to the underlying bedrock aquifer, however, areas of sand will facilitate migration of mobile contaminants.	Moderate

SENSITIVITY PROFILE	DISCUSSION	RATING
Is the Site Located Within 50 m of a Surface Watercourse?	Rochdale Canal is located adjacent to the eastern boundary of the site, however, due to this lying topographically above the site and being a man-made watercourse with concrete base and side walls, it is unlikely that mobile contamination will migrate to the canal. Trub Brook is culverted immediately adjacent to the southern boundary of the site.	High
Sensitive Land Uses	None	Low
Sensitive Ecological Receptors	None	Low
OVERALL SITE ENVIRONMENTAL SENSITIVITY		**Moderate**

4.10. REGULATORY DATABASE

The information summarised in Table 15 has been obtained from a commercially available environmental database. The summary table only includes records from within 250 m of the subject site and is not otherwise detailed in the report.

Table 15 Summary of Environmental Data

RECORD	ENTRIES WITHIN 250 M	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified
Authorised Industrial Processes (IPC/IPPC/LAPPC)	0	None Identified
Licensed pollutant release (Part A(2)/B)	1	OMC Ford, 222m east, respraying of road vehicles.
Licenced Discharge to Controlled Waters	12	Four relating to Castleton South Junction CSO, 14m south. Effluent Type: Sewage/Sewer storm overflow. Receiving water : Trub Brook. Dated from 1983 to 2020. One relating to Rochdale station signal box, 62m north. Effluent type: Sewage. Receiving water: Groundwater. Effective from 2011. Seven relating to Castleton WWTW, 241m southwest. Effluent type: Trade discharges and Sewage. Receiving water: Trub Brook. Current effective from 2020. Historic relating 1980 to 2010.
Fuel Stations Entries	0	None Identified
Licensed Radioactive Substances	0	None Identified
Enforcements, Prohibitions or Prosecutions	0	None Identified
Discharge Consents	2	1 – Located 14 m south. Effluent type: Sewage. Discharges: Sewer storm. Status: revoked 14/04/2020

RECORD	ENTRIES WITHIN 250 M	DETAILS
		2 – Located 62 m north: Effluent type: Sewage. Discharges: Final/treated. Status: active
Pollution Incidents	3	1 – Located 123 m east dated October 2001. Pollutant: inert materials and wastes. Minor land impact. 2 – Located 127 m northwest dated April 2001. Pollutant: oils and fuel. Minor land impact. 3 – Located 166 m north dated August 2001. Pollutant: oils and fuel. Minor water impact.
Dangerous Substances	1	160 m south, Whipp and Bourne Ltd, Cadmium (Not Active).
Consents Issued Under the Planning (Hazardous Substances) Act 1990	0	None Identified
Control of Major Accident Hazard (COMAH) Sites	0	None Identified

5. PRELIMINARY MINING ASSESSMENT

5.1. COAL MINING

The Coal Authority (CA) mapping and records indicate that the site is in an area that may be affected by coal mining.

A CA mining report was obtained (Ref: 51003423575001) dated May 2024.

The CA operates a risk-based approach to assessing potential instability issues associated with future land development located within the predefined CA consultation areas. This risk-based approach subdivides the potential risk into "low" and "high" risk categories.

The risk categories can be defined as:

Low-Risk Sites – Deemed to be land where coal mining has taken place, however, it was at such depth not to pose a risk to new development, and it, therefore, contains no known recorded risks and as such, no further assessment is required.

For low-risk sites, the CA categorically states:

If your proposed development is within the Development Low Risk Area, there is no need for you to submit any coal mining information with your planning application and The Coal Authority will not be consulted by the LPA. The LPA will include our Standing Advice as an informative note within the decision notice.

High-Risk Sites – Deemed to be landholdings located within an area known to contain legacy risks that include:

- Mine entries (shaft or adit);
- Shallow coal workings (recorded and probable);
- Workable coal seam outcrops;
- Mine gas sites and areas;
- Recorded coal-mining-related hazards;
- Geological features (fissures and break lines); and
- Former surface mining sites (sometimes using historic opencast extraction methods).

5.2. COAL MINING INFORMATION

Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st of January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such the CA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of support mechanism.

Determining if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information, and E3P has completed a review of relevant information in relation to potential coal mining activities.

In the first instance, E3P has reviewed the Coal Authority Online Viewer, and an excerpt of this is presented in Figure 5. This map shows that the site is located within a coal mining reporting area. Additionally, areas of the south and centre of the site lie within a high-risk development area, associated with a coal seam outcrop. No recorded workings or mine shafts are located on site.

Figure 5 Excerpt of the Coal Authority Online Viewer

Map Key

Development High Risk Area

Coal Outcrops

Coal Mining Reporting Area

As the site is within an area affected by coal mining E3P has obtained a Coal Authority Consultant Coal Mining Report for the site (ref: 51003423575001), Table 16 provides a summary of pertinent coal mining information with this report.

Table 16 Coal Mining Information

SOURCES OF INFORMATION	SUMMARY
Known Past Underground Mining	None recorded.
Probable Unrecorded workings	No
Spine Roadways at Shallow Depth	None recorded.
Mine Entries within 100m of the Site	None recorded.
Mine Abandonment plans	Yes - 16820
Known outcrops	Arley – Workable: Yes
Faults / Fissures	A fault runs northwest—southeast through the site.
Opencast mines	None recorded within 500m of the site boundary.
Coal Authority Managed Tips	None recorded within 500m of the site boundary.
Remediated Sites	None recorded within 50m of the site boundary.
Coal Mining Subsidence	The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.
Mine Gas	None recorded within 500m of the site boundary.
Mine Water	None recorded within 500m of the site boundary.

SOURCES OF INFORMATION	SUMMARY
Future Underground Mining	None recorded.
Coal Authority Development Advice	If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.
British Geological Survey Mapping	A review of the 1:10,560 geological mapping shows the Arley seam trending northwest—southeast through the centre of the site. A fault is present trending northwest—southeast through the north of site, with the Arley Seam noted to sub-crop again 35 m north-east. Analysis of the surrounding geology shows the seam is likely dipping southwest, however, given the local faulting the geology is likely to be complex.
Review of Coal Authority Archive	No CA archives/mine abandonment plans are made available.
Historical Ordnance Survey Mapping	Review of historical mapping dating back to 1851 did not identify any features indicative of coal mining on site or in the immediate surrounding area.
Historical Site Investigations	REC Ltd have previously undertaken a coal mining risk assessment for the subject site (Report Ref: 44975p1r2, dated April 2014) which has identified the presence of the Arley seam sub-cropping in a northwest—south east trend through the central sector of the site. Due to the fact that the Arley seam is a known worked seam, REC completed an intrusive Ground Investigation. Rotary boreholes were advanced to 15.00 m bgl and no bedrock was encountered, with nearby BGS boreholes indicating that there is circa 50 m bgl of drift in the locality. REC determined that given the significant depth of drift deposits along with the high water table, shallow mining in this area would not be feasible. REC consulted the Coal Authority on their risk assessment, of which they informally agreed upon and considered there would be no requirement for mitigation measures in relation to the proposed development.

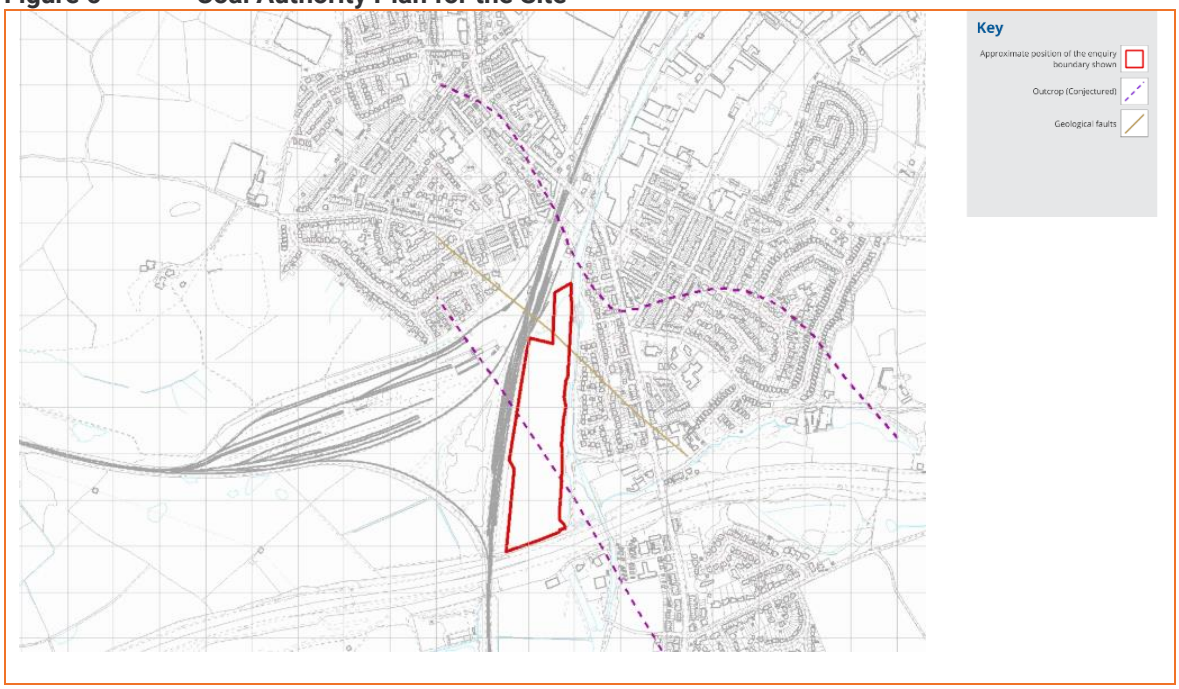
5.3. COAL AUTHORITY PLAN

The Coal Authority plan referenced: MR-LARGE-PLOT- GS-QBC-3JQ-8TM-OAN shows the Arley coal seam sub crop crossing the centre of the site in a north-westerly to south easterly direction, with a fault trending in the same direction further north.

An additional off-site coal outcrop is marked trending northwest to south east, the CA report indicating this is also the Arley Seam.

All features are illustrated in Figure 6.

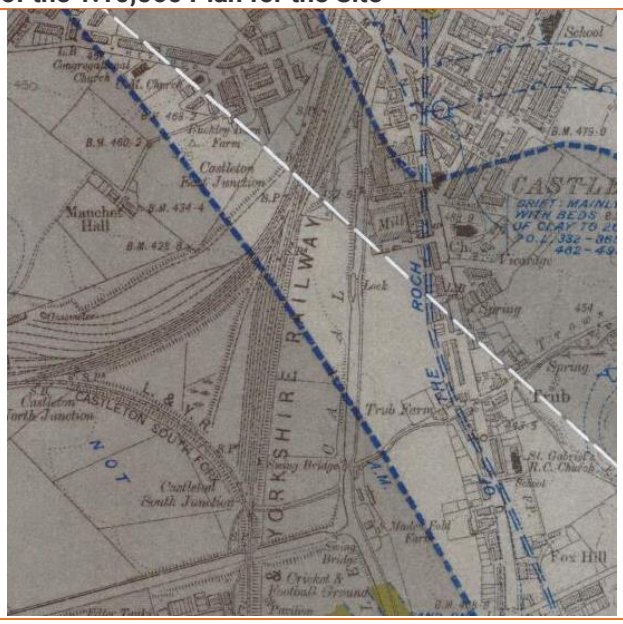
Figure 6 Coal Authority Plan for the Site



5.4. COAL MINING GEOLOGY

Figure 7 is a photograph of the 1:10,560 plan for the site, which shows the Arley seam and faults location on site, however, no dip direction or angle of dip is provided for this seam or the off-site seam to the north.

Figure 7 Snippet of the 1:10,560 Plan for the Site



5.5. OPEN CAST MINING

There are no records of open-cast mining related to the site.

5.6. PRELIMINARY MINE GAS ASSESSMENT

If coal mining is present below the site, this may be a potential source of ground gas that could pose a risk to site end users. A preliminary mine gas assessment is provided in Table 17.

Table 17 Preliminary Mine Gas Assessment

SCENARIO	DISCUSSION	RATING
Are there known coal seams beneath the Site?	Yes – Arley coal seam is recorded to sub-crop beneath the site.	High
Are there coal seams within 150m of the top of the bedrock?	Yes – Arley coal seam sub crops beneath the site.	High
Are there any known workings below the Site?	None	Low
Are the underlying drift deposits impermeable?	Mixed – the site is underlain by clay, peat and sand	Moderate
Are there any mine entrances within the site boundary or within 50m of the Site?	None	Low
Are there any faults below the Site or in close proximity?	Yes – there is a fault beneath the site	High
Is there any records of mine gas emission on or within 50m of the Site	No	Low
Is there any record of historical mine stabilisation works?.	No	Low
Evidence of rising groundwater in flooded mine workings?	No	Low
OVERALL, MINE GAS RISK		Moderate

Conclusions:
The Arley seam is recorded to sub crop beneath the site and is known to be a workable thickness. However, there is no evidence of this seam being worked on site or in the immediate vicinity. The seam is considered to have likely remained undisturbed and therefore is not considered to be a risk. Until proven, given the fault could act as a migration pathway for any gas, the risk remains moderate.

Source:
The Arley Coal Seam.

Pathway:
The site is underlain by >50 m of drift comprising interbedded sand and clay therefore, the likelihood of mine gas migration through the clay to the ground surface is low. However, there is a known fault below the site, which could create a preferential pathway for mine gasses to reach the ground surface.

Recommendations:
Discussed in section 5.7.

5.7. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk-based review of all available information on coal mining issues that are relevant to the application site deemed to be located within a high-risk area. This includes:

- Interpretation of information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- Demonstrating to the local planning authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

The coal mining risk assessment is summarised in Table 18.

Table 18 Summary of Coal Mining Risk Assessment

COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Recorded Underground Coal Mining at Shallow Depth (> 30 m)	No	Low
Evidence of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Mine Entries (Shaft/Adits)	No	Low
Coal Mining Geology – Fractures/Fissures	No	Low
Recorded Gas Emissions	No	Low
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Very Low/Low

REC have previously consulted the Coal Authority on their risk assessment, of which the Coal Authority informally agreed there would be no requirement for mitigation measures in relation to the proposed development.

E3P would suggest caution be exercised; it is likely that the Coal Authority will require deep boreholes to discount the potential for workings in the Arley Coal Seam.

E3P have contacted the Coal Authority in regard to consultation for any further investigation requirements. E3P have received the below response Coal Authority:

"Our Planning Team has a dedicated Pre-app service, however, due to resource issues it is not currently available. They are hoping that it will be up and running again in June 2024."

As such the Coal Authority should be consulted through the planning stage. Should the coal authority deem that further assessment is required, rotary open holes will be primarily advanced to investigate ground conditions, permit in-situ geotechnical testing and confirm the nature of underlying geology and the potential presence of shallow historical workings within the coal crop and area of 'Development High Risk'.

To determine the risk associated with potential mine gas, a ground gas monitoring program should be undertaken as part of any future ground investigation.

6. PRELIMINARY GEOTECHNICAL ASSESSMENT

6.1. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 19.

Table 19 Summary of Geotechnical Data

HAZARD	DESIGNATION
Shrink-Swell Clay	Low risk
Landslides	Low risk
Ground Dissolution	Negligible
Compressible Ground	Moderate risk
Collapsible Deposits	Low risk
Running Sand	Very low risk

6.2. ARTIFICIAL LANDFORM AND GEOMORPHOLOGY

Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological evaluation of the landform and its possible mechanism for formation.

Due to the undeveloped nature of the site, it has not been subject to significant anthropogenic changes with the current site topography broadly representing natural landform. The exception(s) to this relates to the artificial embankment in the northeast, likely associated with the adjacent canal, and the raised area through the centre of the site relating to the installation of combined sewage infrastructure.

Figure 8 Surface Lidar Data

6.3. GROUND CAVITIES AND SINK HOLES

Information within the Groundsure Report states the site is within an area of no hazard to very low hazard from rock solubility.

6.4. PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the desk-study information, the following geotechnical assessment has been made:

- Given the predominantly undeveloped nature of the site, it is likely there will be limited Made Ground fill deposits and obstructions.
- Compressible PEAT deposits are recorded on site which are not considered a suitable founding stratum and would require excavation from beneath the entire development footprint.
- The site is slightly undulating, with some topographical variances. Earthworks will be required to create a level developable platform to construct low-rise residential development.
- Embankment along the eastern boundary may require slope stability assessment.
- Presence of trees in the north and along site boundaries. Foundation design should consider the effect of trees on cohesive soils where encountered.

7. INITIAL CONCEPTUAL SITE MODEL

Under EA LCRM (updated June 2023) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), and BS EN ISO 21365:2021 (Soil Quality – Conceptual models for potentially contaminated sites), E3P has developed a Tier 1 risk assessment comprising an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. An initial screening of the on and potential off-site sources of contamination has been undertaken in Table 20, with the more detailed initial CSM included overleaf as Table 21.

Table 20 Initial Contaminant Source Screening

SOURCE	SOIL	GROUNDWATER	GROUND GAS
ON-SITE			
Made Ground associated with former Wham farm building	Heavy metals, PAH, ACM	Heavy Metals, PAHs	Hazardous ground gas
Infilled field boundaries	Heavy metals, PAH, heavy end TPH	Heavy Metals, PAHs	Hazardous ground gas
OFF-SITE			
Railway Land	Heavy Metals, PAHs, TPH, VOCs, SVOCs, PCBs	Heavy Metals, PAHs, TPH, VOCs, SVOCs	Hazardous ground gas
Cotton/Leather Mills	Heavy metals, solvents, VOCs, SVOCs, sulphide waste, acidic waste	Heavy metals, solvents, VOCs, SVOCs, sulphide waste, acidic waste	Volatile vapours
Electrical Engineering Works	Heavy Metals, PCBs, ACM	Heavy Metals	Hazardous Ground Gas
Tanks	TPH, VOCs, SVOCs	TPH, VOCs, SVOCs	Volatile vapours
Works (unspecified)	Heavy Metals, PAH, TPH, VOCs, SVOCs, ACM	Heavy Metals, PAH, TPH, VOCs, SVOCs	Volatile vapours
Goods Shed	Heavy metals, PAH, heavy end TPH, ACM	Heavy Metals, PAH, TPH, VOCs, SVOCs	Volatile vapours

Migration from off-site source of contamination to the east will be inhibited by the presence of the Rochdale canal running along the eastern boundary of the site.

After reviewing all environmentally pertinent information and the potential contaminant sources, the following initial conceptual site model has been developed for the site.

Table 21 Initial Conceptual Model

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	LEVEL OF RISK	JUSTIFICATION
SOURCES	**MIGRATION PATHWAYS**	**RECEPTORS**				
HUMAN HEALTH						
Made Ground Heavy metals, PAHs, heavy end TPH	Accidental ingestion and/or dermal contact with contaminated soil and/or leachate. **PL1/PL2** Inhalation of contaminated dust. **PL3**	Human Health – construction workers	Low likelihood	Medium	Moderate/Low	Areas of Made Ground may be present on site associated with previous development of Wham Farm and infilling of field boundaries. Site personnel have a greater chance of coming into contact with contaminated soils. Particularly during excavation and soil recovery works. Intrusive investigation and assessment to determine the requirement for a cover system in soft landscaped areas.
		Human Health – end users	Low likelihood	Medium	Low	
Made Ground VOCs, hydrocarbons, volatile PAHs (naphthalene)	Inhalation of vapours. **PL4** Migration through permeable strata and preferential pathways.	Human Health – end users Human Health – Off-site receptors	Low likelihood	High	Low	No on-site volatile sources have been identified. Intrusive investigation and assessment to determine the absence of unacceptable volatile contamination on site.
Made Ground Asbestos (Asbestos containing materials (ACM) and loose fibres)	Inhalation (of fibres). Construction works disturbing bound material and releasing fibres. **PL3**	Human Health – construction workers, end land users, and users of adjacent sites	Low likelihood	High	Moderate	Due to the age of the demolished buildings on site, ACM may be present within any Made Ground surrounding former buildings. Risk of inhalation of fibres during Ground Investigation and construction works. Disturbance of ACMs and dust derivatives from construction would increase risk to adjacent sites. Intrusive investigation is required to assess the

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	LEVEL OF RISK	JUSTIFICATION
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
						presence of ACM within Made Ground deposits.
Made Ground Sulphate from potential ash within the Made Ground.	Sulphate attack on concrete. **PL6**	Building concrete	Low likelihood	Low	Moderate/Low	Due to the potential presence of Made Ground and infilled features on the site, and wider industrial land uses, the potential for sulphate in ash deposits is moderate which may impact the proposed building concrete. Intrusive investigation will be required to assess the concrete classification.
Made Ground Organic contaminants such as hydrocarbons, solvents	Ingestion of tainted water supply. **PL7**	Human Health – End Users Water pipeline	Low likelihood	Medium	Moderate/Low	Low likelihood as significant contamination is not anticipated at pipeline depth across the west of the Site (0.75–1.35 m). Intrusive investigation is required to confirm as possible Made Ground is present onsite.
Made Ground Phytotoxic contaminants	Direct contact (plant uptake). **PL8**	Flora	Low likelihood	Low	Low	Low likelihood as contamination is not considered likely. Contamination may be taken up by flora in soft landscaping/gardens. Intrusive investigation is required.
CONTROLLED WATERS						
Groundwater	Contact with contaminated groundwater. **PL2**	Human Health – site personnel	Unlikely	Medium	Low	Due to limited historical development on site, it is unlikely that contaminated groundwater is beneath the site. Intrusive investigation and sampling of groundwater is required.
	Contaminants leached from the Made Ground and from off-site sources may be	Human Health – end users	Low likelihood	Medium	Low	Impacted groundwater could transport contaminants vertically and horizontally through permeable strata. The underlying bedrock aquifer is of medium sensitivity, however, no significant on site sources

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	LEVEL OF RISK	JUSTIFICATION
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
	mobilised to greater distances through advective flow. **PL5**	Underlying Secondary A bedrock aquifer Adjacent Rochdale Canal & Trub Brook				have been identified. Additionally, the site is recorded to be overlain by more than 50 m of interbedded sand and impermeable clay. Rochdale Canal is located adjacent to the eastern boundary of the site, however, due to this lying topographically above the site and being a man-made watercourse with concrete base and walls, it is unlikely that mobile contamination will migrate to the canal. As such, the primary receptor will be Trub Brook, which is culverted along the southern site boundary.
GROUND GAS						
Ground gases (methane and carbon dioxide in Made Ground)	Inhalation of ground gas. **PL4** Accumulation of ground gas in confined spaces (asphyxiation or explosion)	Human Health – site personnel	Low likelihood	High	Moderate	Ground gases may be present on site associated with Made Ground, organic soils and historic infilled field boundaries. Ground gases may migrate through permeable strata to enter proposed buildings. A period of ground gas monitoring will be required to determine the gas regime for the site.
		Human Health – end users	Low likelihood	High	Moderate	
		Infrastructure and services	Low likelihood	High	Moderate	
Radon	Inhalation of ground gas. **PL4** Accumulation of ground gas in confined spaces (carcinogenic)	Human Health – site personnel	Unlikely	Medium	Very low	The site is not located in a radon effected area and therefore radon protection measures will not be required on stie.
		Human Health – end users	Unlikely	Medium	Very low	The site is not located in a radon effected area and therefore radon protection measures will not be required on stie.

Main exposure pathways: PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants.

Level of Risk

Very Low		Low/Moderate		Moderate/High	
Low		Moderate		High	

8. E3P GROUND INVESTIGATION

8.1. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources summarised in Section 7.0. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 15th and 18th April 2024. The works are summarised in Table 25.

8.2. SCOPE OF INVESTIGATION

A summary of the fieldwork completed are included in Table 22.

Table 22 Summary of Fieldwork

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (M BGL)	MONITORING WELLS RESPONSE ZONE (M BGL)
General Ground Conditions Including the Presence/Nature of Obstructions	WS101	Window Sample Borehole	3.44	1.00–3.00
	WS102		3.45	2.00–3.00
	WS103		3.45	1.00–3.00
	WS104		3.39	1.00–3.00
	WS105		3.40	1.00–3.00
	WS106		5.45	3.50–4.50
	WS107		5.45	1.00–4.00
	WS108		4.45	1.00–3.00
	WS109		4.45	1.00–3.00
	WS110		3.45	2.20–3.00
	WS111		3.45	1.00–3.00
	WS112		5.45	1.00–3.00
	TP101/SA101	Mechanically Excavated Trial Pit	2.00	N/A
	TP102/SA102		2.00	N/A
	TP103		2.00	N/A
	TP104		1.90	N/A
	TP105		2.00	N/A
	TP106		2.50	N/A
	TP107		2.00	N/A
	TP108		1.90	N/A
	TP109		2.00	N/A
	TP110		1.60	N/A
	TP111		2.10	N/A
	TP112		2.20	N/A
	TP113		2.00	N/A
	TP114		2.40	N/A
	TP115/SA103		2.00	N/A
	TP116		2.50	N/A
	TP117		2.60	N/A
	TP118		2.10	N/A

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (M BGL)	MONITORING WELLS RESPONSE ZONE (M BGL)
General Ground Conditions Including the Presence/Nature of Obstructions	TP119	Mechanically Excavated Trial Pit	2.00	N/A
	TP120		2.10	N/A
	TP121		2.00	N/A
	TP122		2.30	N/A
	TP123		1.10	N/A
	TP124		1.20	N/A
	TP125		2.20	N/A
	TP126		3.50	N/A
	TP127		2.30	N/A
	TP128		2.20	N/A
Investigation of Deeper Soil Horizons	CP101	Cable Percussive Borehole	15.00	N/A
	CP102		13.30	N/A
	CP103		15.00	N/A

Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources. Soakaway tests were undertaken within select trial pit locations to determine the suitability for sustainable drainage systems.

Window sample boreholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells.

Cable Percussive Boreholes were advance to investigate deeper soil horizons and undertake in-situ detailed geotechnical testing and collect geotechnical samples from these soils.

The sampling locations are illustrated in Drawing 17-524-005 (APPENDIX IV). The ground conditions encountered are indicated on the logs, which are provided in APPENDIX VII.

The locations were recorded using hand-held GPS and what3words to an accuracy of 3 metres.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged, and samples of groundwater recovered for chemical analysis.

8.3. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube.

The results are shown in the probehole logs in APPENDIX VII, presented in Table 41 and discussed in Section 12.0.

8.4. PERMEABILITY TESTS

Three BRE365 soakaway permeability tests were undertaken within mechanically excavated trial pits (TP101, TP102, TP115) in order to assess the permeability of the underlying strata to determine the potential suitability for sustainable soakaway drainage systems within the proposed development. The results are presented in **Error! Reference source not found.**, and the test certificates are included in Appendix XII.

8.5. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical and geotechnical analysis, summarised in Table 23.

Table 23 Summary of Laboratory Analysis

CHEMICAL ANALYSIS
Metals
pH, total sulphate, water-soluble sulphate (2:1 extract)
Sulphide
Cyanide
Phenols
Total and speciated polycyclic aromatic hydrocarbons (PAHs)
Semi-Volatile Organic Compounds (SVOCs)
Volatile Organic Compounds (VOCs)
Asbestos identification and quantification
Speciated and banded total petroleum hydrocarbons (TPHs)
Total Organic Carbon (TOC)
GEOTECHNICAL ANALYSIS
Atterberg limits determinations
Moisture content
Particle Size Distribution
Dry Density/Optimum Moisture Content Relationship
Single-stage triaxial tests
Oedometer tests

8.6. STORAGE, PRESERVATION AND TRANSPORT OF SAMPLES

Measures taken to ensure the quality and integrity of the collected samples, from collection to receipt of the samples by the laboratory, are summarised in Table 24.

Table 24 Sample Integrity Information

SUBJECT	CHEMICAL SAMPLING	
Storage	**Soil**	**Groundwater**
	Glass jars supplied by the laboratory were used for the collection of soil samples to be analysed for VOCs. Plastic tubs were used to collect soil samples for metals analysis and asbestos screening.	Glass vials supplied by the laboratory were used for the collection of samples to be analysed for VOCs. Samples to be analysed for lower volatility compounds were stored in laboratory-prepared glass jars.
Preservation	Soil and groundwater sample containers were filled to minimise headspace prior to sealing and stored at a low temperature within cool boxes with cooling aids to minimise the loss of volatile contaminants and reduce microbial activity during the collection of samples.	
Sample Integrity	**Soil**	**Groundwater**
	Dedicated disposable nitrile gloves were worn and changed between sample collections to prevent cross-contamination.	Groundwater samples were collected using dedicated plastic tubing, which was changed between monitoring well locations to prevent cross-contamination.
Transport	Samples were stored and shipped in dedicated sample boxes provided by the laboratory. Sample details were recorded on the laboratory chain of custody form enclosed with the samples prior to dispatch. Scheduling information for the samples was confirmed with the laboratory via email.	

Chemical analysis has been undertaken by an accredited laboratory with the testing results summarised and discussed in Section 10 and the testing certificates included in APPENDIX VIII.

Geotechnical samples were collected as required per location immediately after excavation, labelled and sealed to minimise moisture loss. The geotechnical samples were collected and couriered by a dedicated courier to an accredited geotechnical testing laboratory. The testing results are summarised and discussed in Section 9 and the testing certificates included in APPENDIX IX.

9. GROUND AND GROUNDWATER CONDITIONS

9.1. SUMMARY OF GROUND CONDITIONS

The ground investigation confirms the published geology, and the strata are set out in Table 25.

Table 25 Summary of Strata

HOLE	DEPTH TO STRATUM (M BGL)						
	TOPSOIL	MADE GROUND	CLAY	SILT	SAND	GRAVEL	PEAT
WS101	0.0–0.3	–	0.3–0.8	–	0.8–3.44	–	–
WS102	0.0–0.2	–	–	–	0.2–1.0 1.0–3.45	–	1.0–1.9
WS103	–	0.0–0.8	1.7–2.4	–	0.8–1.7	2.4–3.45	–
WS104	0.0–0.2	–	1.4–2.6	–	0.2–1.4 2.6–3.39	–	–
WS105	0.0–0.3	–	0.3–1.0 1.4–2.7	–	1.0–1.4 2.7–3.4	–	–
WS106	0.0–0.3	–	–	–	3.5–5.45	–	0.3–3.5
WS107	0.0–0.25	–	1.4–5.45	–	0.9–1.4	–	0.25–0.9
WS108	0.0–0.25	–	0.25–2.0	–	2.0–4.45	–	
WS109	0.0–0.3	–	1.0–4.45	–	0.3–1.0	–	
WS110	0.0–0.3	–	–	–	2.2–3.45	–	0.3–2.2
WS111	0.0–0.3	–	–	–	1.1–3.45	–	0.3–1.1
WS112	0.0–0.3	–	–	–	0.3–0.5 3.0–5.45	–	0.5–3.0
TP101/SA101	0.0–0.3	–	0.3–0.6 0.8–1.2	–	1.2–2.0	–	0.6–0.8
TP102/SA102	0.0–0.3	–	0.3–1.8	–	1.8–2.0	–	–
TP103	0.0–0.4	–	–	–	0.6–2.0	–	0.4–1.6
TP104	0.0–0.3	–	0.3–1.0	–	1.0–1.9	–	–
TP105	0.0–0.3	–	0.3–0.9	–	0.9–2.0	–	–
TP106	0.0–0.3	–	–	–	2.0–2.5	–	0.3–2.0
TP107	0.0–0.3	–	0.3–0.6	–	1.7–2.0	–	0.6–1.7
TP108	0.0–0.3	–	0.3–0.5 1.5–1.7	–	1.7–1.9	–	0.5–1.5
TP109	–	0.0–0.9	1.8–2.0	–	1.2–1.8	–	0.7–1.2
TP110	–	0.0–0.8	–	–	0.8–1.6	–	–
TP111	0.0–0.4	–	1.6–2.1	–	1.0–1.6	–	0.4–1.0
TP112	0.0–0.3	–	0.3–0.5	–	1.7–2.2	–	0.5–1.7
TP113	0.0–0.3	–	–	–	0.3–2.0	–	–
TP114	–	0.0–0.7	1.7–2.4	–	0.7–1.7	–	–
TP115/SA103	0.0–0.3	–	1.1–2.0	–	–	–	0.3–1.1
TP116	0.0–0.3	–	–	–	1.9–2.5	–	0.3–1.9
TP117	0.0–0.3	–	0.4–1.1	–	0.3–0.4 1.1–1.6 2.1–2.6	–	1.6–2.1
TP118	0.0–0.3	–	–	–	0.3–0.5 0.75–2.1	–	0.5–0.75
TP119	–	0.0–0.5	1.5–1.8	–	0.5–1.5 1.8–2.0	–	–
TP120	0.0–0.3	–	0.7–1.7	–	0.3–0.7 1.7–2.1	–	–
TP121	0.0–0.25	–	–	–	0.25–2.0	–	–
TP122	0.0–0.3	–	0.3–1.9	–	1.60–2.3	–	–

HOLE	DEPTH TO STRATUM (M BGL)						
	TOPSOIL	MADE GROUND	CLAY	SILT	SAND	GRAVEL	PEAT
TP123	–	0.0–1.1	–	–	–	–	–
TP124	0.0–0.35	–	–	–	0.35–1.2	–	–
TP125	0.0–0.35	–	0.35–2.2	–	–	–	–
TP126	0.0–0.4	–	–	3.0–3.5	0.4–0.7	–	0.7–3.0
TP127	–	0.0–1.2	1.2–1.7	–	1.7–2.3	–	–
TP128	0.0–0.3	–	0.3–2.2	–		–	–
CP101	0.0–0.5	–	0.5–1.5 12.4–15.0	–	2.8–12.4	–	1.5–2.8
CP102	0.0–0.3	–	0.3–13.2	–	–	–	–
CP103	0.0–0.3	–	4.9–15.0	–	13.2–13.3	–	0.3–4.9

9.2. MADE GROUND

Made Ground was encountered within seven of the 33 exploratory locations on site to a maximum depth of 1.20 m bgl (TP127).

Made Ground was encountered in the north within TP119 to a recorded proven depth of 0.60 m bgl, in one location in the centre (TP123) to a depth of 0.60 m bgl and along the central eastern boundary in TP109, TP110, TP114, TP127 and WS103, to a maximum depth of 1.20 m bgl, but more generally encountered to depths < 1.00 m bgl.

In all locations Made Ground comprises a reworked topsoil from ground level to a maximum depth of 0.30 m bgl, underlain by a reworked clayey gravelly fine to medium SAND with gravel inclusions of sandstone, mudstone and brick.

Subangular cobbles of whole brick were encountered within TP119.

A Depth of Made Ground Plan is presented as Drawing 13-422-003 in APPENDIX IV.

9.3. NATURAL TOPSOIL

Natural topsoil was encountered within the remaining 26 locations that did not contain Made Ground. The thickness of topsoil varied from 0.20–0.40 m bgl.

Two distinct types of topsoil were encountered: within TP106, TP107, TP112, TP126, WS104, WS109, WS110 and CP101 topsoil deposits comprised dark brown sandy CLAY with rootlets, whilst across the remaining boreholes, natural topsoil comprised a dark brown clayey fine to medium SAND with rootlets.

9.4. DRIFT DEPOSITS

Drift deposits were encountered within all exploratory locations and are variable across the site comprising interbedded layers of CLAY, SAND and PEAT. Drift deposits were encountered from 0.20 to a maximum proven depth of 15.00 m bgl.

Where encountered, cohesive deposits were encountered as brown soft to stiff, silty sandy CLAY. Granular deposits were encountered as light brown very loose to dense fine to medium SAND.

From depths of 3.00 m bgl and below the sands were encountered as 'blowing sand' within window sample and cable percussive boreholes, likely associated with the high water table.

PEAT was encountered within 22 of 33 locations. In the south of the site brown pseudo fibrous PEAT was encountered within TP101, TP104, TP106-TP109, TP111, TP112, TP126, WS102, WS110-WS112 and

CP101 at depths between 0.30 m and 3.00 m bgl, with a thickness ranging from 0.10 m (TP104) to 2.50 m (WS112). In the north of the site brown pseudo fibrous PEAT was encountered within TP103, TP115-TP118, WS106, WS107 and CP103 at depths between 0.25 m and 4.90 m, with a thickness ranging from 0.20 m (TP103) to 3.60 m (CP103).

Additionally, rare plant debris was noted within SAND and CLAY deposits in 10 locations (TP113, TP116-TP118, TP120, TP126, TP128, WS101, WS105 and WS109) at depths between 0.30 m and 2.60 m bgl.

No PEAT or plant debris was encountered within the central eastern sector of the site. With strata in this area of the site comprising interbedded brown slightly clayey gravelly fine to medium SAND and firm to stiff brown mottled grey gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded of mudstone.

A depth and thickness of peat plan drawing ref: 17-524-014 is attached to this report.

9.5. SOLID GEOLOGY

The solid bedrock geology was not encountered during the site investigation.

9.6. GROUNDWATER

Groundwater strikes were encountered across the site at depths between 0.50 m and 13.20 m. Generally, a high water table was encountered with saturated soil arisings noted across the site.

The depths of strikes are shown on the exploratory hole records in APPENDIX VII and are summarised in Table 26.

Table 26 Summary of Groundwater Strikes

LOCATION	DEPTH TO STRIKE (M)	NOTES
TP102/SA102	1.8	Strike
TP107	1.0	Saturated Peat
TP115	0.5	Saturated Peat
TP116	1.0	Saturated Peat
TP117	2.0	Saturated Peat
TP118	1.5	Strike
TP119	1.8	Strike
TP120	0.4	Perched water
TP122	1.9	Seepage
TP124	1.0	Strike
TP125	1.7	Seepage
WS112	2.0	Saturated PEAT
WS104	1.0	Strike
WS105	1.1	Strike
WS110	2.0	Saturated PEAT
WS103	2.0	Strike
CP101	0.9	Strike
CP102	13.2	Strike
CP103	10.3	Strike

Return monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present. These results are summarised in Table 35, and generally record a high water table with groundwater encountered between 0.21 m and 1.14 m bgl during the monitoring period undertaken to date.

9.7. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has not been identified during the site investigation.

9.8. OBSTRUCTIONS

No obstructions were identified during the course of the intrusive investigation.

10. TIER 2 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 2 qualitative land risk assessment with respect to human health, controlled waters and ground gas to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

10.1. DEVIATING SAMPLES

Best practice sampling procedures including the use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis, were undertaken in order to avoid samples being deviating.

10.2. SAMPLE ANALYSIS POPULATION

Table 27 summarises the chemical analysis testing scheduled.

Table 27 Summary of Testing Schedule

TYPE OF SAMPLE	NO. OF SAMPLES	DETERMINANDS
Made Ground	4	pH, total metals, asbestos ID, TOC, speciated PAH, Speciated TPH
	2	Asbestos ID, total metals, VOCs, SVOCs, TPH + BTEX & MTBE
	3	Leachable metals
Natural Topsoil	4	pH, total metals, asbestos ID, TOC, speciated PAH, Speciated TPH
Natural CLAY and SAND	6	pH, total metals, TOC, speciated PAH, Speciated TPH

10.3. HUMAN HEALTH RISK ASSESSMENT

At Tier 2 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267) for a residential end use.

Where Tier 2 screening values are not provided by LQM, other screening values have been used and these are referenced in Table 28.

The Tier 2 screening values for residential with plant uptake have been utilised for this assessment due to the proposed development being a residential end use. To remain conservative at an early stage, the screening values based on a 1% SOM have been utilised for this assessment.

The results of the comparison have been summarised in Table 28.

Table 28 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use (with plant uptake)

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PL	ASSESSMENT
Arsenic	mg/kg	37	16	33	N/A	1	No Further Action
Cadmium	mg/kg	11	16	0.5	N/A	1	No Further Action
Chromium (VI)	mg/kg	6.0	16	<0.50	N/A	1	No Further Action
Lead	mg/kg	200**	16	140	N/A	1	No Further Action
Mercury	mg/kg	1.2	16	0.82	N/A	4	No Further Action
Nickel	mg/kg	130	16	41	N/A	1	No Further Action
Selenium	mg/kg	250	16	0.9	N/A	1	No Further Action
Copper	mg/kg	2400	16	80	N/A	1	No Further Action
Zinc	mg/kg	3700	16	150	N/A	1	No Further Action
Cyanide – Total	mg/kg	791	14	0.6	N/A	1	No Further Action
Phenols – Total	mg/kg	120	14	<0.10	N/A	1	No Further Action
Asbestos	Fibres	NFD	10	Not detected	N/A	3	No Further Action
Naphthalene	mg/kg	2.3	16	0.24	N/A	4	No Further Action
Acenaphthylene	mg/kg	170	16	<0.10	N/A	2	No Further Action
Acenaphthene	mg/kg	210	16	<0.10	N/A	1	No Further Action
Fluorene	mg/kg	170	16	<0.10	N/A	1	No Further Action
Phenanthrene	mg/kg	95	16	3.0	N/A	2	No Further Action
Anthracene	mg/kg	2400	16	1.2	N/A	2	No Further Action
Fluoranthene	mg/kg	280	16	11	N/A	2	No Further Action
Pyrene	mg/kg	620	16	9.1	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	16	3.2	N/A	2	No Further Action
Chrysene	mg/kg	15	16	3.9	N/A	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	16	**3.6**	**TP107 0.4 m**	2	Further Action
Benzo(k)Fluoranthene	mg/kg	77	16	1.5	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	16	**3.0**	**TP107 0.4 m**	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	27	16	1.9	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	16	**0.74** **0.29** **0.26**	**TP107 0.4 m** **TP120 0.1 m** **TP108 0.1 m**	2	Further Action
Benzo(ghi)Perylene	mg/kg	320	16	2.0	N/A	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	16	<1.0	N/A	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	16	<1.0	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	16	<1.0	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	74	16	12	N/A	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	16	34	N/A	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	260	16	21	N/A	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	1100	16	244	N/A	1	No Further Action

Notes
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation

Abbreviations: GAC = general assessment criteria, N = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; PL = Contaminant Pathway; NFD = no fibres detected.

The pathway noted in the table is the primary pathway, however it may not be the only pathway of that contaminant
* The Tier 2 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 2 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 2 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.
**The Tier 2 GAC for lead has been taken from CL:AIRE C4SL.
*** USEPA Risk Management Levels

Referring to Table 28, the result of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminants:

Organics

- Benzo(b)Fluoranthene (TP107)
- Benzo(a)pyrene (TP107)
- Dibenzo(a,h)Anthracene (TP107, TP108, TP120)

No significant concentrations of VOCs were identified in the soils submitted for chemical analysis.

No asbestos has been identified in any of the tested samples.

10.3.1. EXPOSURE PATHWAYS

The main exposure pathways based on the Tier 2 exceedances are:

- Dermal contact and ingestion (PL2); and,
- Consumption of homegrown vegetables (PL1).

10.3.2. HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

Organic Contamination

All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils (PL2 and consumption of homegrown vegetables (PL1).

Elevated benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene has been recorded within a brown sandy CLAY with organic odour within TP107 at 0.30 - 0.60 m. Dibenzo(a,h)Anthracene exceedances are recorded within natural sandy topsoil samples at 0.10 m within TP108 and TP120.

Due to the relatively high Total Organic Carbon (TOC) content within the tested samples, the screening values for the elevated determinants can be adjusted based on the calculated SOM value. Table 29 below shows the GAC for the three compounds with respect to a residential with plant uptake end use development. The Soil Organic Matter (SOM) contents have been considered: 1%, 2.5% and 6% by weight.

Table 29 Screening values for increased SOM

DETERMINANT	TIER 1 CIEH / GAC			LOACTION OF EXCEEDANCE
	1% SOM	2.5% SOM	6% SOM	
Benzo(b)Fluoranthene	2.6	3.3	3.7	TP107 (3.6 mg/kg)
Benzo(a)Pyrene	2.2	2.7	3.0	TP107 (3.0 mg/kg)
Dibenzo(a,h)Anthracene	0.24	0.28	0.30	**TP107 (0.74 mg/kg)** TP108 (0.26 mg/kg) TP120 (0.29 mg/kg)

Due to a total organic carbon (TOC) content of 7.4%, 6.5% and 10% within TP107, TP108 and TP120 respectively, resulting in a calculated SOM of 8.88% (TP107), 7.8% (TP108) and 12% (TP120), for all the aforementioned locations, a GAC for 6% SOM can be used for the direct comparison.

As show in Table 29 the concentrations of benzo(b)fluoranthene and benzo(a)pyrene within TP107 and concentrations of dibenzo(a,h)anthracene within TP108 and TP120 are below the GAC with an SOM of 6% and therefore are not considered to pose an unacceptable level of risk to the residential development. Hotspot removal does not need to be undertaken for these determinants.

In comparison to values presented in Table 29, the concentration of dibenzo(a,h)anthracene within TP107 at 0.40 m bgl exceeds the GAC with an SOM of 6%. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals, non-volatile PAH compounds and long chain hydrocarbons can be mitigated through the installation of a suitable cover system in all proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils. Where hardstand is proposed (roads, plots and driveways) this will cut the contamination pathway and remove the risk to human health. Alternatively, hotspot removal could be undertaken with impacted soils chemically validated and placed in areas of future low sensitivity.

Chemical analysis of the natural clay drift deposits has identified these soils to be acceptable for use as subsoil within the proposed garden areas; however, further chemical validation samples may be required to meet regulatory sampling frequency.

Natural topsoil on site is suitable for reuse within gardens subject to further testing to meet regulatory sampling frequency.

10.4. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 30.

Table 30 Controlled Waters Conceptual Model and Sensitivity Profile

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground No significant on site contamination sources have been identified through the desk study or during the intrusive ground investigation. Additionally, no significantly elevated heavy metals, TPH or PAH within soil samples analysed.		**Low**
Pathway		
Vertical Migration Impacted groundwater could transport contaminants vertically through permeable strata. However, the ground investigation has encountered interbedded SAND and CLAY across the site, with significant thickness of CLAY soils (>5 m) recorded at depth. The presence of low permeability cohesive deposits will inhibit the lateral migration of mobile phase contaminants. Given that the underlying bedrock aquifer is likely overlain by more than 50 m of interbedded sand and impermeable clay and that there are no groundwater/potable abstractions within 1 km of the site the risk is considered low.		**Low**
Lateral migration Lateral migration of contaminants is considered possible due to the presence of granular glaciofluvial deposits across the site. Lateral migration to the canal to the east will be greatly reduced as the canal is likely lined with a dock wall and impermeable clay. Lateral migration to the adjacent Trub Brook is considered possible, however, the brook is recorded to be culverted south of the boundary and likely to be within a concrete or brick lined structure that will limit the lateral migration of any mobile phase contaminants.		**Moderate**
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary A aquifer	**Medium**
Aquifer Classification in Bedrock	Secondary A aquifer	**Medium**
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected	**Low**
Distance to the Closest Groundwater Abstraction Point	None identified within a 1 km radius.	**Low**

DISCUSSION		SENSITIVITY RATING
Is the Site Located Within 50 m of a Surface Watercourse?	The Rochdale Canal is located adjacent to the eastern boundary of the site. As it is a man-made watercourse the sensitivity is significantly reduced as groundwater is unlikely naturally flow to the watercourse. This is exacerbated by the canal being at higher elevation than the site. Trub Brook is culverted to the immediate south of the site.	**High**
Given the artificial side walls and base, there is not considered to be a direct pathway to the adjacent Rochdale Canal. Despite the significantly reduced risk due to the presence of a culvert, the lateral migration of contaminants to the Trub Brook cannot be entirely discounted. Therefore, the ICSM developed within the context of the site setting has a pollutant pathway, which would be the lateral migration of potentially mobile phase-soluble contaminants towards the adjacent Trub Brook.		

The Tier 2 assessment in line with LCRM (2023) has included a comparison of leachate analysis from samples of the Made Ground, groundwater samples obtained within installed monitoring wells and surface water samples obtained east and west of the site from Trub Brook to drinking water standards (DWS) and environmental quality standards (EQS).

EQS will be viewed as a priority given the pollutant linkage is with the nearby surface watercourse, however, where there are no regulatory guidance values for EQS, the DWS will be utilised in their absence.

Water samples were obtained utilising a bailer.

The results of leachate, groundwater and surface water tests are presented in Table 31 and Table 32.

Table 31 Comparison of Groundwater and Leachate Analysis with Tier 2 Screening Levels

DETERMINAND	UNIT	EQS [1, 2] AA	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	3	10	N/A	3	11	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	3	<0.11	N/A	3	<0.11	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	3	<20	N/A	3	<20	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	3	<0.50	N/A	3	3.6	N/A	No Further Action
Copper	µg/l	1	2000	3	**1.6**	**WS103**	3	**16 15 14**	**TP109 0.3m TP127 0.6m TP119 0.4m**	**Further Action**
Total Cyanide	µg/l	1	50	3	<0.005	N/A	3	<0.05	N/A	No Further Action
Lead	µg/l	1.2	10	3	<0.50	N/A	3	**29 28 14**	**TP119 0.4m TP109 0.3m TP127 0.6m**	**Further Action**
Mercury	µg/l	–	1.0	3	0.02	N/A	3	0.10	N/A	No Further Action
Nickel	µg/l	4	20	3	**5.8**	**WS105**	3	1.9	N/A	**Further Action**
Selenium	µg/l	–	10	3	<0.50	N/A	3	1.4	N/A	No Further Action
Zinc	µg/l	10.9	–	3	**15 11 11**	**WS103 WS105 WS112**	3	**16**	**TP109 0.3m**	**Further Action**
pH	6–9			3	6.3–6.6		3	6.9–7.1	N/A	No Further Action
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/l	2	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Anthracene	µg/l	0.1	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Fluoranthene	µg/l	0.0063	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	3	<0.50	N/A	3	<0.01	N/A	No Further Action

DETERMINAND	UNIT	EQS [1,2] AA	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Aromatic Hydrocarbon										
TPH C5-C7 (benzene)	µg/l	10	1	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C7-C8 (toluene)	µg/l	74	700	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C8-C10 (xylene)	µg/l	30	300	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C10-C12 (naphthalene)	µg/l	2	90	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C12-C16	µg/l	–	90	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C16-C35	µg/l	–	90	3	<0.10	N/A	3	<0.10	N/A	No Further Action
Aliphatic Hydrocarbon										
TPH C5-C6	µg/l	–	1000[5]	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C6-C8	µg/l	–	1000[5]	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C8-C10	µg/l	–	300	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C10-C12	µg/l	–	300	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C16-C21	µg/l	–	300**	3	<0.10	N/A	3	<0.10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	3	<0.10	N/A	3	<0.10	N/A	No Further Action
Volatile Organic Compounds										
Tetrachloroethylene	µg/l	0.4	10	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Trichloroethylene	µg/l	10	10	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Trichlorobenzene	µg/l	0.4	–	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Trichloromethane	µg/l	2.5	–	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Dichloromethane	µg/l	20	200	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Carbon Tetrachloride	µg/l	12	3	3	<1.0	N/A	N/A	N/A	N/A	No Further Action
Vinyl Chloride	µg/l	–	0.3	3	<1.0	N/A	N/A	N/A	N/A	No Further Action

Notes
 # Solubility <0.01µg/l
AA – Annual Average
** Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water*
*** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.*

DETERMINAND	UNIT	EQS [1, 2]	DWS [3,4]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								

1. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (legislation.gov.uk)
2. The Water Supply (Water Quality) Regulations 2018 (legislation.gov.uk)
3. Guidelines for drinking-water quality, 4th edition, incorporating the 1st addendum (who.int)
4. CL:AIRE publishes Petroleum Hydrocarbons in Groundwater guidance (claire.co.uk)
5. *A total TPH criteria of 1000 mg/kg will act as a surrogate criterion for remaining aliphatic and aromatic TPH fractions.*

Table 32 Comparison of Surface Water Analysis from Trub Brook With Tier 2 Screening Levels

DETERMINAND	UNIT	EQS [1,2] AA	DWS [3,4]	NO. OF SAMPLES	RECORDED CONCENTRATION mg/l	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	2	0.77	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	2	<0.11	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	2	<20	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	2	<0.50	N/A	No Further Action
Copper	µg/l	1	2000	2	**4.3** **3.9**	**EAST** **WEST**	**Further Action**
Total Cyanide	µg/l	1	50	2	<0.005	N/A	No Further Action
Lead	µg/l	1.2	10	2	0.82	N/A	No Further Action
Mercury	µg/l	–	1.0	2	<0.01	N/A	No Further Action
Nickel	µg/l	4	20	2	1.5	N/A	No Further Action
Selenium	µg/l	–	10	2	<0.50	N/A	No Further Action
Zinc	µg/l	10.9	–	2	**15** **11**	**EAST** **WEST**	**Further Action**
pH	6–9			2	7.3–7.7	N/A	No Further Action
Polycyclic Aromatic Hydrocarbons							
Naphthalene	µg/l	2	10*	2	<0.50	N/A	No Further Action
Anthracene	µg/l	0.1	10*	2	<0.50	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	2	<0.50	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	2	<0.50	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	2	<0.50	N/A	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	2	<0.50	N/A	No Further Action
Fluoranthene	µg/l	0.0063	10*	2	<0.50	N/A	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	2	<0.50	N/A	No Further Action
Aromatic Hydrocarbon							
TPH C5-C7 (benzene)	µg/l	10	1	2	<0.10	N/A	No Further Action
TPH C7-C8 (toluene)	µg/l	74	700	2	<0.10	N/A	No Further Action
TPH C8-C10 (xylene)	µg/l	30	300	2	<0.10	N/A	No Further Action
TPH C10-C12 (naphthalene)	µg/l	2	90	2	<0.10	N/A	No Further Action
TPH C12-C16	µg/l	–	90	2	<0.10	N/A	No Further Action

DETERMINAND	UNIT	EQS [1,2] AA	DWS [3,4]	NO. OF SAMPLES	RECORDED CONCENTRATION mg/l	LOCATION OF EXCEEDANCE	ASSESSMENT
TPH C16-C35	µg/l	–	90	2	<0.10	N/A	No Further Action
Aliphatic Hydrocarbon							
TPH C5-C6	µg/l	–	1000[5]	2	<0.10	N/A	No Further Action
TPH C6-C8	µg/l	–	1000[5]	2	<0.10	N/A	No Further Action
TPH C8-C10	µg/l	–	300	2	<0.10	N/A	No Further Action
TPH C10-C12	µg/l	–	300	2	<0.10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	2	<0.10	N/A	No Further Action
TPH C16 – C21	µg/l	–	300**	2	<0.10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	2	<0.10	N/A	No Further Action
Volatile Organic Compounds							
Tetrachloroethylene	µg/l	0.4	10	2	<1.0	N/A	No Further Action
Trichloroethylene	µg/l	10	10	2	<1.0	N/A	No Further Action
Trichlorobenzene	µg/l	0.4	–	2	<1.0	N/A	No Further Action
Trichloromethane	µg/l	2.5	–	2	<1.0	N/A	No Further Action
Dichloromethane	µg/l	20	200	2	<1.0	N/A	No Further Action
Carbon Tetrachloride	µg/l	12	3	2	<1.0	N/A	No Further Action
Vinyl Chloride	µg/l	–	0.3	2	<1.0	N/A	No Further Action

10.4.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

This comparison indicates that the data exceeds the EQS values for the following inorganic compounds:

- Copper (Leachate, groundwater and surface water analysis)
- Lead (Leachate analysis)
- Nickel (Groundwater analysis)
- Zinc (Leachate, groundwater and surface water analysis)

In relation to the elevations of lead these were occurrences from leachate analysis undertaken in Made Ground soils at TP107, TP108 and TP120.

It should be noted that leaching tests were undertaken alongside groundwater and surface water testing. The leachate test is aggressive (de-ionised water) and is not in aqueous equilibrium (steady state) within the solid sample. This may cause rapid dissolution and overestimation of the aqueous phase concentrations compared to groundwater in contact with contaminated soils. Therefore, these results should be interpreted with caution.

10.4.2. M-BAT ASSESSMENT

Due to exceedances in leachate, groundwater and surface water (Trub Brook) samples for copper, nickel and zinc, an m-BAT assessment has been completed to assess the bioavailability of the metals with respect to surface water receptors (Trub Brook). The chemical values from the surface water analysis have been input into the assessment.

Where the Risk Characterisation Ratio (RCR) is greater than 1, this indicates the bioavailable concentration is above the EQS and the receptor is therefore at risk. In this instance, surface water chemical data for DOC was input into the m-BAT for the onsite locations.

The following locations exceed the RCR:

Trub Brook East (Upstream)
- Copper (0.21)
- Nickel (0.13)
- Zinc (0.42)

Trub Brook West (Downstream)
- Copper (0.18)
- Nickel (0.07)
- Zinc (0.61)

No exceedances of nickel in comparison to EQS were recorded within the culverted surface water feature adjacent to the site. Additionally, copper and zinc are not considered bioavailable within Trub Brook up or downstream from the site, due to the RCR values being below 1. In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to surface waters for copper, nickel or zinc.

10.4.3. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

Historically, the site has predominantly been undeveloped with isolated occurrences of Made Ground relating to historic development and demolition of Wham Farm and infilling of field boundaries. As such, no significant on-site contamination sources have been identified.

The site is underlain by a mixed geology of interbedded cohesive clay and granular sands with large areas of peat encountered in the north, south and west of the site. The granular and organic deposits across the site will afford less protection to the underlying secondary A aquifer in the bedrock and the adjacent watercourse. However, due to a nearby BGS borehole indicating drift deposits of interbedded sand and clay to a depth of circa 80 m bgl, and intrusive investigation recording the presence of >5 m of CLAY at depth across the site, it is considered unlikely for any impacted groundwater to migrate vertically to the bedrock aquifer.

However, where present, impacted groundwater has the potential to migrate laterally to the adjacent watercourses through the high permeability granular deposits. Given the artificial side walls and base and location of the canal at a higher elevation to the site, there is not considered to be a direct pathway to the adjacent Rochdale Canal. Despite the significantly reduced risk due to the presence of a hardstand culvert, the lateral migration of contaminants to the Trub Brook cannot be entirely discounted, given that groundwater could seep through any mortar in a brick lined culvert, as such, Trub Brook is considered the primary controlled water receptor.

Low level heavy metal impact has been encountered within the leachate and groundwater analysis (copper, lead, nickel and zinc). Lead elevations have only been encountered within leachate analysis which can overstate the risk and is not wholly representative of the site characterisation. Therefore, given the absence of lead exceedances within the ground and surface water samples, this is not considered to be a significant contamination source.

Nickel was recorded above EQS values within groundwater samples obtained in one location (WS105) but was not noted within surface water samples of the adjacent canal. Within WS105 no Made Ground was encountered, additionally, review of the historical land uses suggests no potentially contaminative point source in this area of the site. As such, nickel is not considered to be a significant contamination source.

Minor copper and zinc exceedances above EQS values have been recorded within leachate, groundwater and surface water samples indicating the potential presence of a source, pathway and receptor link. However, exceedances were noted in the adjacent water course both upstream (east) and downstream (west), indicating the elevated zinc and copper is representative of the natural background water conditions, or that the source is present upstream and not originating on site due to their presence within upstream samples. Additionally, the M-BAT assessment confirmed that zinc and copper are not bio-available in Trub Brook.

The heavy metal compounds are of low solubility and low mobility and therefore migration to the adjacent watercourse is considered to be a low likelihood. Given the low mobility, lack of on site contamination sources and above conclusions drawn from the leachate, groundwater and surface water sampling/assessments, E3P do not consider the site to pose an unacceptable level of risk to surface waters.

10.5. GROUND GAS RISK ASSESSMENT

10.5.1. RATIONALE

Hazardous ground gas qualitative risk assessment is based on a conceptual site model (CSM) similar to that used for soil and groundwater contamination sources (i.e., source pathway receptor pollutant linkages).

The risk can be assessed based on knowledge of the ground conditions and CSM and a measure of hazardous gas concentrations and gas flow at the site within monitoring standpipes.

10.5.2. SOURCES AND PATHWAYS OF GROUND GAS

Table 33 summarises the potential sources and pathways of ground gas within the context of the recorded site setting and proposed development.

Table 33 Identified Potential Sources of Ground Gas

SOURCE
Made Ground Made Ground was encountered within seven of the 33 exploratory locations on site to a maximum depth of 1.20 m bgl. Made Ground comprises reworked topsoil underlain by either reworked clayey gravelly fine to medium SAND or reworked gravelly sandy CLAY. Gravel is fine to coarse subangular to rounded of mudstone, sandstone and brick. Subangular cobbles of whole brick were encountered within TP119. With the exception of Made Ground topsoil, that is to be stripped as part of the enabling works, no organic or putrescible material was noted within the Made Ground during the investigation.
Drift Strata Drift deposits were encountered within all exploratory locations and are variable across the site comprising interbedded layers of CLAY, SAND and PEAT. Drift deposits were encountered from 0.20 to a maximum proven depth of 15.00 m bgl. PEAT was encountered within 22 of 33 locations. In the south of the site brown pseudo fibrous PEAT was encountered within TP101, TP104, TP106-TP109, TP11, TP112, TP126, WS102, WS110-WS112 and CP101 at depths between 0.30 m and 3.00 m bgl, with a thickness ranging from 0.10 m (TP104) to 2.50 m (WS112). In the north of the site brown pseudo fibrous PEAT was encountered within TP103, TP115-TP118, WS10, WS106 and CP103 at depths between 0.25 m and 4.90 m, with a thickness ranging from 0.20 m (TP103) to 3.60 m (CP103). Additionally, rare plant debris was noted within SAND and CLAY deposits in 10 locations (TP113, TP116-TP118, TP120, TP126, TP128, WS101, WS105 and WS109) at depths between 0.30 m and 2.60 m bgl. No PEAT or plant debris was encountered within the central eastern sector of the site. Where present, PEAT and organic soils are a source of ground gas. It should be noted that it is highly likely that PEAT deposits will need to be removed beneath the development platform.
Solid Strata The solid geology was not encountered during the site investigation. The Arley coal seam is mapped to sub-crop beneath the site. Given the anticipated depth of the drift deposits (>80 m) and lack of evidence of historic coal mining in the immediate area, it is unlikely to have been worked beneath the site. However, this is unproven at this time. If worked, the seam could be a significant source of ground gas.
Landfill Sites There are no active or historical landfills within 250 m of the site.
Other Gases The BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

10.5.3. MONITORING FREQUENCY

The CIRIA C665 guidance on gas risk assessment includes recommendations for periods and frequencies for monitoring visits. These recommendations take into account the nature of the proposed development and the likely generation potential of the source.

The proposed development comprises private residential properties, which would be classified as a Type A development (high sensitivity) in accordance with BS8485:2015+A1:2019. However, it is considered that the likely generation potential of the identified gas sources (taking into account the likelihood of future increases in gas generation) would be best classified as low.

Therefore within the context of the proposed residential end-use and ground gas generation potential, the gas assessment requires six visits over three months, with at least two sets of readings at low or falling atmospheric pressure.

10.5.4. GROUND GAS RISK ASSESSMENT METHODOLOGY

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in:

- CIRIA Report 665 – Assessing risks posed by hazardous ground gases to buildings (2007)
- BS8485:2015+A1:2019 – Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings

BS8485 provides guidance on the level of gas protection requirements based upon the characteristic situation (CS) and the proposed development based on building type.

Therefore, in accordance with BS8485, based on the measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) shall be derived for each monitoring point, from which the site characteristic hazardous gas flow rate (Q_{hgs}), and then the Characteristic Situation (CS) can be determined.

The following equation should be utilised:

$$Q_{hg} = q\left(\frac{C_{hg}}{100}\right)$$

Where:
q is the measured flow rate (in litres per hour) of combined gases from the monitoring standpipe
C_{hg} is the measured hazardous gas concentration (in percentage volume/volume).

The subsequent derived gas screening value (GSV) should be the maximum Q_{hg} (flow rate x concentration as a percentage volume) for all the monitoring events.

A 'worst case check' may be carried out using the maximum recorded flow in any hole with the maximum concentration in any hole to present the plausible worst case conditions. Adoption of the worst case Q_{hg} requires thorough justification and reference to the CSM.

The final derived GSV can then be used to characterise the site as summarised in Table 34.

Table 34 Site Characterisation by GSV (BS8485:2015)

CS	HAZARD POTENTIAL	GSV (L/HR) FOR METHANE AND CARBON DIOXIDE	ADDITIONAL FACTORS
CS1	Very Low	< 0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	< 0.70	Typical measured flow rate <70 l/h (otherwise consider an increase to CS3)
CS3	Moderate	< 3.5	N/A
CS4	Moderate to High	< 15	N/A
CS5	High	< 70	N/A
CS6	Very High	> 70	N/A

Notes

1) *The CS is equivalent to the characteristic GSV in CIRIA C665.*
2) *The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter should be considered.*
3) *Gas Screening Value is the Borehole Gas Volume Flow Rate, in litres per hour, multiplied by the concentration in the air stream of the particular gas being considered.*
4) *The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.*

It should be noted that in the first instance, this assessment has been carried out in accordance with BS8485:2015+A1(2019) and the thresholds given in Table 34.

10.5.5. MONITORING METHODOLOGY

Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) (hydrogen sulphide) were measured using a calibrated infrared gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 300 seconds (5 minutes) at each location, increasing to 600 seconds if elevated concentrations identified, at which point the maximum concentration of CH_4 and CO_2, together with the lowest concentration of O_2 were recorded.

The results of the ground gas monitoring are presented in Table 35.

In addition to the raw data, the results for each individual standpipe have been assessed with reference to guidance provided in BS8485:2015. Based on the initial peak measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) have been derived for each monitoring point, from which an individual Characteristic Situation (CS) can ultimately be determined.

10.5.6. SUMMARY OF MONITORING RESULTS

Table 35 presents of the ground gas and groundwater monitoring results to date.

Table 35 Summary of Ground Gas Monitoring Results

WELL	STRATA	DATE	CH_4 PEAK (%V/V)	CH_4 STEADY (%V/V)	CH_4 Q_{hg} (l/hr)	CO_2 PEAK (%V/V)	CO_2 STEADY (%V/V)	CO_2 Q_{hg} (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	SAND	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1009	Falling	0.1	0.1	1.00-3.00	2.53	0.54
		24/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1000	Falling	0.1	0.1		2.53	0.32
WS102	SAND	09/05/24	0.1	0.1	0.0093	0.2	0.2	0.0186	20.5	1009	Falling	9.3	9.3	2.00-3.00	2.37	0.47
		24/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1000	Falling	0.1	0.1		2.37	0.37
WS103	CLAY and SAND	09/05/24	0.1	0.1	0.0002	0.1	0.1	0.0002	20.6	1010	Falling	0.2	0.2	1.00-3.00	1.49	0.72
		24/05/24	0.1	0.1	0.0001	0.5	0.5	0.0005	20.3	999	Falling	0.1	0.1		1.49	0.12
WS104	CLAY	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1010	Falling	0.1	0.1	1.00-3.00	2.35	1.14
		24/05/24	0.1	0.1	0.0121	0.3	0.2	0.363	20.3	998	Falling	12.1	0.1		2.35	0.65
WS105	CLAY	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.6	1009	Falling	0.1	0.1	1.00-3.00	2.70	0.78
		24/05/24	0.1	0.1	0.0001	0.2	0.1	0.0002	20.4	998	Falling	0.1	0.1		2.70	0.48
WS106	SAND	09/05/24	0.1	0.1	0.0001	2.3	2.2	0.0023	19.3	1010	Falling	0.1	0.1	3.50-4.50	3.40	1.01
		24/05/24	0.1	0.1	0.0001	1.9	1.9	0.0019	19.5	997	Falling	0.1	0.1		3.40	0.38
WS107	CLAY	09/05/24	0.1	0.1	0.0001	0.5	0.5	0.0005	20.6	1010	Falling	0.1	0.1	1.00-4.00	4.06	0.67
		24/05/24	0.1	0.1	0.0001	0.3	0.3	0.0003	20.4	998	Falling	0.1	0.1		4.06	0.38
WS108	CLAY and SAND	09/05/24	0.1	0.1	0.0006	0.1	0.1	0.0006	20.8	1009	Falling	0.6	0.6	1.00-3.00	2.87	0.90
		24/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Falling	0.1	0.1		2.87	0.39
WS109	CLAY and SAND	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.7	1009	Falling	0.1	0.1	1.00-3.00	1.11	0.58
		24/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	997	Falling	0.1	0.1		1.11	0.23
WS110	SAND and GRAVEL	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1008	Falling	0.1	0.1	2.20-3.00	3.03	0.45
		24/05/24	0.1	0.1	0.0079	0.1	0.1	0.0008	20.4	997	Falling	7.9	0.1		3.03	0.21
WS111	SAND	09/05/24	0.1	0.1	0.0006	3.4	3.4	0.0204	17.4	1008	Falling	0.6	0.6	1.00-3.00	2.72	0.81
		24/05/24	0.1	0.1	0.0107	2.1	2.1	0.2247	19.7	997	Falling	10.7	0.1		2.72	0.37
WS112	PEAT	09/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.9	1008	Falling	0.1	0.1	1.00-3.00	2.98	0.58
		24/05/24	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	997	Falling	0.1	0.1		2.98	0.45

CIRIA Characteristic Situation		Q_{hg}		
	CS1	*<0.07*	*Typical Max CO2 <5 % Typical Max CH4 <1 %*	*Values in BOLD exceed CS1 Thresholds*
	CS2	*<0.7*	*Flow rate not to exceed 70 l/hr otherwise consider increase to CS3*	*Values in BLUE denote water above level of response zone (flooded)*
	CS3	*<3.5*		
	CS4	*<15*	*Quantitative Risk Assessment required to evaluate scope of protective measures*	

Values in blue – Well flooded and bailed.
**Well still after bailing*

10.5.7. GROUNDWATER

The water level within the majority of the monitoring wells was recorded to be above the top of the response zone (flooded) on a number of occasions, as summarised in Table 36, thus rendering the majority of the monitoring data obtained to date unreliable. Therefore, each time a flooded well was encountered, the well was bailed and left to re-equilibrate prior to the next visit.

Table 36 Flooded Monitoring Well Data

WELL	VISIT 1 09/05/2024	VISIT 2 24/05/2024	VISIT 3 TBC	VISIT 4 TBC
WS101	Y	Y		
WS102	Y	Y		
WS103	Y	Y		
WS104	N	Y		
WS105	Y	Y		
WS106	Y	Y		
WS107	Y	Y		
WS108	Y	Y		
WS109	Y	Y		
WS110	Y	Y		
WS111	Y	Y		
WS112	Y	Y		

10.5.8. BAROMETRIC PRESSURE

Visit 1 and 2 have been undertaken during a period of falling pressure, with pressure recorded to be between 1008 and 1010 m bar during visit 1 and 1000 and 997 m bar during visit 2.

Future visits be arranged to target other pressure systems to ensure that all atmospheric conditions have been represented.

10.5.9. GAS FLOW

Throughout the monitoring period, the majority of flow rates were recorded to be 0.1 l/hr (limit of detection of the analyser).

A maximum initial flow of 12.1 l/hr was recorded in WS104, however, given the response zone was flooded and the water level raised by circa 0.50 m, this increased flow is deemed to have been as a result of rising water level resulting in the formation of pressure within the monitoring well, as opposed to ground gas generation.

10.5.10. GAS CONCENTRATIONS

The maximum methane value recorded within the monitoring wells was 0.1% /v (limit of detection of the analyser).

Steady carbon dioxide concentrations were recorded at concentrations ranging from 0.1% v/v to 3.4% v/v (WS111).

10.5.11. RADON RISK

The site is in an area where 1–3 % of homes are above the Radon Action Level, therefore basic radon protection measures will not need to be incorporated into any proposed new dwellings.

10.5.12. CONCLUSION

Due to the high water table on site resulting in flooded wells, much of the current data collected is unreliable. The high water table is likely to trap any ground gas within shallow soils meaning the site is at a greater risk from hazardous ground gas.

Given the presence of organic soils and PEAT across large areas of the site and sub cropping Arley coal seam (at depth), at this stage precautionary CS2 measured should be allowed for. The full ground gas protection regime will be decided upon completion of the ground gas monitoring.

Radon protection measures are not required for any proposed dwellings on site.

10.6. POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites"

Table 37 Pipeline Selection PE Threshold Concentrations

CONTAMINANT GROUP	PE-THRESHOLD (MG/KG)	CONCENTRATIONS AT CURRENT PIPELINE DEPTH (MG/KG)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	<1.0
Total SVOCs (Excluding PAH and those substances marked with an *)	2	<0.50
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.0
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	9.5
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	152.5
Phenols (From SVOC Analysis)*	2	<0.50
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	N/A
Ethers*	0.5	N/A
Nitrobenzene*	0.5	N/A
Ketones*	0.5	N/A
Aldehydes*	0.5	N/A
Amines	Fail	N/A
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes – TPH EC10-EC16 of 11 mg/kg within TP108 topsoil at 0.1 m bgl. However, this material is not deemed to affect the pipeline selection given its location at the surface and above the water table.	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No hydrocarbon impact at greater than pipeline depth has been identified.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	Yes – topsoil is likely to be stripped and reused in gardens on site.	
Will soils be imported to site as part of any future earth works	Site levels will likely need to be raised as part of a phase of enabling works. The importation of materials may affect the UKWIR Risk Assessment which should be updated after completion.	

Notes - Pipe line depth normally between 0.75m–1.35m.

Based on the assessment of current site conditions it is likely that PE pipe can be used at the proposed development. However, the importation of materials may affect the UKWIR Risk Assessment which should be updated after completion of enabling works.

10.7. DEVELOPED CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 38 has been prepared for the site.

Table 38 Developed Conceptual Model

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
SOIL						
HUMAN HEALTH						
Made Ground Elevated Dibenzo(a,h)Anthracene encountered within TP107 at 0.4 m bgl.	Accidental ingestion and/or dermal contact with contaminated soil and/or leachate. **PL1/PL2**	Human Health – construction workers Human Health – end users	Likely	Low	The CSM has identified one isolated occurrence of elevated Dibenzo(a,h)Anthracene in TP108 at 0.4 m bgl with a viable pollutant pathway of dermal contact and ingestion of soils. This poses a human health risk to future end users and construction workers. **Recommendation:** Construction works to be completed with appropriate PPE and welfare facilities. Implementation of clean cover systems to garden areas. Hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity.	Low

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
Made Ground Volatile contamination	Inhalation of vapours. **PL4**	Human Health – end users Human Health – Off-site receptors	Unlikely	High	Desk study did not identify any on site sources of volatile contamination. Intrusive investigation has not identified any elevated volatile or semi-volatile contamination. **Recommendation:** No further investigation is required.	Very low
Made Ground Asbestos (Asbestos containing materials (ACM) and loose fibres)	Inhalation (of fibres). Construction works disturbing bound material and releasing fibres. **PL3**	Human Health - Site personnel, end land users, and users of adjacent sites	Unlikely	High	No fibres have been identified within Made Ground samples tested. However, the presence of ACM cannot be entirely discounted. Risk of inhalation of fibres during Ground Investigation and construction works. Disturbance of ACMs and dust derivatives from construction would increase risk to adjacent sites. **Recommendation:** Should asbestos be encountered during enabling works construction works to be completed with PPE and provision of welfare.	Low

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
Made Ground Sulphate from potential ash within the Made Ground.	Sulphate attack on concrete. **PL6**	Building concrete	Unlikely	Low	No deposits containing ash have been encountered on site. **Recommendation:** Concrete design DS-1 AC-1s. Construction works to be completed with appropriate PPE and welfare facilities.	Very low
Made Ground Organic contaminants such as hydrocarbons, solvents	Ingestion of tainted water supply. **PL7**	Human Health – End Users Water pipeline	Unlikely	High	No elevated concentrations of contaminants have been identified at pipeline depth (0.75–1.35 m). **Recommendation:** It is likely that PE pipe can be used at the proposed development. A UKWIR should be completed post enabling works.	Very low
Made Ground Phytotoxic contaminants	Direct contact (plant uptake). **PL8**	Flora	Likely	Medium	Likely probability as a single exceedance has been encountered within Made Ground, which may be taken up by flora in soft landscaping/gardens. **Recommendation:** Removal of contamination as part of hotspot removal. Implementation of clean cover systems to private gardens and soft landscaped areas.	Very low

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
CONTROLLED WATERS						
Made Ground Leachable heavy metals within Made Ground	Leaching of contaminants from Made Ground through infiltration and percolation of rainwater. **PL5**	Underlying Secondary A bedrock aquifer Rochdale Canal Trub Brook	Low likelihood	Medium	A number of low-level exceedances of heavy metals were identified compared to the EQS screening values. No onsite contamination source and no bio-availability in the adjacent watercourse, as such, the risk is very low. **Recommendation:** No further investigation is required.	Very low
		Infrastructure and services	Low likelihood	Medium	The development of hardstanding on site will reduce the leachate produced from contaminated soils. Infrastructure and services shall be designed to resist chemical attack and ingress.	Very low
Groundwater	Contact with contaminated groundwater. **PL2**	Human Health – site personnel	Low likelihood	Medium	Shallow groundwater is known to be present across the site. No exceedances have been identified compared to the DWS screening values.	Very low
	Contaminants leached from the Made Ground and from off-site sources may be mobilised to greater	Underlying Secondary A bedrock aquifer Rochdale Canal	Low likelihood	Medium	A number of low-level exceedances of heavy metals were identified compared to the EQS screening values. No onsite contamination source and no bio-availability in the	Very low

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
	distances through advective flow. **PL5**	Trub Brook			adjacent watercourse, as such, the risk is very low. Additionally, analysis of surface water samples has shown exceedances both upstream and downstream of site and as such the elevated levels cannot be attributed to the site. **Recommendation:** No further investigation is required.	
GROUND GAS						
Ground gases (methane and carbon dioxide production from organic soils/PEAT and Made Ground)	Inhalation of ground gas. **PL4** Accumulation of ground gas in confined spaces (asphyxiation or explosion)	Human Health – site personnel	Low likelihood	High	Ground gases may be present on site associated with Made Ground, historic infilled field boundaries and the organic soils present beneath the site. Ground gases may migrate through permeable strata to enter proposed buildings. Precautionary CS2 measures during on going gas monitoring. Final gas protection measures to be decided upon completion of ground gas monitoring.	Low
		Human Health – end users	Low likelihood	High		Low
		Infrastructure and services	Low likelihood	High		Low
Radon	Inhalation of ground gas. **PL4**	Human Health – site personnel	Unlikely	Medium	The site is not located in a radon effected area and therefore radon protection	Very low

CONTAMINANT RISK			LIKELIHOOD	SEVERITY	MITIGATION DISCUSSION	RESIDUAL RISK
SOURCES	MIGRATION PATHWAYS	RECEPTORS				
	Accumulation of ground gas in confined spaces (carcinogenic)				measures will not be required on stie.	
		Human Health – end users	Unlikely	Medium	The site is not located in a radon effected area and therefore radon protection measures will not be required on stie.	Very low

Main Exposure Pathways:
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = vapour/gas inhalation; PL5 = vertical / lateral migration; PL6 = corrosion of concrete; PL7=tainting of water supply; PL8 = uptake by plants.

LEVEL OF RISK	
Very Low	
Low	
Low/Moderate	
Moderate	
Moderate/High	
High	

11. GEOTECHNICAL ASSESSMENT

11.1. SOIL CONSISTENCY

Undrained shear strength values were measured using both field hand shear vane tests and laboratory undrained triaxial tests. Results of the tests are presented in Table 39 and Table 40, respectively, which indicate the clay soils to vary between very soft and very stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils, with variable superficial deposits encountered across the site. In situ hand shear vane tests could not be completed in clay soils with a high sand or gravel content.

Table 39 Summary of Hand Shear Vane Tests

LOCATION	DEPTH	SHEAR STRENGTH (KPA)	CALCULATED ALLOWABLE BEARING CAPACITY (KN/M^2)
TP101/SA101	1	6	14.1
TP102/SA102	1.5	49	115.15
TP114	2	158	371.3
TP115/SA103	1.5	29	68.15
TP117	0.8	13	30.55
TP118	1	41	96.35
TP118	2	78	183.3
TP120	0.8	20	47
TP122	0.7	71	166.85
TP122	1.3	115	270.25
TP125	0.8	139	326.65
TP125	1.3	142	333.7
TP125	1.6	71	166.85
TP125	2	123	289.05
TP128	1	91	213.85

Notes: ABC Calculated using Stroud and Butler et al 1974.
** granular content within soil tests may underestimate true shear strength.*

Table 40 Summary of Undrained Shear Strength in Triaxial Compression – Laboratory Test

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m^2)	CONSISTENCY
WS108	1.5–2.0	Brown slightly sandy slightly gravelly silty CLAY	46	Firm

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 41.

Table 41 Standard/Cone Penetration Test Results

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m²)	ALLOWABLE BEARING CAPACITY (kN/m²)*
CP101	1.20	CLAY	11	10.79	N/A	Medium strength	Stiff	53.97	110.96
CP101	2.00	PEAT	2	1.83	N/A	Extremely Low Strength	Very Soft	9.14	18.78
CP101	3.00	SAND	1	0.87	Very Loose	N/A	N/A	N/A	8.70
CP101	4.00	SAND	1	0.84	Very Loose	N/A	N/A	N/A	8.45
CP101	5.00	SAND	30	24.89	Medium Dense	N/A	N/A	N/A	248.89
CP101	6.00	SAND	25	20.50	Medium Dense	N/A	N/A	N/A	204.97
CP101	7.50	SAND	34	27.58	Medium Dense	N/A	N/A	N/A	275.84
CP101	9.00	SAND	37	29.85	Medium Dense	N/A	N/A	N/A	298.53
CP101	10.50	SAND	38	29.98	Medium Dense	N/A	N/A	N/A	299.79
CP101	12.00	SAND	42	31.26	Dense	N/A	N/A	N/A	312.59
CP101	14.00	CLAY	30	20.78	N/A	High strength	Very Stiff	103.91	213.63
CP102	1.20	CLAY	5	4.91	N/A	Low strength	Firm	24.53	50.44
CP102	2.00	CLAY	11	10.05	N/A	Medium strength	Stiff	50.24	103.30
CP102	3.00	CLAY	1	0.87	N/A	Extremely low strength	Very Soft	4.35	8.94
CP102	4.00	CLAY	11	9.29	N/A	Medium strength	Stiff	46.47	95.54
CP102	5.00	CLAY	15	12.44	N/A	Medium strength	Stiff	62.22	127.93
CP102	6.00	CLAY	16	13.12	N/A	Medium strength	Stiff	65.59	134.86

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m²)	ALLOWABLE BEARING CAPACITY (kN/m²)*
CP102	9.00	CLAY	20	16.14	N/A	High strength	Very Stiff	80.68	165.89
CP102	12.00	CLAY	37	27.54	N/A	High strength	Very Stiff	137.69	283.09
CP103	1.20	PEAT	1	0.98	N/A	Extremely Low Strength	Very Soft	4.91	10.09
CP103	2.00	PEAT	2	1.83	N/A	Extremely Low Strength	Very Soft	9.14	18.78
CP103	3.00	PEAT	2	1.74	N/A	Extremely low strength	Very Soft	8.70	17.88
CP103	4.00	PEAT	3	2.53	N/A	Very low strength	Soft	12.67	26.06
CP103	5.00	CLAY	12	9.96	N/A	Medium strength	Stiff	49.78	102.34
CP103	6.00	CLAY	17	13.94	N/A	Medium strength	Stiff	69.69	143.28
CP103	9.00	CLAY	31	25.01	N/A	High strength	Very Stiff	125.06	257.13
CP103	10.50	CLAY	35	27.61	N/A	High strength	Very Stiff	138.06	283.85
CP103	12.00	CLAY	37	27.54	N/A	High strength	Very Stiff	137.69	283.09
CP103	13.50	CLAY	38	26.79	N/A	High strength	Very Stiff	133.93	275.35
WS101	1.00	SAND	4	4.03	Loose	N/A	N/A	N/A	40.33
WS101	2.00	SAND	15	13.70	Medium Dense	N/A	N/A	N/A	137.03
WS101	3.00	SAND and GRAVEL	50	43.48	Dense	N/A	N/A	N/A	434.83
WS102	1.00	PEAT	6	6.05	N/A	Low strength	Firm	30.24	62.18
WS102	2.00	SAND	8	7.31	Loose	N/A	N/A	N/A	73.08
WS102	3.00	SAND and GRAVEL	50	43.48	Dense	N/A	N/A	N/A	434.83
WS103	1.00	SAND	41	41.33	Dense	N/A	N/A	N/A	413.34

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m²)	ALLOWABLE BEARING CAPACITY (kN/m²)*
WS103	2.00	CLAY	16	14.62	N/A	Medium strength	Stiff	73.08	150.26
WS103	3.00	GRAVEL	50	43.48	Dense	N/A	N/A	N/A	434.83
WS104	1.00	SAND	7	7.06	Loose	N/A	N/A	N/A	70.57
WS104	2.00	CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
WS104	3.00	SAND	50	43.48	Dense	N/A	N/A	N/A	434.83
WS105	1.00	SAND	7	7.06	Loose	N/A	N/A	N/A	70.57
WS105	2.00	CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
WS105	3.00	SAND	50	43.48	Dense	N/A	N/A	N/A	434.83
WS106	1.00	PEAT	5	5.04	N/A	Low strength	Firm	25.20	51.82
WS106	2.00	PEAT	0	0.00	N/A	Extremely low strength	Very Soft	Extremely low strength	0.00
WS106	3.00	PEAT	0	0.00	N/A	Extremely low strength	Very Soft	Extremely low strength	0.00
WS106	4.00	SAND	17	14.36	Medium Dense	N/A	N/A	N/A	143.62
WS106	5.00	SAND	27	22.40	Medium Dense	N/A	N/A	N/A	224.00
WS107	1.00	SAND	7	7.06	Loose	N/A	N/A	N/A	70.57
WS107	2.00	CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
WS107	3.00	CLAY	13	11.31	N/A	Medium strength	Stiff	56.53	116.22
WS107	4.00	CLAY	20	16.90	N/A	High strength	Very Stiff	84.49	173.70
WS107	5.00	CLAY	47	38.99	N/A	Very high strength	Very Stiff	194.96	400.84
WS108	1.00	CLAY	7	7.06	N/A	Low strength	Firm	35.29	72.55

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m²)	ALLOWABLE BEARING CAPACITY (kN/m²)*
WS108	2.00	SAND	9	8.22	Loose	N/A	N/A	N/A	82.22
WS108	3.00	SAND	16	13.91	Medium Dense	N/A	N/A	N/A	139.14
WS108	4.00	SAND	30	25.35	Medium Dense	N/A	N/A	N/A	253.46
WS109	1.00	CLAY	4	4.03	N/A	Low strength	Firm	20.16	41.46
WS109	2.00	SAND	6	5.48	Loose	N/A	N/A	N/A	54.81
WS109	3.00	SAND	16	13.91	Medium Dense	N/A	N/A	N/A	139.14
WS109	4.00	SAND	25	21.12	Medium Dense	N/A	N/A	N/A	211.21
WS110	1.00	PEAT	1	1.01	N/A	Extremely low strength	Very Soft	5.04	10.36
WS110	2.00	PEAT	7	6.39	N/A	Low strength	Firm	31.97	65.74
WS110	3.00	SAND and GRAVEL	50	43.48	Dense	N/A	N/A	N/A	434.83
WS111	1.00	PEAT	2	2.02	N/A	Very low strength	Soft	10.08	20.73
WS111	2.00	SAND	11	10.05	Medium Dense	N/A	N/A	N/A	100.49
WS111	3.00	SAND	25	21.74	Medium Dense	N/A	N/A	N/A	217.41
WS112	1.00	PEAT	1	1.01	N/A	Extremely low strength	Very Soft	5.04	10.36
WS112	2.00	PEAT	4	3.65	N/A	Very low strength	Soft	18.27	37.56
WS112	3.00	SAND	7	6.09	Loose	N/A	N/A	N/A	60.88
WS112	4.00	SAND	2	1.69	Very Loose	N/A	N/A	N/A	16.90
WS112	5.00	SAND	9	7.47	Loose	N/A	N/A	N/A	74.67

NOTES
* The Allowable Bearing Capacity (ABC) should be considered indicative.
The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).
Allowable bearing capacity on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.

11.2. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations in cohesive deposits were stable during excavation. Within granular and organic deposits, below a depth of 1.00 m, the sides of trial pit excavations were unstable.

Excavation was undertaken with relative ease with standard plant and machinery.

11.3. CONSOLIDATION

One undisturbed samples of Glacial Till were submitted for oedometer analysis. The results are provided in Table 42.

Table 42 Oedometer Consolidation Results

LOCATION	DEPTH (M)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	Mv (m^2/MN)	Cv (m^2/year)
CP103	7.5–7.95	U100	15.2	155	0.40	2.93
				310	0.09	3.50
				620	0.05	5.91
				1240	0.03	5.73
				155	0.01	

When considered at over-burden pressure with an additional load of 110 kPa the coefficient of volume compressibility (Mv) ranged from 0.01 m^2/MN up to 0.40 m^2/MN. The material is considered to be low to medium compressibility.

The rate at which settlement is likely to occur is determined by the coefficient of consolidation (Cv). As shown in Table 7.8, the coefficient ranges from 2.93 m^2/yr to 5.91 m^2/yr.

11.4. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of granular and cohesive material via wet sieve to obtain information on the soil fractions. The results are included in Table 43. The full results can be found in APPENDIX IX.

Table 43 Summary of Particle Size Distribution Test Results

LOCATION	DEPTH (M)	SOIL FRACTION (%)				MCHW 600 CLASSIFICATION
		COBBLES	GRAVEL	SAND	SILT/CLAY	
WS107	1.5–2.0	0	4	27	69	2A/2B
TP114	1.2	0	65	31	4	1A
TP124	0.7	0	1	92	7	1B
TP128	0.8	0	5	36	59	2A/2B

11.5. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils via utilising proctor compaction tests utilising a 4.5kg rammer. The results of the tests have been summarised in Table 44. The full test results can be found in APPENDIX IX.

Table 44 Summary of Dry Density and Moisture Content

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (M)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 MM SIEVE (%)	MAX DRY DENSITY (MG/M³)	MATERIAL RETAINED ON 20.0 MM TEST SIEVE (%)
WS107	Slightly gravelly sandy CLAY	1.5	4.5kg	13.5	12	0	1.97	0
TP114	Silty sandy GRAVEL	1.2	4.5kg	7.8	9.4	0	2.03	0
TP124	Slightly gravelly silty SAND	0.7	4.5kg	22.6	15	0	1.59	0
TP128	Slightly gravelly slightly sand silty CLAY	0.8	4.5kg	14.9	11	0	1.96	1

The proctor compaction tests have indicated that the materials on site are variable with the gravel in TP114 being dry of the optimum and sand and clay in the rest of the tested samples being wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

As the majority of the site is sand and clay engineering of this type of material will need to be completed during dry weather periods only.

11.6. SOIL INFILTRATION

In-situ BRE 365 Soakaway tests were undertaken over a 48 hour period within trial pits completed as SA101-SA103.

Soakaways were undertaken in trial pit locations TP101, TP102 and TP115. All soakaway tests failed with water level rising during the monitoring period. Due to the presence of shallow groundwater on site soakaway drainage is not considered viable for the proposed development.

11.7. SOIL PLASTICITY

The liquid and plastic limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average plasticity index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth.

E3P typically only consider a soil to be shrinkable if the proportion finer than 63 µm is > 35%.

PI results are compared against guidance given in the NHBC standards, Chapter 4.2 (revised January 2014), which advocates the use of modified plasticity index (I'p), defined as:

$$I'p = Ip \times (\% < 425\ \mu m/100)$$

In other words, if PI is 30%, but the soil contains 80% < 425 µm, then I'p = 30 × 80/100 = 24%.

It should be noted that in accordance with the requirements of BS 1377, the % passing the 425 µm sieve is routinely reported by testing labs.

E3P apply engineering judgement where PI results are spread over a range of classifications. Consideration is given to the average values for each particular soil type (differentiate between residual soil and alluvium), the number of results in each class and the actual values.

The Atterberg limits determinations, summarised in Table 45, show the clay to be of low plasticity.

Table 45 Summary of Plasticity Index Test results

LOCATION	DEPTH (M)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 MM SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS105	2.0	14.3	11	27	16	100	16	Low
WS107	2.0	14.9	11	26	15	100	15	Low
WS109	2.0	14.9	12	28	16	100	16	Low
CP102	1.2	15.0	11	25	14	100	14	Low

The results of the Atterberg limits testing confirmed that the soils would be deemed to be "Low Potential" in accordance with the classification system utilised by the LABC/NHBC industry guidance.

11.8. PH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in APPENDIX VIII (summarised in Table 46), shows that the soils at the site meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

Table 46 Summary of pH and Sulphate Data

LOCATION	DEPTH (M)	SO_4 IN 2:1 WATER/SOIL (G/L)	PH VALUE	CLASSIFICATION
TP101	0.1	< 0.010	8.0	DS-1 AC-1s
TP101	1.5	< 0.010	7.5	DS-1 AC-1s
TP107	0.4	0.018	7.7	DS-1 AC-1s
TP108	0.1	0.021	7.3	DS-1 AC-1s
TP109	0.3	0.015	7.7	DS-1 AC-1s
TP113	1	< 0.010	7.9	DS-1 AC-1s
TP114	2	0.017	8.0	DS-1 AC-1s
TP110	0.1	0.021	7.0	DS-1 AC-1s
TP118	1	0.022	7.5	DS-1 AC-1s
TP119	0.1	0.017	8.0	DS-1 AC-1s
TP120	0.1	< 0.010	9.0	DS-1 AC-1s
TP125	0.1	< 0.010	8.3	DS-1 AC-1s
TP127	0.6	< 0.010	8.2	DS-1 AC-1s
WS106	3.7	0.058	8.5	DS-1 AC-1s

11.8.1. HIGHWAYS AND CONCRETE

MCHW Series 600 provides a criterion of 1500 mg/l for water-soluble sulphate within 500mm of any concrete structure. A second criteria of 300 mg/l is given with respect to soils within 500mm of steel structures.

No exceedances of the MCHW criteria have been recorded on site.

11.9. GROUNDWATER

Table 47 Summary of Groundwater Strikes

LOCATION	DEPTH (M BGL)	DESCRIPTION OF STRIKE	STRATA	EVIDENCE OF CONTAMINATION
Site Investigation Waterstrike Information				
TP102/SA102	1.8	Strike	SAND	None
TP107	1.0	Saturated Peat	PEAT	None
TP115	0.5	Saturated Peat	PEAT	None
TP116	1.0	Saturated Peat	PEAT	None
TP117	2.0	Saturated Peat	PEAT	None
TP118	1.5	Strike	CLAY	None
TP119	1.8	Strike	SAND	None
TP120	0.4	Perched water	SAND	None
TP122	1.9	Seepage	SAND	None
TP124	1.0	Strike	SAND	None
TP125	1.7	Seepage	CLAY	None
WS112	2.0	Strike	PEAT	None
WS104	1.0	Strike	SAND	None
WS105	1.1	Strike	SAND	None
WS110	2.0	Strike	PEAT	None
WS103	2.0	Strike	CLAY	None
CP101	0.9	Strike	CLAY	None
CP102	13.2	Strike	SAND	None
CP103	10.3	Strike	CLAY	None
Location	**Depth to water (m bgl)**	**Period of monitoring (May-September)**	**Weather conditions during monitoring**	
Groundwater Monitoring Summary from Installations				
WS101	0.54	May	Variable – wet start and drying up towards end of monitoring period.	
WS102	0.47	May		
WS103	0.72	May		
WS104	1.14	May		
WS105	0.78	May		
WS106	1.01	May		
WS107	0.67	May		
WS108	0.90	May		
WS109	0.58	May		
WS110	0.45	May		
WS111	0.81	May		
WS112	0.58	May		

Shallow groundwater has been recorded across the site.

Groundwater levels indicate a shallow groundwater table, if mobile, is likely to flow in a southerly direction towards the offsite Trub Brook.

11.10. SITE PREPARATION

Our assessment has been based on the fact that the site will be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW).* This should include the following:

- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Peat and organic soils beneath the development will require removal with the resulting void infilled with suitable compacted engineered fill.
- Existing services should be located, and the suitable easement should be marked out before development begins.
- Assessment should be made to ensure no disturbance to the adjacent rail and canal infrastructure.

11.11. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the safe allowable bearing capacity (ABC) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 48.

Table 48 Summary of ABC

GRANULAR SOILS			
Description	**Depth (Range m bgl)**	**Relative Density**	**Allowable Bearing Capacity (kN/m²)**
SAND	3.00–4.00	Very Loose	8.70–16.90
Clayey gravelly SAND	2.00–5.00	Loose	40–82
Clayey gravelly SAND	2.00–4.00	Medium Dense	137–253
SAND	5.00–10.50	Medium Dense	205–299
Gravelly SAND	12.00	Dense	313
SAND and GRAVEL	1.00–3.00	Dense	413–435
COHESIVE SOILS			
Description	**Depth (range m bgl)**	**Undrained Shear Strength (Cu) (kN/m²)**	**Allowable Bearing Capacity (kN/m²)**
Silty sandy CLAY	2.00–3.00	4.35–9.14	8.94–18.78
Silty sandy CLAY	1.00–1.50	20–35	41–73
Slightly gravelly sandy CLAY	2.00–6.00	46–84	93–173
Slightly gravelly sandy CLAY	9.00–14.00	80–138	165–284

Ground conditions were very variable across the site with much of the site recording loose sands and organic peat deposits.

Compressible PEAT deposits on site are not considered a suitable founding stratum and will require removal across the development, therefore net Allowable Bearing Capacity (ABC) calculated from CPT/SPT values from peat stratum have been discounted.

From 1.00–3.45 m bgl, the underlying natural clay drift deposits have been evaluated and found to generally be firm low strength to stiff medium strength, with a ABC ranging from 42 kN/m^2 at 1.00 m bgl to 116 kN/m^2 at 3.00 m bgl. Two localised areas of very soft extremely low strength clay with a net ABC ranging from 8.94–18.78 kN/m^2, have been identified in CP101 at 2.00 m bgl and CP102 at 3.00 m bgl.

From 4.00–6.45 m bgl the natural clay drift deposits are generally stiff medium strength with a net ABC ranging from 96–143 kN/m^2. From 9.00 m bgl the clay deposits are very stiff high strength with an ABC of 166 kN/m^2 which generally increases with depth to 284 kN/m^2.

Where peat deposits are not present on site the underlying natural sand deposits are generally loose with a net ABC ranging from 55–74 kN/m^2 from 1.00–2.45 m bgl. Natural sand directly underlying peat deposits (3.00–5.45 m bgl) were found to be very loose with a net ABC ranging from 8.45–16.90 kN/m^2

From 3.00 m bgl the natural sand are generally medium dense to dense with a minimum ABC of 100.49 kN/m^2 which generally increases with depth.

11.12. FOUNDATIONS OPTIONS APPRAISAL

Ground conditions were very variable across the site with much of the site recording loose sands, soft alluvial clays and organic peat deposits. Peat deposits were generally identified within the western sector of the site where lacustrine deposits are mapped by the BGS and were found to be present from the near surface to <3.00 m bgl. Peat deposits were therefore unconsolidated and will require excavation from beneath the entire development footprint to ensure no differential settlement to the plots, gardens and external infrastructure.

The site will require extensive earthworks to cut / fill and most likely significantly uplift the site to create a developable platform. The shallow groundwater strikes will require consideration during the earthworks as a degree of dewatering is likely to be required. Furthermore, due to the shallow groundwater, any earthworks to be undertaken will need to be completed during the drier summer months when wet materials will be easier to manage.

The site is mostly low lying and is known to be wet at the surface with very shallow water strikes. It is therefore likely that the proposed development levels will be set at a higher topographical level than the site is currently. Due to the significantly loose sands and soft cohesive deposits displaying generally low ABCs at shallow depth, coupled with the fact that the site is likely to require raising, will mean that the majority of plots are likely to require a driven pile foundation with the possibility of a mass trench fill solution in the central eastern areas where founding stratum was found to be shallower and ground conditions displayed greater ABCs.

To determine if VSC is viable at the subject site, E3P has completed a Ground Improvement Design Risk Matrix that is summarised in Table 49.

Table 49 Ground Improvement Design Risk Matrix

RISK ITEM	COMMENT	PASS/FAIL
Soft clays with an undrained shear strength less than 30 kN/m^2	CLAY soils with Cu <30 kN/m^2 have been encountered across the site.	FAIL
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200 mm, either as a single layer or the sum of the thicknesses of individual layers throughout the length of the stone column	Peat deposits have been encountered to a maximum depth of 4.90 m bgl across the west of the site and an isolated area in the southeast. As part of the enabling works, peat should be removed from beneath the development.	FAIL (PASS ON COMPLETION OF ENABLING WORKS)

RISK ITEM	COMMENT	PASS/FAIL
Voided filled ground, e.g. old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	No significant depths of filled ground or voids have been encountered on site.	PASS
Loose or non-engineered fill not previously subject to rising or fluctuating water levels saturation	None identified.	PASS
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified	PASS
Fill, containing degradable material where organic material forms more than 15% of fill by volume	Organic PEAT has been encountered across much of the site. As part of the enabling works, peat should be removed from beneath the development.	FAIL (PASS ON COMPLETION OF ENABLING WORKS)
Clays with a plasticity index greater than 40%	None identified.	PASS
Highly sensitive soils liable to collapse or remoulding	None identified.	PASS
Cohesive soils with trees in influencing distance	Plots where tree influence has been modelled and will either be subject to a piled or mass trench-fill solution.	PASS
Overall Risk Rating and Suitability for Vibratory Ground Improvement		**FAIL**

Due to the presence of organic soils and soft cohesive deposits, VSC ground improvement is unlikely to be suitable.

11.13. GROUND FLOOR SLABS

Current building control regulations require that where infilled ground is present to depths in excess of 600 mm, or where the substratum is variable in terms of the structure and settlement potential, or where clay soils are present within the influence of existing or proposed trees, a suspended floor slab is required.

In this instance, due to the variable ground conditions and site levels likely increasing as part of the development, a suspended floor slab will be required.

Where a cast in-situ suspended slab is utilised with no subfloor void, appropriate compressible material (heave precautions) will be required in the construction of the substructure. In clay soils if the foundation depth is greater than 1.5m, allowance should be made in the design for heave. This must incorporate either a clear void of a specified minimum depth under the suspended floor, or a proprietary compressible material/void former below the underside of the floor construction.

Ground bearing slabs should not be used in ground conditions where heave can occur or where the foundation depth is greater than 1.50 m. Under these circumstances a suspended floor construction should be used.

11.14. SETTLEMENT

The site has been appraised through desk based information and site investigation data in order to inform geotechnical risk where possible. Table 50 below has been formulated to determine if settlement risks are required to be further appraised. Where any item is determined to be appraised a settlement appraisal for the site should be prepared upon receipt of development levels and layout.

Table 50 Summary of Geotechnical Information for Settlement

RISK	COMMENT	ASSESSMENT
Site is located in an area deemed to be at Risk from Ground Dissolution from desk based information	The site is at a negligible risk of ground dissolution based on BGS data searches.	No Further Assessment
Site is in an area where geology is reported as having a compressible risk from desk based information	Peat deposits associated with lacustrine deposits are recorded in the west, north and south of the site the site.	**Further Assessment**
Do historical maps indicate relic excavation features such as opencast or ponds that have been infilled.	No significant infilled features have been identified on site.	No Further Assessment
Has the site been proven to be underlain by anthropogenic materials to an unknown specification?	No significant depths of Made Ground have been encountered on site.	No Further Assessment
Have Oedometers and/or ground conditions reported compressible stratum on site?	Yes highly compressible peat and organic soils are recorded across the site. Odometer testing of deeper cohesive soils shows low to moderate compressibility.	**Further Assessment**
Have High walls been identified on site that could result in differential settlement?	None identified	No Further Assessment
Has any evidence been observed on site indicating settlement (non structural assessment)	None identified	No Further Assessment
Is voided ground present beneath the site?	None identified	No Further Assessment
Is the site in an area where a mobile groundwater regime is present in influencing distance of foundations and infrastructure?	Shallow groundwater has been identified across the site and is assumed to be mobile given the presence of blowing sands.	**Further Assessment**
Will the site be subject to changes in site levels that may induce heave or settlement?	The final site levels have not yet been made available. Should site levels change significantly this will increase the load on the underlying soils. Further assessment is recommended.	**Further Assessment**

The site has been appraised as having potential future settlement risk. In order to determine the level of risk and appropriate mitigation options a detailed settlement appraisal is required for the site. This does not form a part of the structural engineer's settlement calculations associated with the sub structure, however, loadings will need to be considered for surcharging both static and variable pressures.

11.14.1. PRIMARY, CONSOLIDATION SETTLEMENT

This is the response of the ground due to the closing up of voids, typically water filled. Much of the peat encountered across the site is heavily saturated.

The magnitude of ground movement associated with this is a function of the characteristics of the ground as well as the magnitude of the load.

The rate at which primary settlement occurs is related directly to the permeability of the ground. Primary settlement typically provides the largest individual contribution to the magnitude of overall ground movement.

The profile of settlement against time can be described by a polynomial regression and is typically plotted on a log-time vs settlement graph and forms a curve, which flattens as consolidation nears completion.

Due to the risk of immediate and primary, consolidation settlement on site, E3P recommends that all peat is removed as part of the remediation and enabling works.

11.15. HEAVE PRECAUTIONS

The site has been proven to be underlain by clay soils which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC/LABC conjectures zones of influence.

The clay has been determined as being of low volume change potential. Table 51 shows where heave precautions are required for a trench fill, pier and beam and pile and beam foundation types which are in the zone of influence of trees which are to remain or be removed.

Table 51 Position of Heave Precautions

SITUATION	TRENCH FILL	PIER AND BEAM	PILE AND BEAM
External trench fill and pier foundations. Unless NHBC is satisfied that the soil is not desiccated compressible material should be provided to the:	Inside faces of external wall foundations deeper than 1.5m, based on the appropriate tree height.	All faces of pier foundations deeper than 1.5m, based on the appropriate tree height.	N/A
External ground beams. Unless NHBC is satisfied that the soil is not desiccated, compressible material or void formers should be provided to the:	N/A	Inside faces	Inside faces
Internal trench fill foundations and ground beams. Compressible material required:	No	No	No
External and internal ground beams. Compressible material, void former or void should be provided to the underside of:	N/A	All	All
Heave precautions required for proposed trees where the soil is not desiccated:	No	No	No

Note: Information taken from NHBC Standards 2024, Chapter 4.2, Table 8 – Position of heave precautions

A summary of heave precautions is presented in Table 52.

Table 52 Summary of Heave Precautions

VOLUME CHANGE POTENTIAL	VOID DIMENSION AGAINST SIDE OF FOUNDATION AND GROUND BEAM	VOID DIMENSION UNDER GROUND BEAMS, AND SUSPENDED IN-SITU CONCRETE GROUND FLOOR	VOID DIMENSION UNDER SUSPENDED PRECAST CONCRETE AND TIMBER FLOORS(1)
High	35mm	150mm	300mm
Medium	25mm	100mm	250mm
Low	0mm	50mm	200mm

In addition to the requirements of the 'Drainage' section, drainage near trees should incorporate additional provisions. Where there is a volume change potential within the ground, the provisions include:

- Increased falls to cater for any ground movement.
- Deeper and wider backfill of granular material.
- A drainage system that is capable of movement should heave and shrinkage occur.
- Drainage pipes should not be encased in concrete.
- Additional clearance is required where drains pass through the structure of a building to allow for additional movement.

11.16. HIGHWAYS CONSTRUCTION

Where unsuitable materials are identified beneath proposed highways or infrastructure remediation works will be required to ensure that unsuitable materials are removed, and the resultant void is backfilled and engineered to a suitable geotechnical design specification.

A programme of remediation and enabling works will be required to remediate the proposed road sub-grade in accordance with the requirements of the highways design manual (series 600) for a Method Compaction.

11.17. DRAINAGE

Where organic soils are identified beneath proposed highways or infrastructure remediation works will be required to ensure that unsuitable materials are removed, and the resultant void is backfilled and engineered to a suitable geotechnical design specification.

Where loose or soft materials have been identified at drainage invert levels, there will need to be consideration for the use of reinforced pipe bedding.

Shrinkage and heave of clay soils can affect pipelines. To protect against the effects of heave, drainage should be designed:

- To take account of potential ground movement as shown in Table 53 , including where pipes and services pass through substructure walls or foundations.
- With gradients which may need to be steeper.

- To use alternative means of catering for the movement when sufficient falls cannot be provided, for example, by deepening the excavation and laying pipework on a granular bedding of suitable thickness to reduce the extent of potential movement.

Table 53 Potential Ground Movement for Drainage

VOLUME CHANGE POTENTIAL	HIGH	MEDIUM	LOW
Potential ground movement	150mm	100mm	50mm

11.18. EXCAVATIONS

Trial pits were generally stable in clays and unstable in organic soils and granular soils; this will impact the excavation to form sewerage and drainage infrastructure and foundations. Excavations were completed with relative ease using standard machinery.

Site observations have also indicated shallow groundwater to be present across the site.

Due to the presence of variable and unstable deposits on site, and likelihood of trench collapse, it is considered that all excavations are to be supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations, then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to rail and canal infrastructure in close proximity to the site.

Table 54 Civil Engineering Excavation Risk Matrix

RISK ITEM	PRESENT	COMMENT
Running Sands	Yes	Possible running sand has been identified in TP102 at 1.80–2.00 m bgl. Additionally, blowing sands have been recorded at depths between 1.10 m and 13.20 m bgl in the south west of the site within WS108, WS109, WS111, CP101 and CP102.
Minor Water Ingress	Yes	Water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	No	Bedrock has not been encountered during the site investigation.

11.19. CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated in to the site works:

- Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub formations to foundations and pavement construction.

- Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.

- It is considered that dewatering is likely to be required, especially following periods of heavy rainfall. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.

- Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.

- The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).

- Peat and organic soils beneath the development will require removal with the resulting void infilled with suitable compacted engineered fill. It is recommended that sufficient allowance is made for the inspection and validation of PEAT removal.

- Existing services should be located, and the suitable easement should be marked out before development begins.

- Assessment should be made to ensure no disturbance to the adjacent rail and canal infrastructure.

- Dependant on final levels, a slope stability assessment may be required on the slope along the eastern boundary.

- A surface water management plan is likely to be required prior to construction.

11.20. DEVELOPED GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	TP107	<5	During a process of cut/fill enabling works, hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity
Trench collapse	All	100	Granular, organic and saturated deposits beneath the site were prone to collapse in mechanically excavated trial pits. All excavations are to be supported or battered back in accordance with guidance contained in CIRIA R97.
Drainage Invert levels	All	100	Loose materials present at drainage invert levels – reinforced pipe bedding will be required. Organic soils will require removal from beneath proposed drainage and infrastructure.
Mature trees	In proximity to site boundaries	10-20	Arboriculture survey required to determine areas of potential tree influence. Semi-mature and mature trees are present along southwest and eastern boundaries of the site.
Volume change potential clay	None	0	The clay soils on site have been found to be of low volume change potential and therefore heave precautions will not be required.
Peat	West sector and isolated area in southeast	50-60	Peat has been identified across the majority of the west, south and north of the site. PEAT is a highly compressible stratum that represents a risk in terms of consolidation inducing failure to structures and infrastructure. To mitigate this peat is to be removed during remediation and enabling works.
Running sands	TP102	25	Data searches indicate low risk. However, one area of possible running sand identified within TP102 and blowing sands encountered within the southwest of the site in five locations.
Ground dissolution	N/A	N/A	Data searches indicate no hazard.
Concrete design	None	None	Soils at the site meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).
Low-permeability ground	All	100	Due to shallow groundwater and interbedded cohesive and granular strata across the site, BRE 365 soakaway tests failed and the use of soakaway drainage will not be feasible on site.

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Services/sensitive structures	Southern and central areas	30	A formal drainage survey has not been completed, however, statutory utility plans for the site have been reviewed. A high pressure gas main has been identified along the southern boundary of the site A combined sewer is located in the centre of the site transecting north to south. In the south of the site this is diverted to the south western boundary. A further combined public sewer is located along the southern boundary of the site. A surface water sewer is present in the centre of the site transecting south and then diverting west to the south western boundary. A further surface water sewer is present in the north of the site crossing east to west. Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal foundation solutions	All	100	Due to the presence of peat, soft, clays and blowing sands, combined with the requirement to likely significantly raise site levels for the proposed development, it is likely an abnormal foundation solution will be required on site.
Mining	TBC	TBC	E3P have contacted the Coal Authority in regard to consultation for any further investigation requirements. E3P have received the below response Coal Authority: *"Our Planning Team has a dedicated Pre-app service, however, due to resource issues it is not currently available. They are hoping that it will be up and running again in June 2024."* Should the coal authority deem that further assessment is required, rotary open holes will be primarily advanced to investigate ground conditions, permit in-situ geotechnical testing and confirm the nature of underlying geology and the potential presence of shallow historical workings within the coal crop and area of 'Development High Risk'
Slope	Eastern boundary	20	A slope is present along the eastern boundary, with the site set at a lower level than the wider area to the east.
Consolidation & Settlement	All	100	The presence of compressible peat represents an unacceptable risk associated with the consolidation of materials that could induce unacceptable settlement to structures and infrastructure. A detailed settlement analysis will be required as part of a Geotechnical Design Report.

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Enabling Earthworks	All	100	All proposed earthworks will need to be designed by a suitably qualified geotechnical engineer in accordance with NHBC Chapter 4.6. The earthworks design will incorporate a Geotechnical Specification for Earthworks that will define protocols to ensure no unacceptable future risk.

11.21. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

- Plot-specific foundation schedule (upon receipt of the final development levels).
- Arboricultural survey.
- Settlement Analysis for earthworks design.
- Geotechnical Design Report (GDR).
- Geotechnical Earthworks Strategy (infrastructure).
- Remediation and enabling works strategy.

END OF REPORT

APPENDIX I
LIMITATIONS

GENERAL

1. This report and any associated works (together comprising the "Services") were compiled and carried out by E3P for the client (as present in Section 1) under the E3P “Terms of Business” or with those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under E3P Standard Terms and Business as included within our proposal to the Client.

3. Project-specific appointment documents may be agreed upon at our discretion and a charge may be levied for both the time to review and finalise appointment documents and also for associated changes to the appointment terms. E3P reserves the right to amend the fee should any changes to the appointment terms create an increased risk to E3P.

4. The report needs to be considered in light of the proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEOENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

5. Coverage: This section covers reports with the following titles or combination of titles: Phase 1; Desktop Study; Geoenvironmental Assessment; Development Appraisal; Preliminary Environmental Risk Assessment; Constraints Report; Due Diligence Report; Geotechnical Development Review; Environmental Statement; Environmental Chapter; Baseline Environmental Assessment; Project Scope Summary Report (PSSR), Program Environmental Impact Report (PEIR), Geotechnical Development Risk Register; Agricultural Land Assessment; Mineral Safeguarding Assessment; Desk Top Coal Mining Risk Assessment; Hydrogeological Appraisal; Construction Environmental Management Plan; and Site Water Management Plan.

6. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walkover inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. E3P cannot be held responsible for any disclosures that are provided post-production of our report and will not automatically update our report.

7. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, E3P reserves the right to review such information and, if warranted, to modify the opinions accordingly.

8. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

9. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and does not constitute or replace full and proper surveys completed by suitably qualified and experienced specialists in these fields.

10. E3P does not warrant work/data undertaken/provided by others.

INTRUSIVE INVESTIGATION REPORTS

11. Coverage: The following report titles (or combination) may cover this category of work: Geoenvironmental Site Investigation; Geotechnical Assessment; GIR (Ground Investigation Reports); Preliminary Environmental And Geotechnical Risk Assessment; Preliminary Summary; Coal Mining Risk Assessment, Ground Gas Addendum; and, Geotechnical Risk Register.

12. The investigation has been undertaken to provide information concerning either:

    I. The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or

    II. Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

13. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

14. Unless otherwise specified in the scope of works, any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.

15. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

16. For geotechnical investigations, the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

17. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

18. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

19. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, E3P has used reasonable skill and care to extrapolate conditions between these points based on assumptions to develop our interpretation and conclusions.

20. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation and at the time of the investigation.

21. Conditions can change between investigation points both spatially and over time and these interpretations should therefore be considered indicative. The assessment of extreme weather events and their impact on ground conditions is not within the scope of E3P's work.

22. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated with the risk assessment process have been outlined within the body or associated appendix of the report.

23. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

24. Where soil contamination concentrations recorded as part of this investigation are used for commentary on the potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed and the waste classification and any subsequent disposal option agreed upon with licenced subcontractors and/or the relevant regulators.

25. The results of the asbestos testing are factually reported and interpretation is given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and/or trace loose asbestos fibres within the soil matrix at the site.

26. If costs have been included in relation to additional site works, and/or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

27. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

28. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIATION AND ENABLING WORK STRATEGY REPORTS

29. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected based on the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

30. The outputs of the Detailed Quantitative Risk Assessments are based upon the manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

31. Before adoption on-site, assessment criteria will need to be discussed and agreed upon with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatoy Authority engagement are not within the control of E3P. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

32. E3P does not accept liability for any subcontract work that has not been completed in strict accordance with an approved E3P Remediation and Enabling Works Strategy.

GEOTECHNICAL DESIGN REPORT (GDR)

33. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS AND BUILD PHASE MITIGATION)

34. These reports are factual and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of earthworks or remedial works.

35. The data is presented and will be compared with assessment criteria.

APPENDIX II
GLOSSARY

TERMS

ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	**NR**	Not recorded
CA	Coal Authority	**PAH**	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	**PCB**	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	**PI**	Plasticity index
CIRIA	Construction Industry Research Association	**PID**	Photo ionisation detector
CLEA	Contaminated land exposure assessment	**POS**	Public open space
CML	Council of Mortgage Lenders	**PPE**	Personnel protective equipment
CoC	Contaminants of concern	**ProPG**	Professional practice guidance
CSM	Conceptual site model	**QA**	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	**SGV**	Soil guideline value
DWS	Drinking water standard	**SPH**	Separate-phase hydrocarbon
EA	Environment Agency	**SPT**	Standard penetration test
EQS	Environmental quality standard	**SVOC**	Semi-volatile organic compound
FFL	Finished floor level	**TPH**	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	**TPH CWG**	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	**UKWIR**	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	**UST**	Underground storage tank
HCV	Health criteria value	**VCC**	Vibro-concrete column
ICSM	Initial conceptual site model	**VOC**	Volatile organic compound
LEL	Lower explosive limit	**VRSC**	Vibro-replacement stone columns
LMRL	Lower method reporting limit	**VSC**	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	**WHO**	World Health Organisation

MCV	Moisture condition value	**WRAP**	Waste and Resources Action Programme
MIBK	Methyl isobutyl ketone	**WTE**	Water table elevation
m	Metres	**ppm**	Parts per million
km	Kilometres	**mg/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection
PFAS	Per- and Poly-Fluorinated Substances	**PFOA**	Perfluorooctanoic Acid

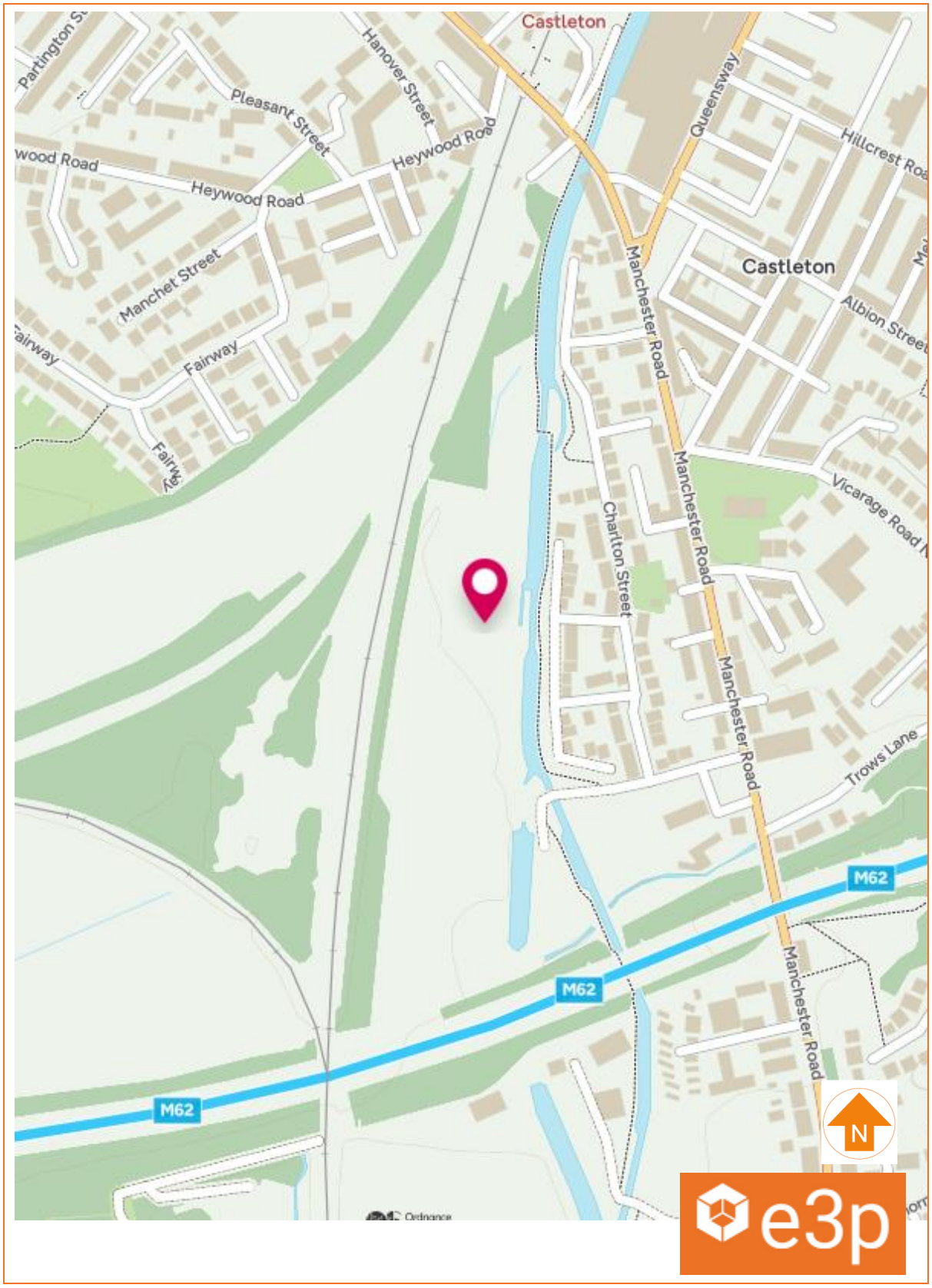
APPENDIX III
RISK CLASSIFICATION

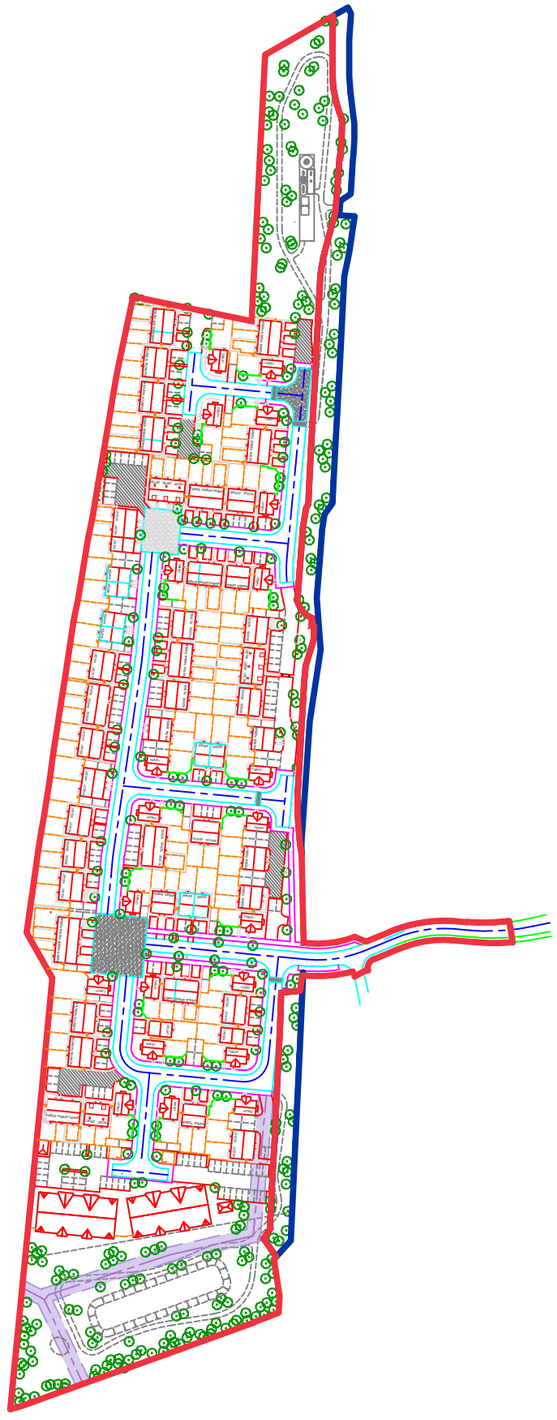
RISK CLASSIFICATION

RISK	DEFINITION
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of future redevelopment of the Site.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the Site will likely require further site investigation.
Moderate High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment, including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine the level of risk and associated liability.

APPENDIX IV
DRAWINGS

DRAWING 17-524-001 – Site Location Plan





P1	REVA	22.03.2024	OW	MD	MD
Phase	Issue	Date	Drawn	Checked	PM

Notes:

Client: MCI

Job No: 17-524

Date: 22.03.2024

Drawing No: 002

Scale: 1:1000 @ A3

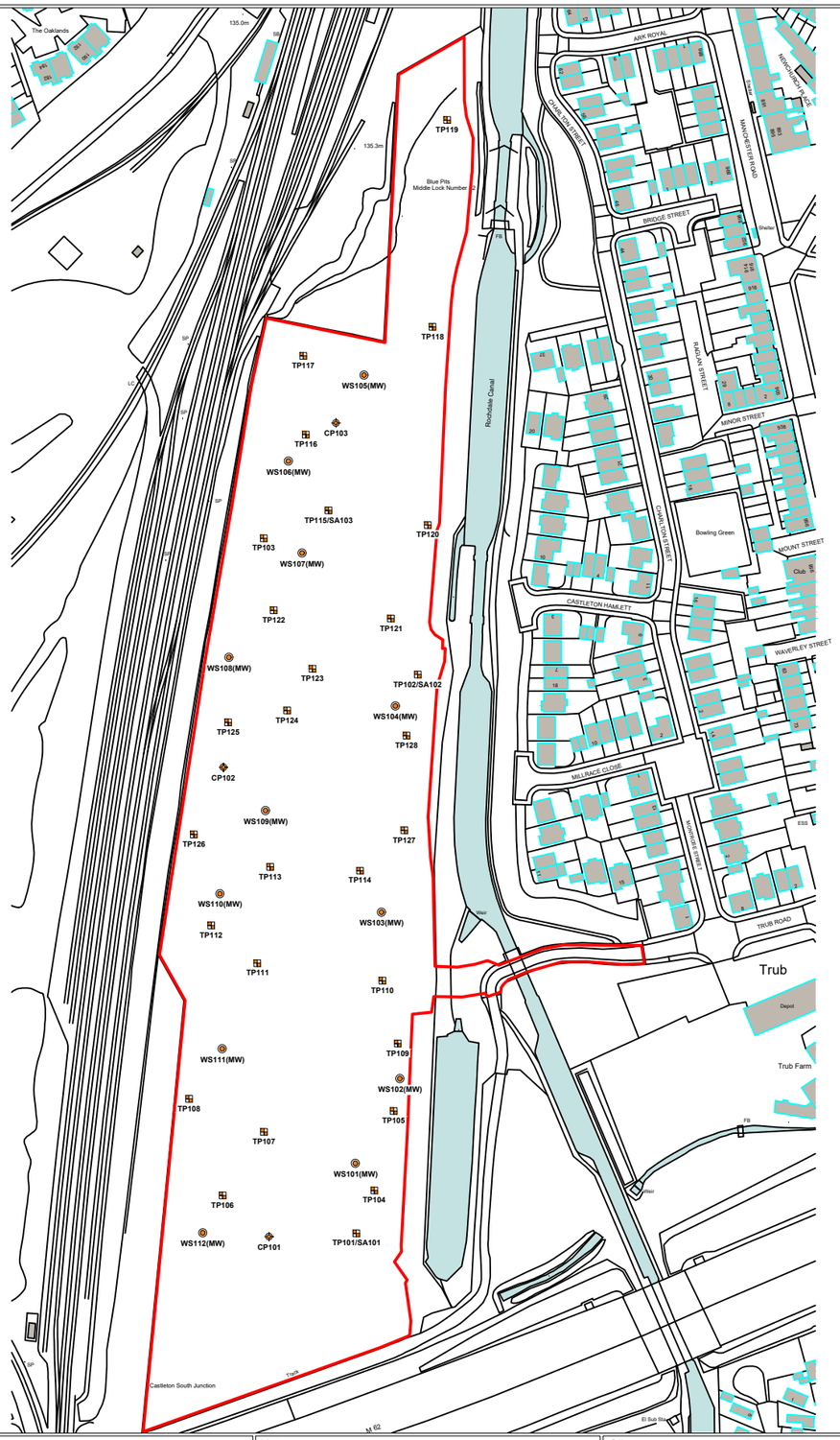
Job Title: Trubs Farm, Roachdale

Drawing Title: Proposed Development Plan

e3p

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Location Symbols

- WS101 — Approximate Window Sample Probehole Location (E3P April 2024)
- WS101(MW) — Approximate Window Sample Probehole Location with Install (E3P April 2024)
- TP101 — Approximate Trial Pit Location (E3P April 2024)
- SA101 — Approximate Soakaway Test Location (E3P April 2024)
- CP101 — Approximate Cable Percussive Borehole Location (E3P April 2024)

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	22.04.2024	EB	JB	MD

Client: MCI

Job No: 17-524

Date: 22.04.2024

Drawing No: 005

Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Exploratory Hole Location Plan

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

Location Symbols

- WS101 — Approximate Window Sample Probehole Location (E3P April 2024)
- WS101(MW) — Approximate Window Sample Probehole Location with Install (E3P April 2024)
- TP101 — Approximate Trial Pit Location (E3P April 2024)
- SA101 — Approximate Soakaway Test Location (E3P April 2024)
- CP101 — Approximate Cable Percussive Borehole Location (E3P April 2024)

Made Ground Depth (m)

- Depth of Made Ground 0.01 - 0.24m
- Depth of Made Ground 0.25 - 0.49m
- Depth of Made Ground 0.50 - 0.74m
- Depth of Made Ground 0.75 - 0.99m
- Depth of Made Ground 1.00 - 1.24m

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	25.04.2024	EB	JB	MD

Client: MCI

Job No: 17-524

Date: 25.04.2024

Drawing No: 006

Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Depth of Made Ground Plan

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

Location Symbols

- WS101 — Approximate Window Sample Probehole Location (E3P April 2024)
- WS101(MW) — Approximate Window Sample Probehole Location with Install (E3P April 2024)
- TP101 — Approximate Trial Pit Location (E3P April 2024)
- SA101 — Approximate Soakaway Test Location (E3P April 2024)
- CP101 — Approximate Cable Percussive Borehole Location (E3P April 2024)

Topsoil Depth (m)

- Depth of *Topsoil* 0.25 - 0.49m
- Depth of *Topsoil* >0.50m

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	31.05.2024	OW	JB	MD

Client: MCI

Job No: 17-524

Date: 31.05.2024

Drawing No: 007

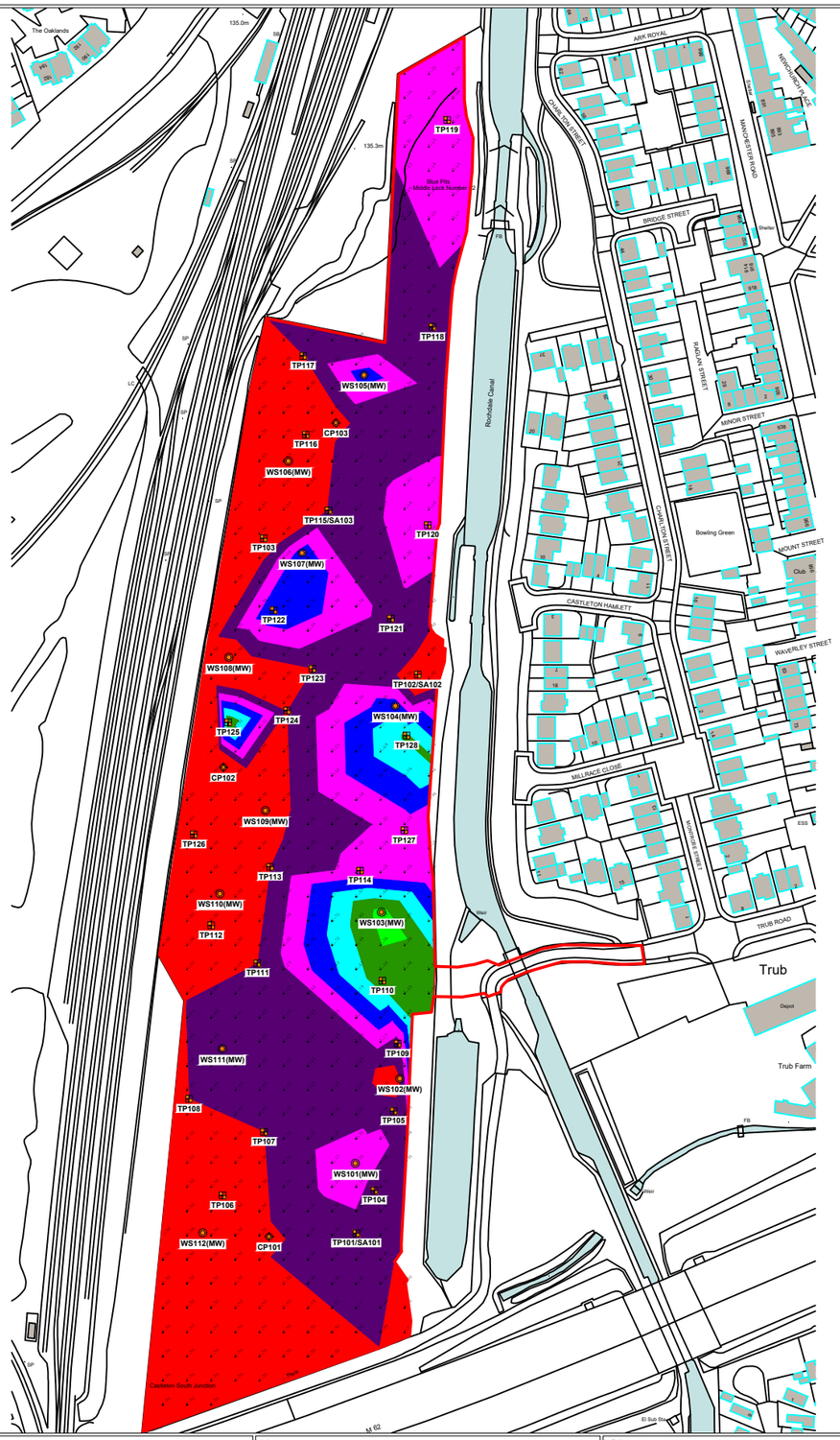
Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Depth of Topsoil Plan

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Location Symbols

- WS101 — Approximate Window Sample Probehole Location (E3P April 2024)
- WS101(MW) — Approximate Window Sample Probehole Location with Install (E3P April 2024)
- TP101 — Approximate Trial Pit Location (E3P April 2024)
- SA101 — Approximate Soakaway Test Location (E3P April 2024)
- CP101 — Approximate Cable Percussive Borehole Location (E3P April 2024)

Shallow Spread Footings

- Depth to Founding Strata 0.00 - 1.24m
- Depth to Founding Strata 1.25 - 1.49m

Mass Trench Fill Footings

- Depth to Founding Strata 1.50 - 1.74m
- Depth to Founding Strata 1.75 - 1.99m
- Depth to Founding Strata 2.00 - 2.24m

Engineered Footings

- Depth to Founding Strata 2.25 - 2.49m
- Depth to Founding Strata >2.50m

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	31.05.2024	OW	JB	MD

Client: MCI

Job No: 17-524

Date: 31.05.2024

Drawing No: 008

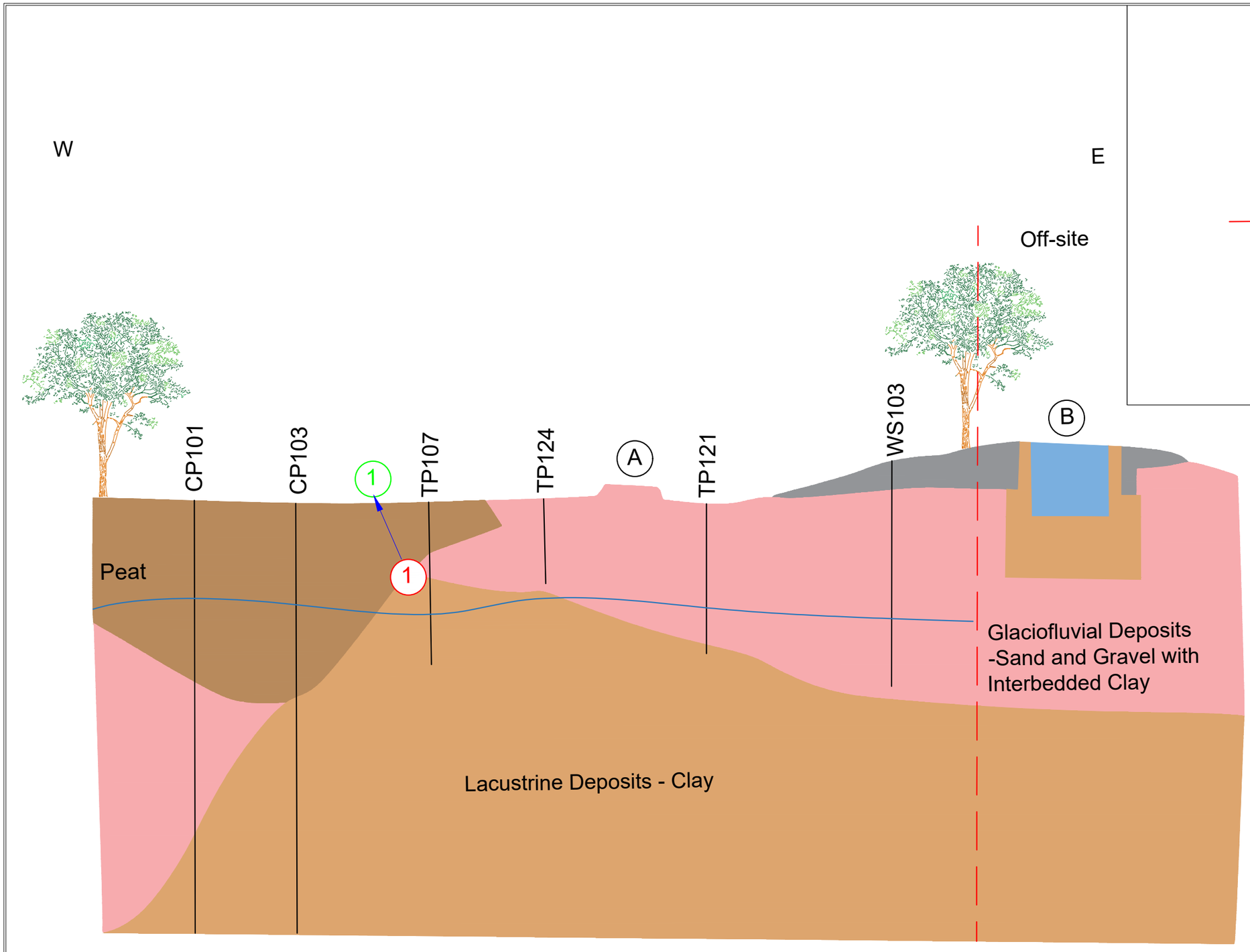
Scale: 1:2500 @ A3

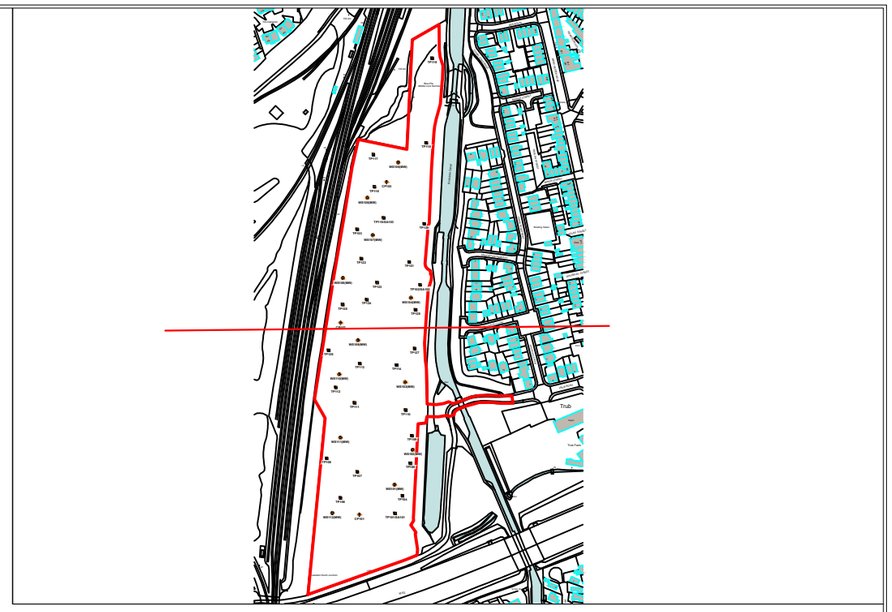
Job Title: Trubs Farm, Roachdale

Drawing Title: Depth to Founding Strata Plan

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.





Geology Key

- Peat
- Glaciofluvial Deposits
- Lacustrine Deposits - Clay
- Shallow Groundwater
- Made Ground

Sources

1. Non Volatile PAH's, Non Volatile (Made Ground)
2. Asbestos
3. Volatile Contaminants
4. Ground Gases
5. Mobile Contaminants
6. Sulphate
7. Phytotoxic Contaminants

Pathways

- Dermal Contact / Ingestion
- Vapour Inhalation
- Inhalation / Accumulation
- Tainting of Water Supplies
- Dust Inhalation
- Vertical / Lateral Migration
- Sulphate Attack on Concrete
- Plant Uptake

Receptors

1. Future End Users
2. Water Pipes
3. Groundwater (Secondary B Aquifer)
4. Surface Water Features
5. Off-site Receptors
6. Building Structure
7. Flora

Site Features

- A High Pressure Water Main and Sewer
- B Offsite Canal

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	31.05.2024	OW	JB	MD

Client: MCI

Job No: 17-524

Date: 31.05.2024

Drawing No: 010

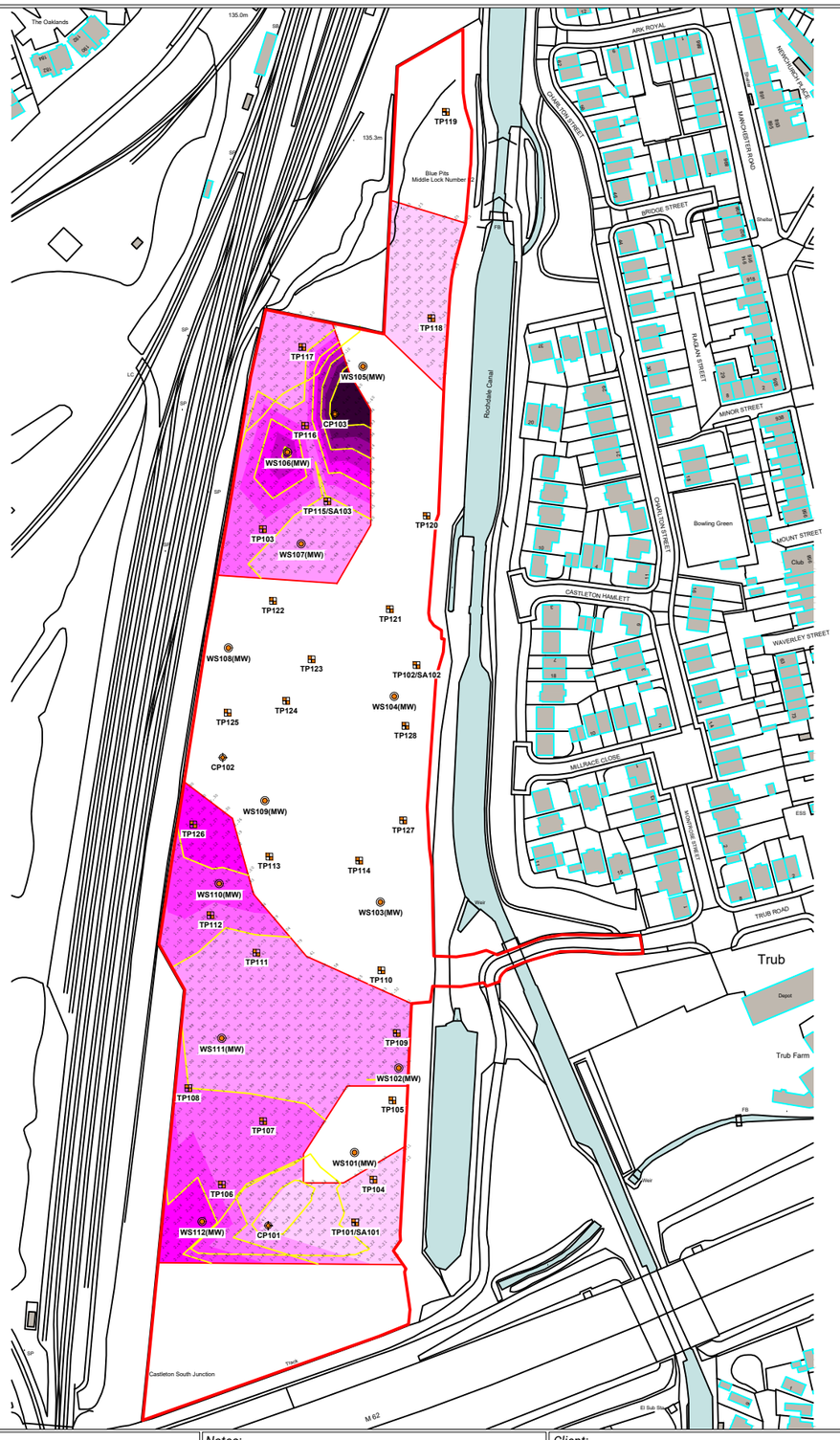
Scale: NTS

Job Title: Trubs Farm, Roachdale

Drawing Title: Conceptual Site Model

e3p
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Depth and Thickness of Peat			
Location	Depth to Top of Peat (mBGL)	Depth to Base of Peat (mBGL)	Thickness of Peat (m)
TP101	0.60	0.80	0.20
TP103	0.40	1.60	1.20
TP104	0.60	0.70	0.10
TP106	0.30	2.00	1.70
TP107	0.60	1.70	1.10
TP108	0.50	1.50	1.00
TP109	0.70	1.20	0.50
TP111	0.40	1.00	0.60
TP112	0.50	1.70	1.20
TP115	0.30	1.10	0.80
TP116	0.30	1.90	1.60
TP117	1.60	2.10	0.50
TP118	0.50	0.75	0.25
TP126	0.70	3.00	2.30
WS102	1.00	1.90	0.90
WS106	0.30	3.50	3.20
WS107	0.25	0.90	0.65
WS110	0.30	2.20	1.50
WS111	0.30	1.10	0.80
WS112	0.50	3.00	2.50
CP101	2.50	2.80	0.30
CP103	0.30	4.90	4.60

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Approximate Trial Pit Location
- Approximate Hand Dug Pit Location
- Approximate Soakaway Test Location
- Approximate Cable Percussive Borehole Location
- Approximate Rotary Borehole Location
- Approximate California Bearing Ratio Test Location
- Approximate Dynamic Cone Penetrometer Test Location

Peat Thickness (m)

- Thickness of Peat 0.00 - 0.49m
- Thickness of Peat 0.50 - 0.99m
- Thickness of Peat 1.00 - 1.49m
- Thickness of Peat 1.50 - 1.99m
- Thickness of Peat 2.00 - 2.49m
- Thickness of Peat 2.50 - 2.99m
- Thickness of Peat 3.00 - 3.49m
- Thickness of Peat 3.50 - 3.99m
- Thickness of Peat >4.00m

0.00 Thickness of Peat

Notes:

P1	REVA	31.05.2024	CB	MD	MD
Phase	Issue	Date	Drawn	Checked	PM

Client: MCI

Job No: 17-524

Date: 31.05.2024

Drawing No: 014

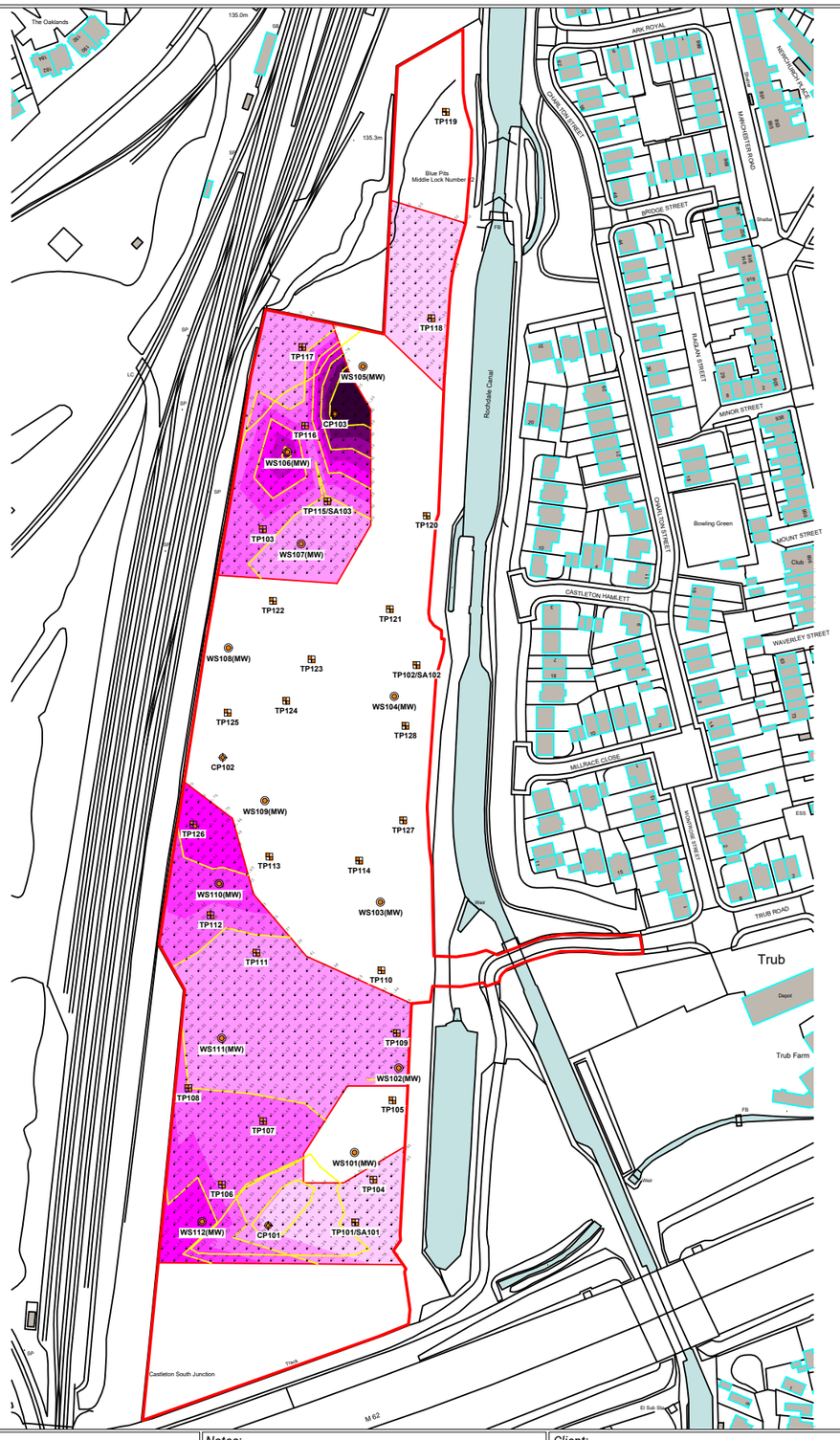
Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Thickness of Peat Plan

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.



Depth and Thickness of Peat			
Location	Depth to Top of Peat (mBGL)	Depth to Base of Peat (mBGL)	Thickness of Peat (m)
TP101	0.60	0.80	0.20
TP103	0.40	1.60	1.20
TP104	0.60	0.70	0.10
TP106	0.30	2.00	1.70
TP107	0.60	1.70	1.10
TP108	0.50	1.50	1.00
TP109	0.70	1.20	0.50
TP111	0.40	1.00	0.60
TP112	0.50	1.70	1.20
TP115	0.30	1.10	0.80
TP116	0.30	1.90	1.60
TP117	1.60	2.10	0.50
TP118	0.50	0.75	0.25
TP126	0.70	3.00	2.30
WS102	1.00	1.90	0.90
WS106	0.30	3.50	3.20
WS107	0.25	0.90	0.65
WS110	0.30	2.20	1.50
WS111	0.30	1.10	0.80
WS112	0.50	3.00	2.50
CP101	2.50	2.80	0.30
CP103	0.30	4.90	4.60

Location Symbols

- WS101 — Approximate Window Sample Probehole Location
- WS101(MW) — Approximate Window Sample Probehole Location with Install
- TP101 — Approximate Trial Pit Location
- HP101 — Approximate Hand Dug Pit Location
- SA101 — Approximate Soakaway Test Location
- CP101 — Approximate Cable Percussive Borehole Location
- RB101 — Approximate Rotary Borehole Location
- CBR101 — Approximate California Bearing Ratio Test Location
- DCP101 — Approximate Dynamic Cone Penetrometer Test Location

Peat Thickness (m)

- Thickness of Peat 0.00 - 0.49m
- Thickness of Peat 0.50 - 0.99m
- Thickness of Peat 1.00 - 1.49m
- Thickness of Peat 1.50 - 1.99m
- Thickness of Peat 2.00 - 2.49m
- Thickness of Peat 2.50 - 2.99m
- Thickness of Peat 3.00 - 3.49m
- Thickness of Peat 3.50 - 3.99m
- Thickness of Peat >4.00m

0.00 Depth of Peat

Notes:

P1	REVA	25.04.2024	EB	MD	MD
Phase	Issue	Date	Drawn	Checked	PM

Client: MCI

Job No: 17-524

Date: 25.04.2024

Drawing No: 014

Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Depth and Thickness of Peat Plan

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

Location Symbols

- Approximate Window Sample Probehole Location (E3P April 2024)
- Approximate Window Sample Probehole Location with Install (E3P April 2024)
- Approximate Trial Pit Location (E3P April 2024)
- Approximate Soakaway Test Location (E3P April 2024)
- Approximate Cable Percussive Borehole Location (E3P April 2024)

Development Constraints

- Area of Potential Peat
- Area of Organic Soils Outside of Peat Areas
- Blowing Sands Identified
- Slopes to Adjacent Canal and Rail Infrastructure
- Surface Water Infrastructure
- Combined Sewage Infrastructure
- Cadent Gas Main

Notes:

Phase	Issue	Date	Drawn	Checked	PM
P1	REVA	05.06.2024	EB	JB	MD

Client: MCI

Job No: 17-524

Date: 05.06.2024

Drawing No: 015

Scale: 1:2500 @ A3

Job Title: Trubs Farm, Roachdale

Drawing Title: Development Constraints Plan

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.

APPENDIX V
PHOTOGRAPHS

PLATE 1 VIEW OF SITE LOOKING NORTH

PLATE 2 PEAT DEPOSITS IN TP126

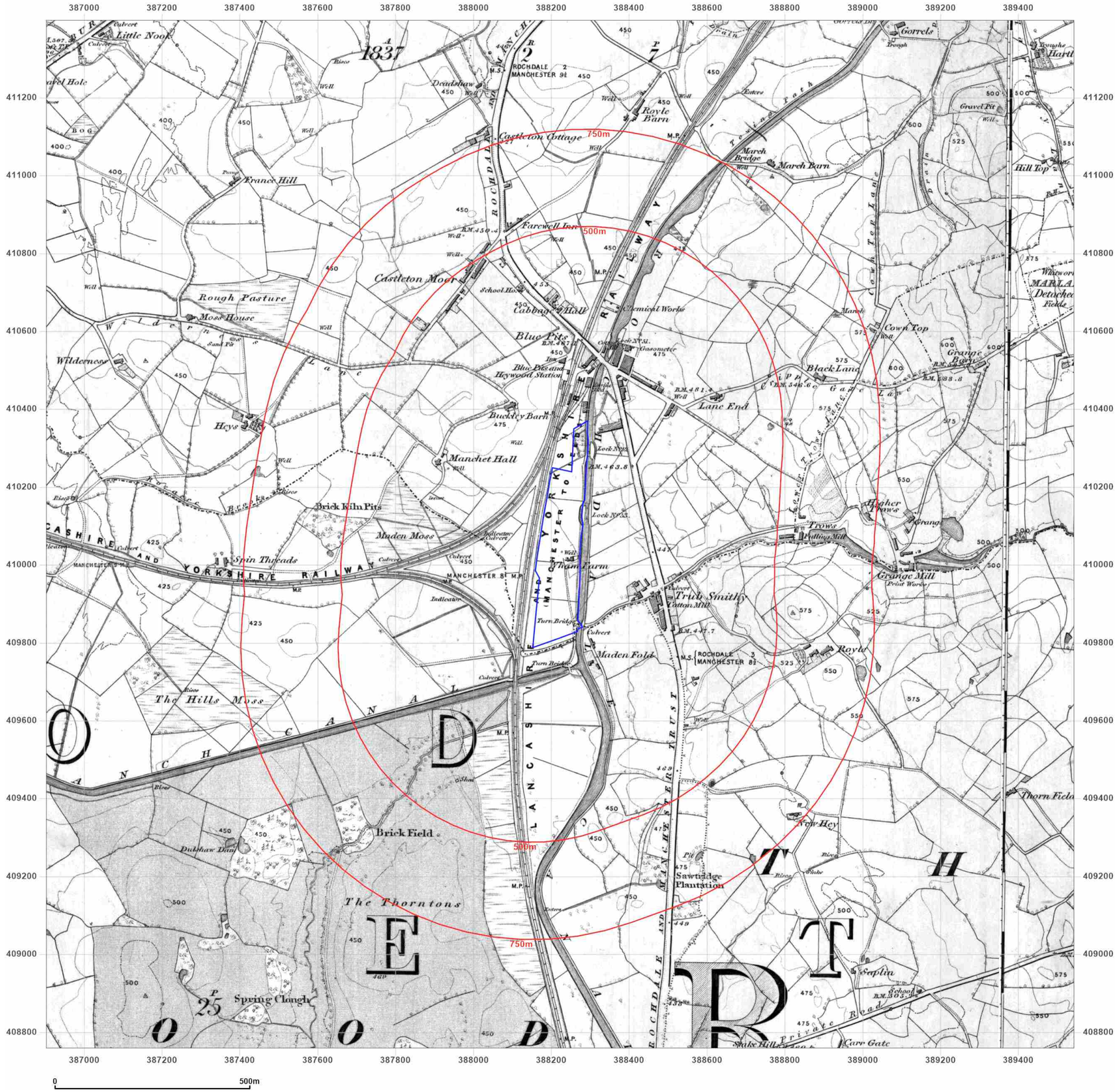
PLATE 3 EXAMPLE OF CORE FROM WS107

PLATE 4 WINDOW SAMPLE MONITORING WELL

PLATE 5 SOUTH OF SITE POST WORKS

PLATE 5 VIEW OF SITE LOOKING SOUTH

APPENDIX VI
HISTORICAL MAPS



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: County Series

Map date: **1851**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1847
Revised N/A
Edition 1851
Copyright N/A
Levelled N/A

Surveyed 1848
Revised N/A
Edition 1851
Copyright N/A
Levelled N/A

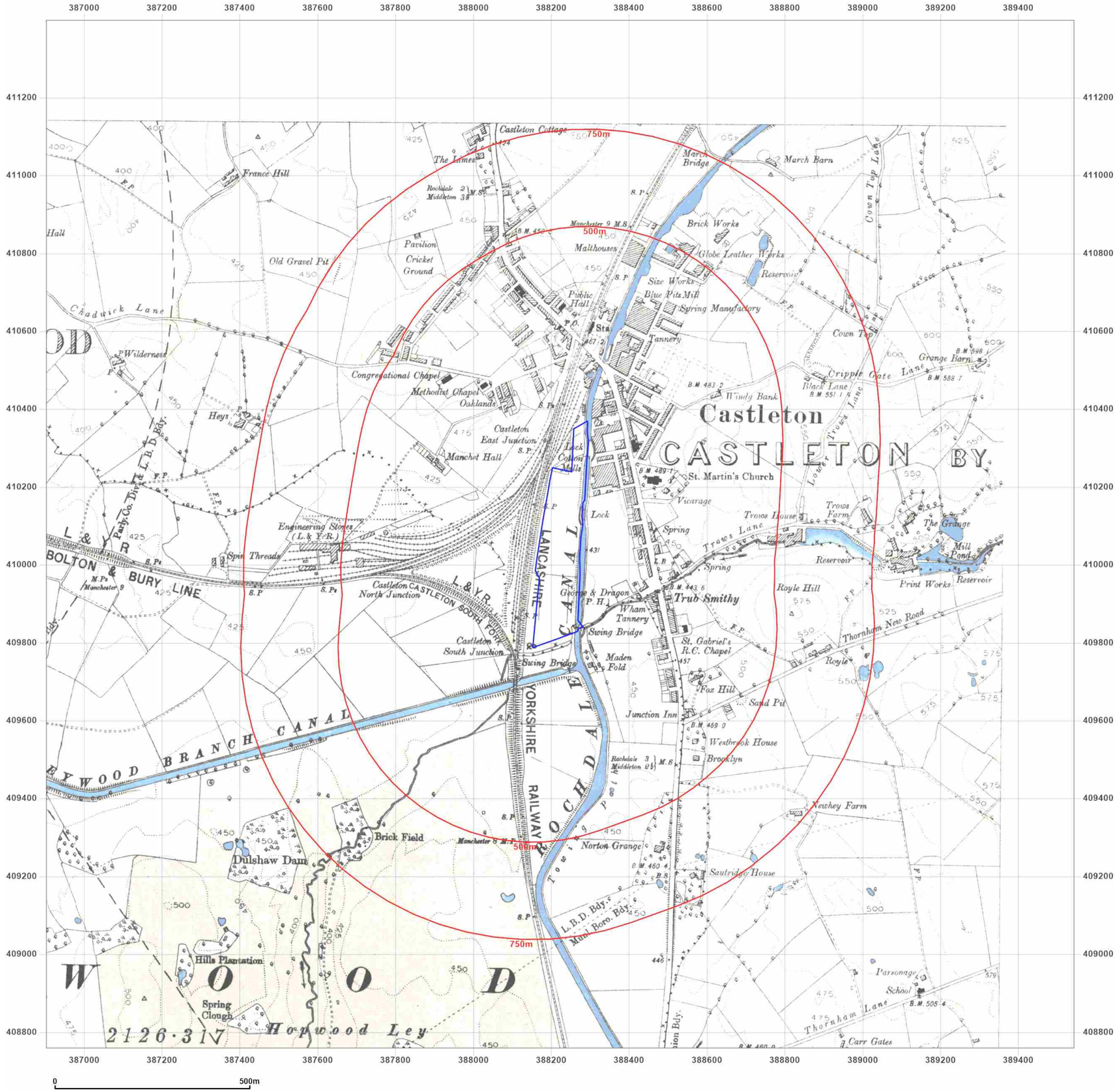
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: County Series

Map date: **1890**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A

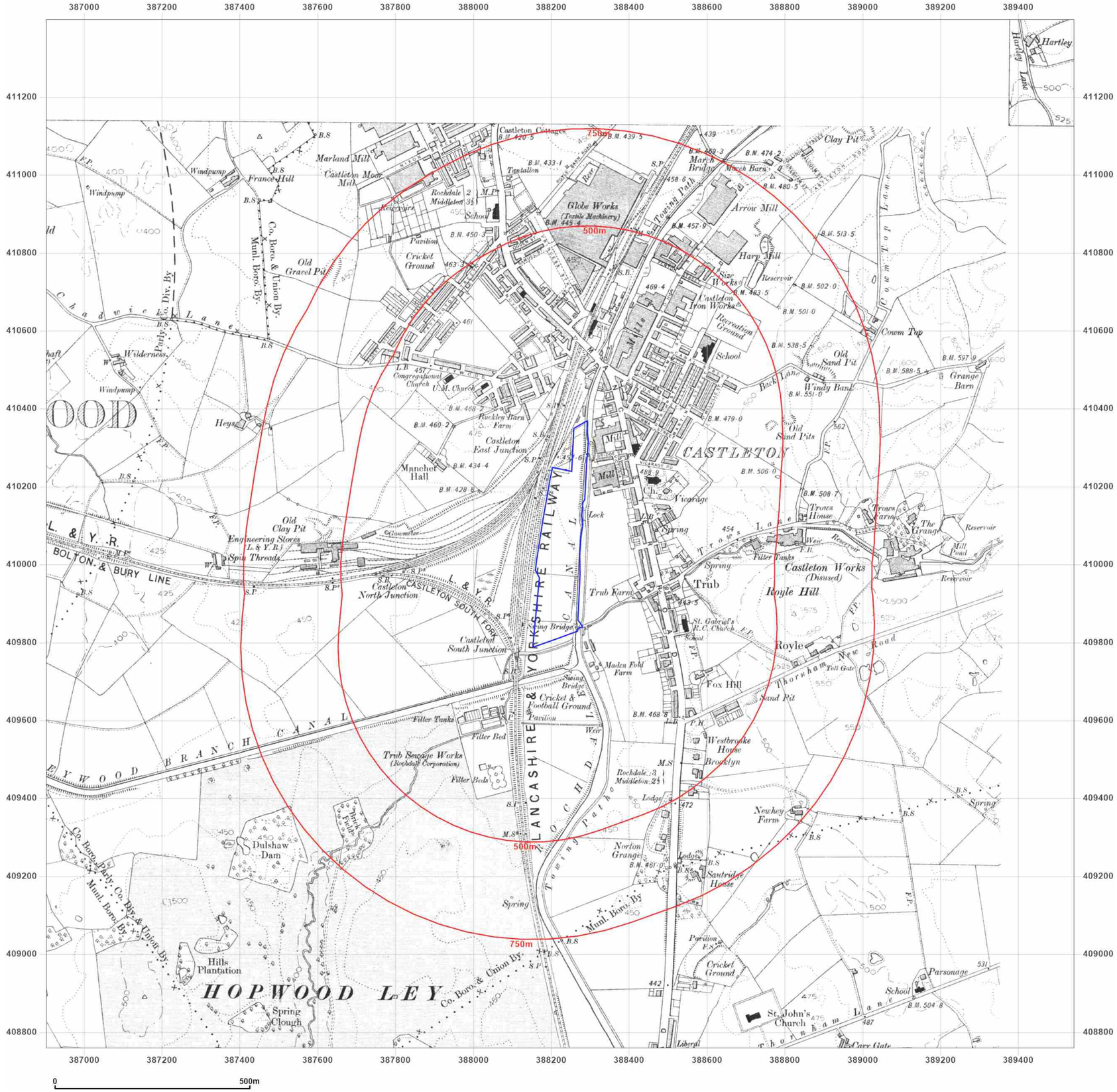
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: County Series

Map date: **1908-1909**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1848
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

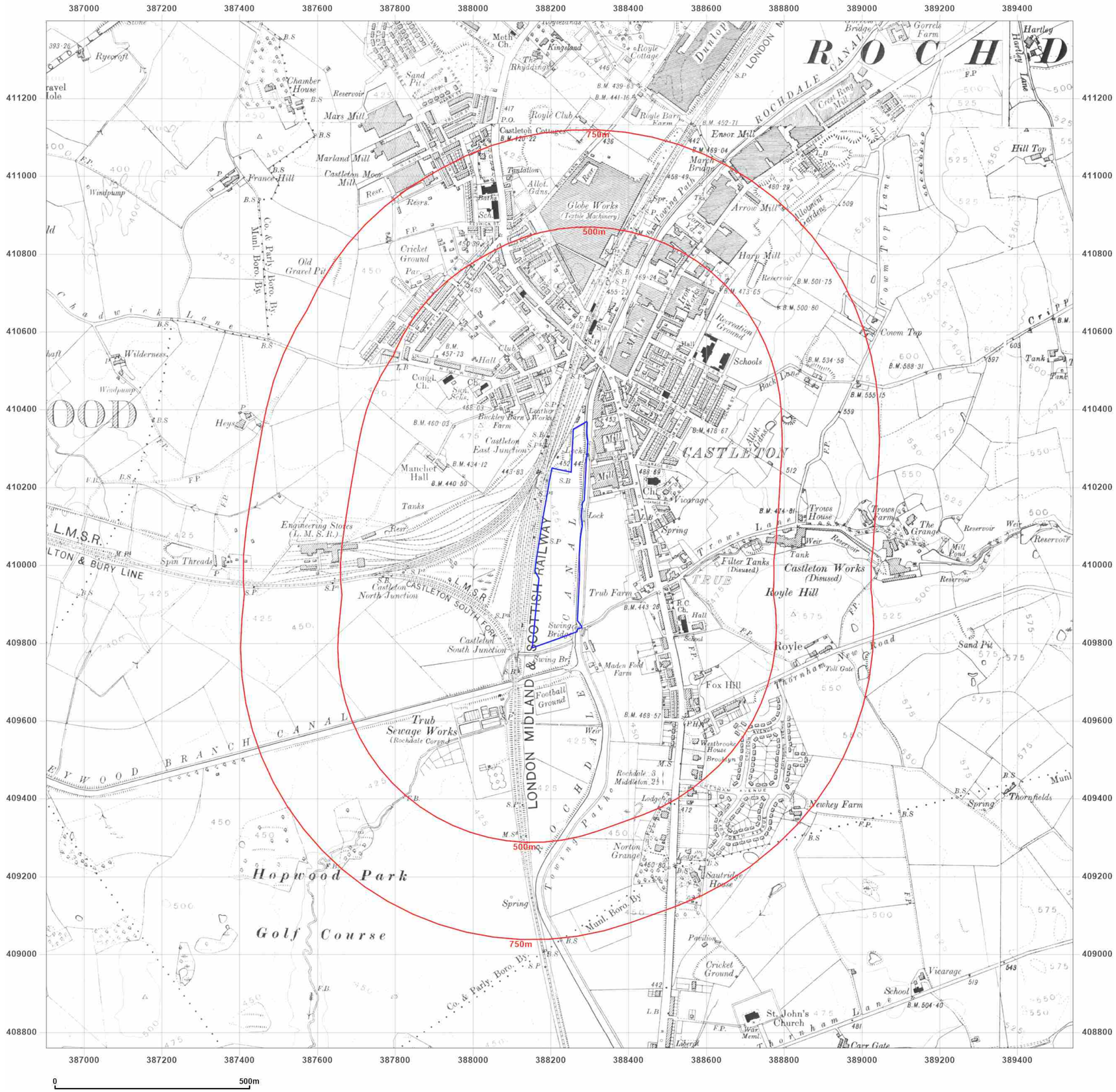
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: County Series

Map date: **1928**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1848
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

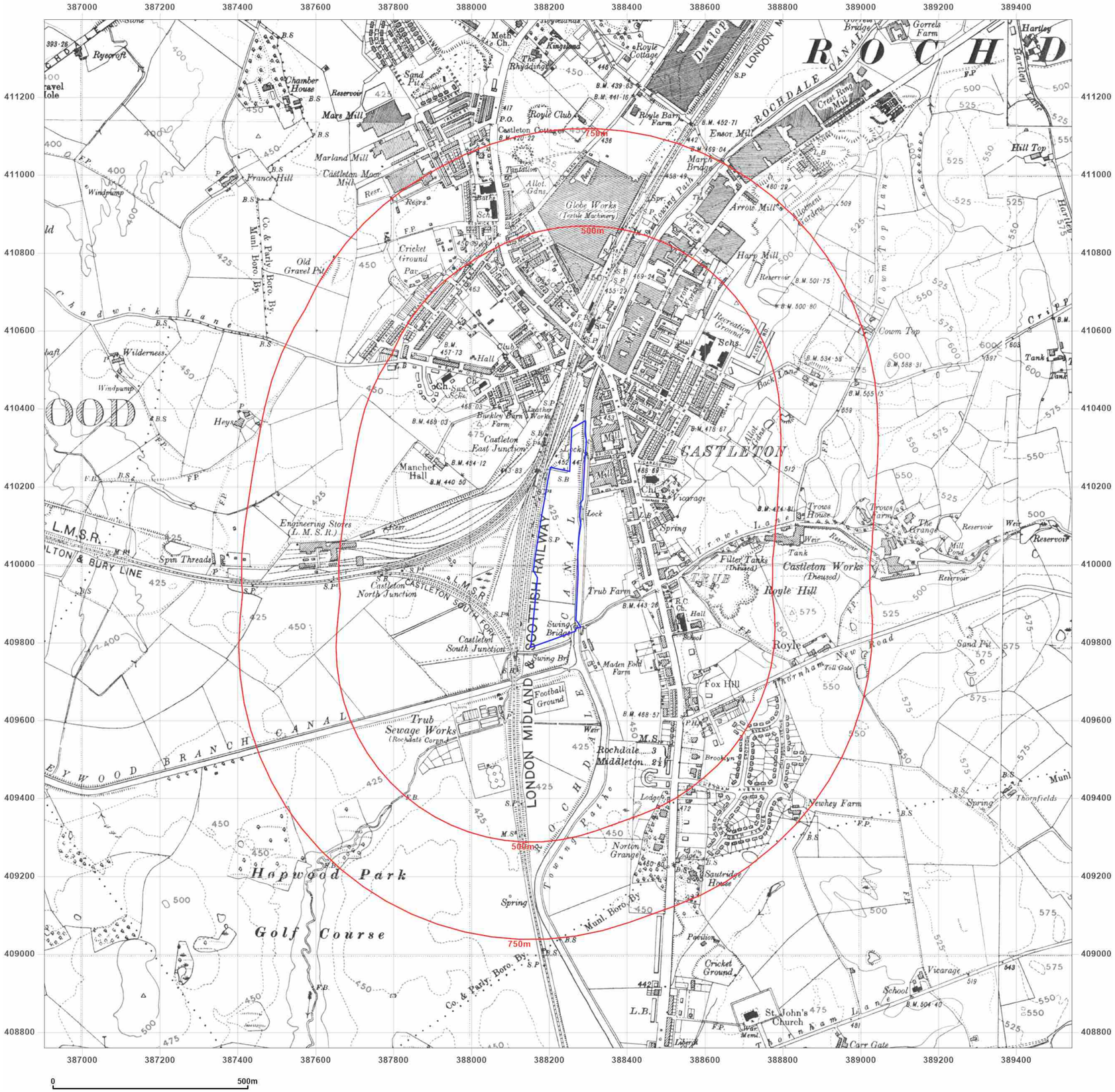
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

0 500m

Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: Provisional

Map date: **1955-1956**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1955
Edition 1956
Copyright N/A
Levelled N/A

Surveyed N/A
Revised 1955
Edition N/A
Copyright N/A
Levelled N/A

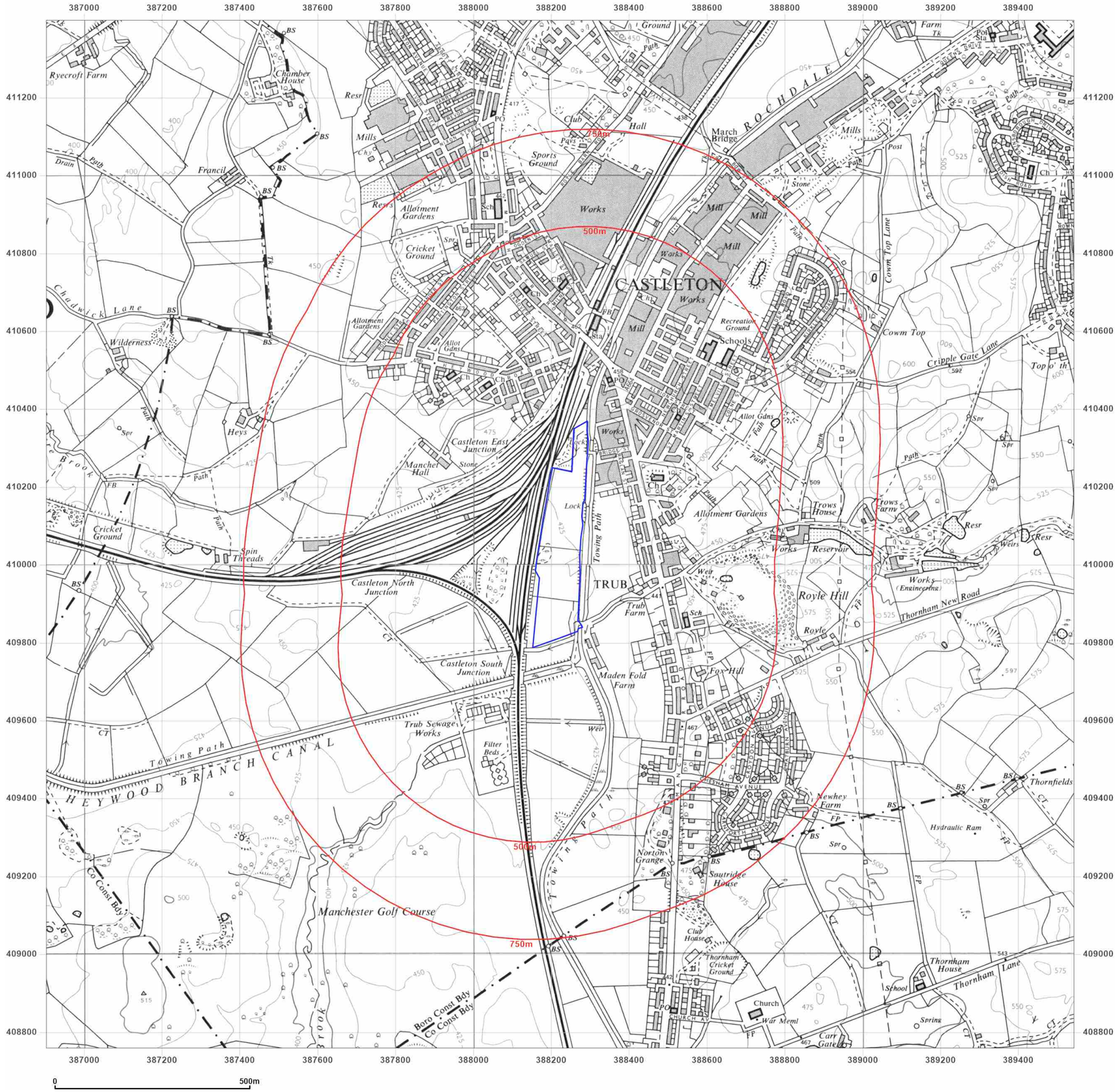
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: Provisional

Map date: **1965-1968**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1968
Revised 1968
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1965
Revised 1965
Edition N/A
Copyright N/A
Levelled N/A

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **1975**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1974
Revised 1975
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1974
Revised 1975
Edition N/A
Copyright N/A
Levelled N/A

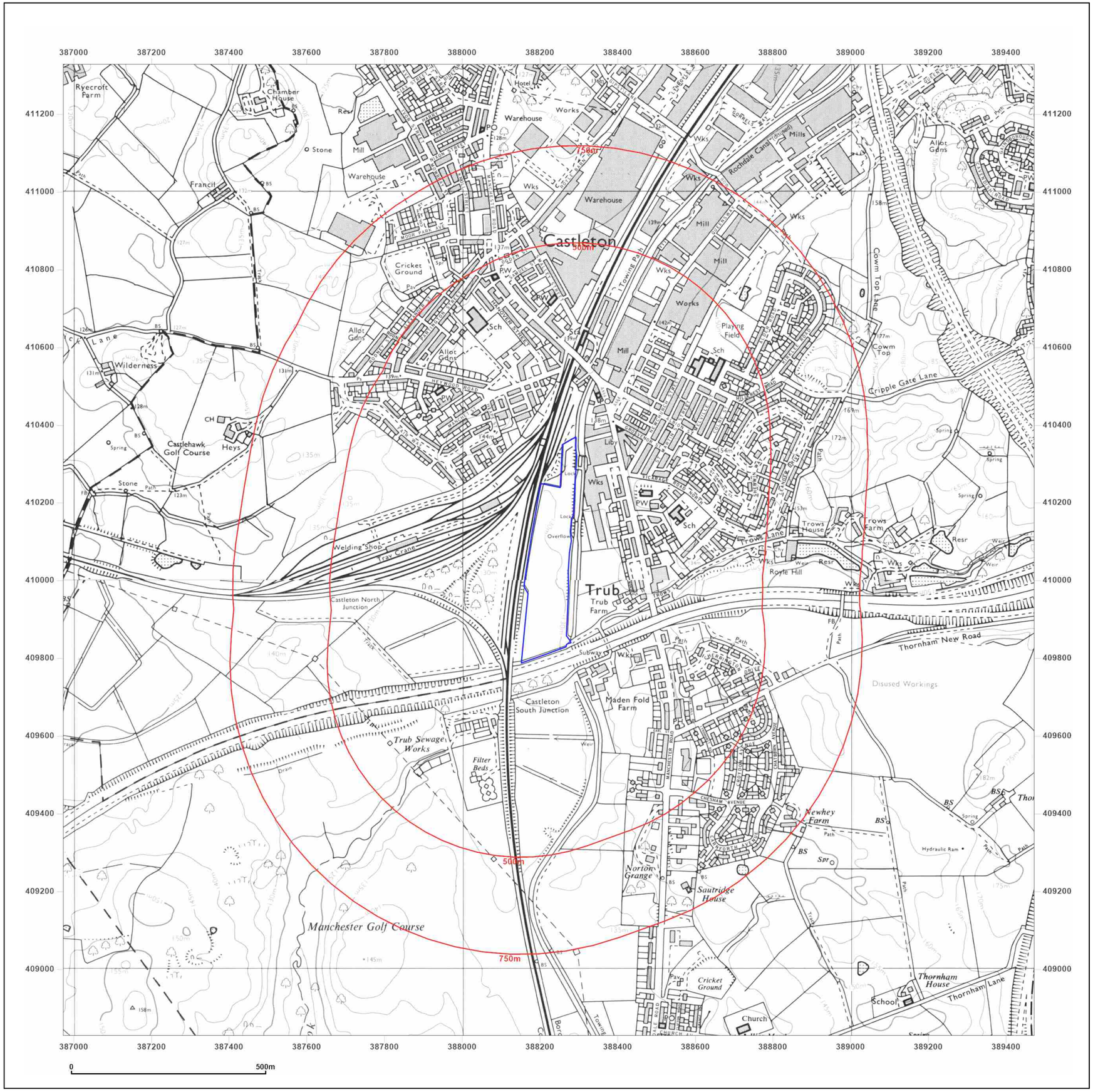
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **1982-1987**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1984
Revised 1987
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1980
Revised 1982
Edition N/A
Copyright N/A
Levelled N/A

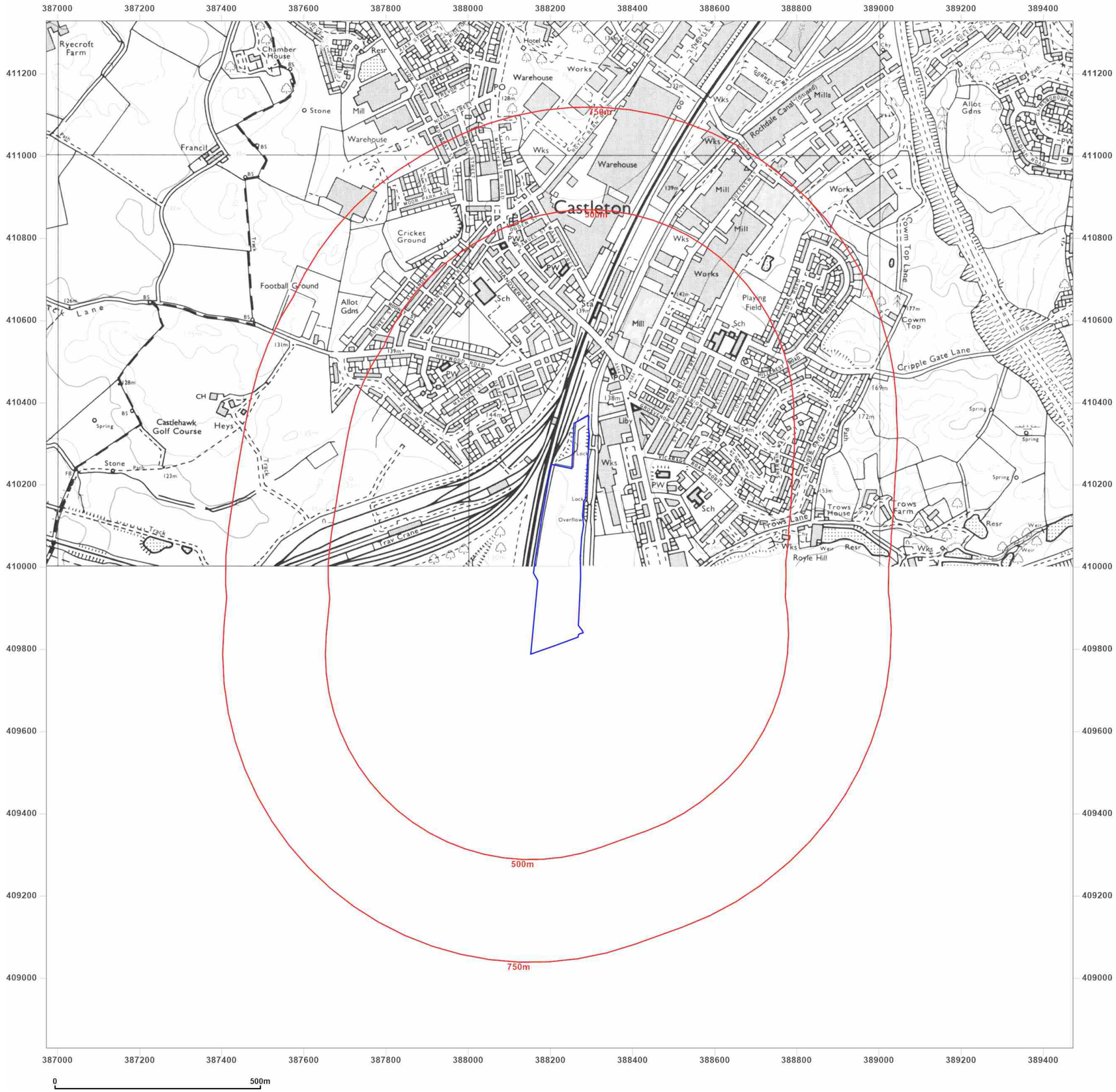
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **1992**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1984
Revised 1992
Edition N/A
Copyright N/A
Levelled N/A

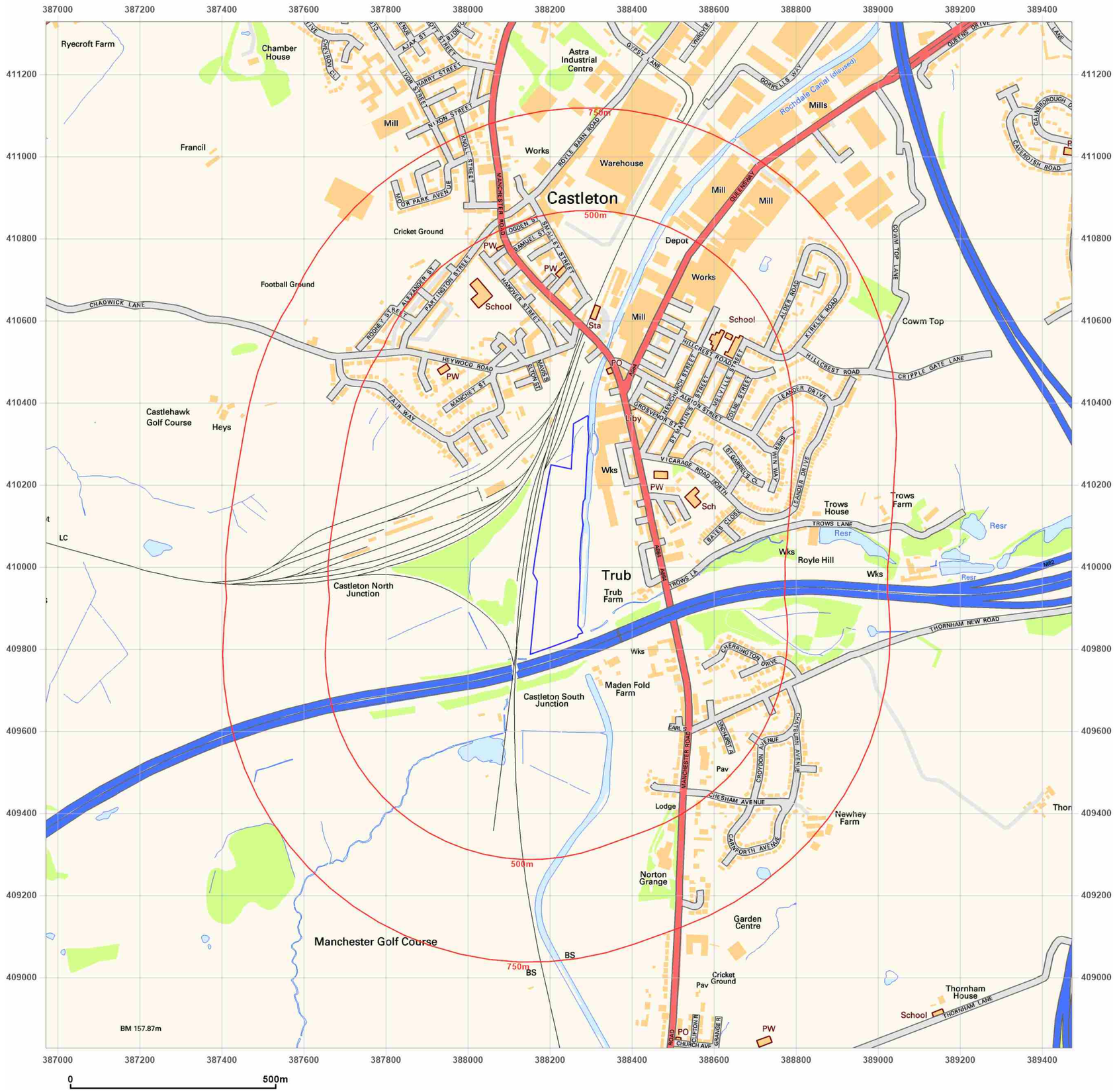
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **2001**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2001

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2010

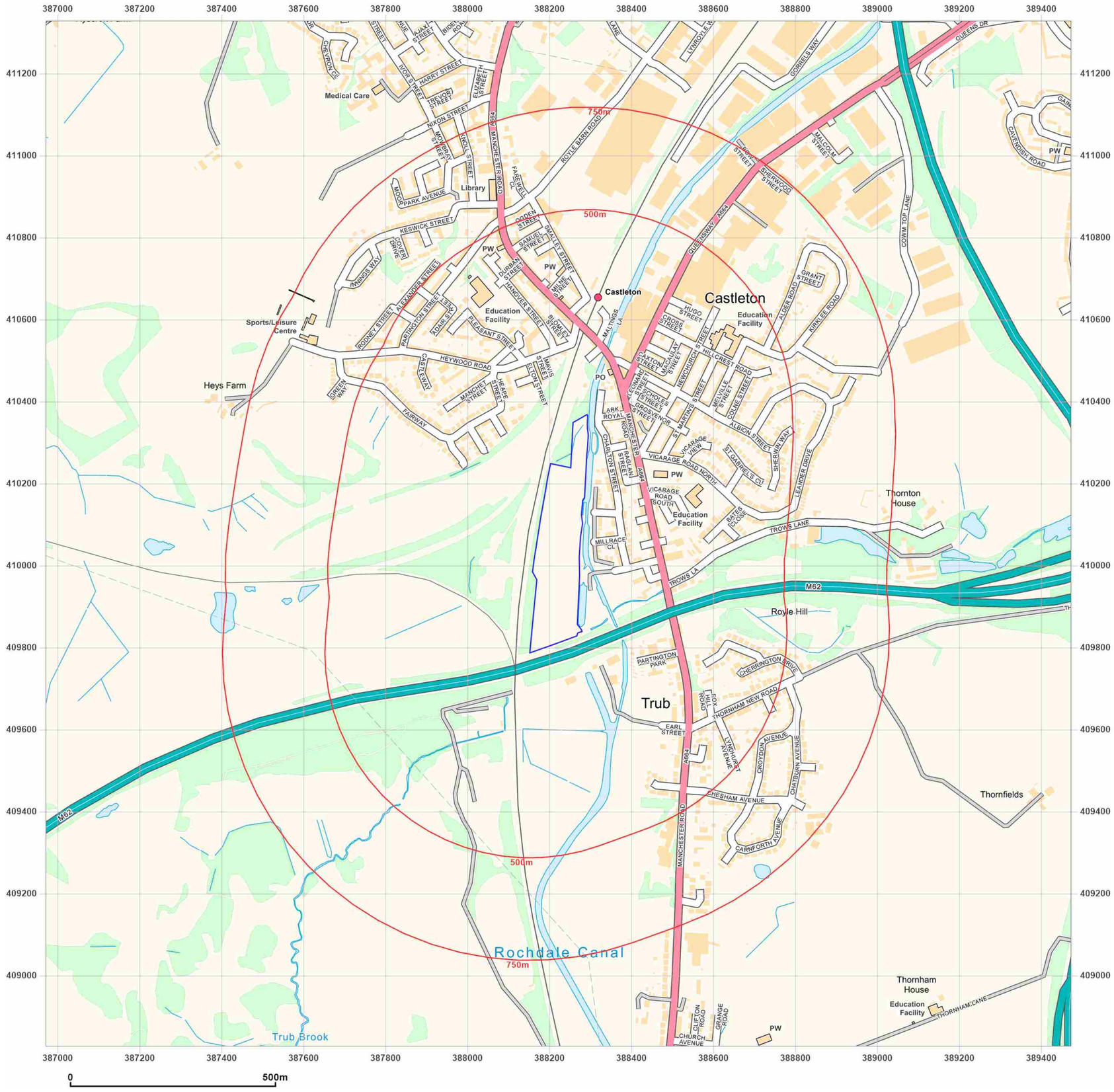
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf



Groundsure INSIGHTS

Site Details:

TRUB FARM, MANCHESTER ROAD, ROCHDALE, OL11 2XG

Client Ref: 008203
Report Ref: GS-SKH-RQO-Z1D-GYM
Grid Ref: 388222, 410078

Map Name: National Grid

Map date: **2024**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2024

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2024 Ordnance Survey 100035207

Production date: 10 May 2024

Map legend available at:
www.groundsure.com/sites/default/files/groundsure_legend.pdf

APPENDIX VII
EXPLORATORY HOLE LOGS

Trial Pit Log

TrialPit No TP101/ SA101
Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Firm brownish grey very sandy CLAY.
				0.60			Brown pseudo fibrous PEAT.
				0.80			Very soft grey sandy CLAY with organic odour.
	1.00	HVP	6				
				1.20			Grey clayey fine to medium SAND.
	1.50	ES					
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 101/ Soakaway 101

Trial Pit 101 Spoil

Remarks: 1. Complete. 2. BRE365 Soakaway test completed.

Stability: Stable

Trial Pit Log

TrialPit No TP102/ SA102
Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.40 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Firm brownish orange gravelly very sandy CLAY. Gravel is fine to medium subangular to subrounded of mudstone.
	1.20	ES					
	1.50	HVP	49				
1.80				1.80			Orangish brown fine to medium SAND. (Possible running sand).
				2.00			End of Pit at 2.00m

1 2 3 4

Remarks: 1. Complete. 2. BRE365 Soakaway test completed.

Stability: Unstable in sand

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP103 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.00	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.40			Brown pseudo fibrous PEAT.
				1.60			Grey very clayey fine to medium SAND.
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 103

Trial Pit 103 Spoil

Remarks: 1. Complete.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP104 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 1.90	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
	0.90	ES		1.00			Very soft brown sandy CLAY. Peat band at 0.60 to 0.70 m bgl.
	1.50	B		1.90			Grey clayey fine to medium SAND.
							End of Pit at 1.90m

1 2 3 4

Trial Pit Photographs

Trial Pit 104

Trial Pit 104 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP105 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.90			Greyish light brown slightly gravelly very sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone.
				2.00			Grey clayey fine to medium SAND.
							End of Pit at 2.00m

1
2
3
4

Trial Pit Photographs

Trial Pit 105

Trial Pit 105 Spoil

Remarks: 1. Complete.

Stability: Unstable below 1.50 m

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP106 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.50	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown sandy CLAY with rootlets (TOPSOIL).
				0.30			Brown pseudo fibrous PEAT.
	1.00	D					
	1.50	ES					
				2.00			Grey clayey fine to medium SAND.
				2.50			End of Pit at 2.50m

1 2 3 4

Trial Pit Photographs

Trial Pit 106

Trial Pit 106 Spoil

Remarks: 1. Complete.

Stability: Unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP107 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown sandy CLAY with rootlets (TOPSOIL).
	0.40	ES		0.30			Brown very sandy CLAY with organic odour.
1.00				0.60			Brown pseudo fibrous PEAT.
	1.80	B		1.70			Grey clayey fine to medium SAND.
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 107

Trial Pit 107 Spoil

Remarks: 1. Complete. 2. Water at 1.00 m bgl in saturated PEAT.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP108 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 1.90	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Brown sandy CLAY with organic odour.
				0.50			Brown pseudo fibrous PEAT.
				1.50			Firm grey very sandy CLAY.
				1.70			Grey clayey fine to medium SAND.
				1.90			End of Pit at 1.90m

1 2 3 4

Trial Pit Photographs

Trial Pit 108

Trial Pit 108 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP109 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.30	ES		0.20			MADE GROUND: Dark brown sandy clay with rootlets. (Topsoil).
				0.70			MADE GROUND: Greyish brown slightly clayey gravelly fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone, sandstone and rare brick.
				1.20			Brown pseudo fibrous PEAT.
				1.80			Grey gravelly very clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.
				2.00			Stiff brown mottled grey gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone.
							End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 109

Trial Pit 109 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP110 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 1.60	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.30			MADE GROUND: Dark brown sandy clay with rootlets. (Topsoil).
				0.80			MADE GROUND: Brownish grey gravelly sandy clay (reworked). Gravel is fine to coarse subangular to subrounded of mudstone, sandstone and brick.
	1.50	B		1.60			Light brown slightly gravelly slightly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded.
							End of Pit at 1.60m

1 2 3 4

Trial Pit Photographs

Trial Pit 110

Trial Pit 110 Spoil

Remarks: 1. Complete.

Stability: Unstable in sand

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP111 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.10	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.40			Brown pseudo fibrous PEAT.
				1.00			Grey gravelly clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.
	1.70	ES		1.60			Brownish grey slightly gravelly silty sandy CLAY.
				2.10			End of Pit at 2.10m

1 2 3 4

Trial Pit Photographs

Trial Pit 111

Trial Pit 111 Spoil

Remarks: 1. Complete.

Stability: Unstable in sand

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP112 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.20	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown sandy CLAY with rootlets (TOPSOIL).
				0.30			Soft brown sandy CLAY.
				0.50			Brown pseudo fibrous PEAT.
	1.20	D					
				1.70			Grey gravelly clayey fine to medium SAND. Gravel is fine to coarse subrounded to rounded of mudstone.
				2.20			End of Pit at 2.20m

1 2 3 4

Trial Pit Photographs

Trial Pit 112

Trial Pit 112 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP113 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.00	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Brown slightly clayey fine to medium SAND with organic odour and plant debris.
				0.70			Grey clayey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
	1.00 1.00	B ES					
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 113

Trial Pit 113 Spoil

Remarks: 1. Complete.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP114 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 15/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.40	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.20			MADE GROUND: Dark brown clayey fine to medium sand with rootlets. (Topsoil).
				0.70			MADE GROUND: Brown gravelly clayey fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone and brick.
	1.20	B		1.70			Orangish brown very gravelly fine to medium SAND with cobbles. Gravel is fine to coarse subrounded to rounded of mudstone. Cobbles are subrounded to rounded of mudstone.
	2.00 2.00	ES HVP	158	2.40			Very stiff brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone.
							End of Pit at 2.40m

1 2 3 4

Trial Pit Photographs

Trial Pit 114

Trial Pit 114 Spoil

Remarks: 1. Complete.

Stability: Unstable in sand

e3p

Trial Pit Log

TrialPit No TP115/ SA103
Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.40 × 0.60 Depth 2.00	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				1.10			Dark brown pseudo fibrous PEAT (saturated).
	1.50 1.50	ES HVP	29	2.00			Soft grey slightly gravelly silty CLAY.
							End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 115/ Soakaway 103

Trial Pit 115/ Soakaway 103 Spoil

Remarks: 1. Complete. 2. BRE365 Soakaway test completed. 3. Water at 0.50 m bgl in saturated PEAT.

Stability: Stable

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP116 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.50	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Dark brown pseudo fibrous PEAT (saturated).
1.00							
	2.00	B		1.90			Grey slightly clayey silty fine to medium SAND with rare plant debris.
				2.50			End of Pit at 2.50m

1 2 3 4

Trial Pit Photographs

Trial Pit 116

Trial Pit 116 Spoil

Remarks: 1. Complete. 2. Water at 1.00 m bgl in saturated PEAT.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP117 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.60	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.40			Brown clayey fine to medium SAND with plant debris.
	0.70 0.80	ES HVP	13	1.10			Very soft brown silty CLAY with plant debris.
				1.60			Grey slightly clayey silty fine to medium SAND with rare plant debris.
2.00				2.10			Brown pseudo fibrous PEAT.
				2.60			Grey slightly clayey silty fine to medium SAND with rare plant debris.
							End of Pit at 2.60m

1 2 3 4

Trial Pit Photographs

Trial Pit 117

Trial Pit 117 Spoil

Remarks: 1. Complete. 2. Water at 1.00 m bgl in saturated PEAT.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP118 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.10	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.50			Brown slightly clayey fine to medium SAND with plant debris.
				0.75			Dark brown pseudo fibrous PEAT.
	1.00 1.00	ES HVP	41				Firm to stiff grey mottled brown slightly gravelly sandy silty CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Light brown sand lens at 1.30 to 1.60 m bgl.
▼ 1.50							
	2.00	HVP	78	2.10			End of Pit at 2.10m

1 2 3 4

Trial Pit Photographs

Trial Pit 118

Trial Pit 118 Spoil

Remarks: 1. Complete. 2. Water strike encountered at 1.50 m bgl.

Stability: Unstable in sand

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP119 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.00	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine to medium subangular of brick. (Topsoil).
	0.40	ES		0.30			MADE GROUND: Dark brown gravelly clayey fine to medium sand with rare cobbles. Gravel is fine to coarse angular to subrounded of mudstone and brick. Cobbles are subangular of brick.
	1.00	B		0.50			Orangish light brown clayey fine to medium SAND.
				1.50			Grey mottled light brown very sandy CLAY.
1.80				1.80			Orangish light brown slightly silty fine to medium SAND.
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 119

Trial Pit 119 Spoil

Remarks: 1. Complete. 2. Water strike encountered at 1.80 m bgl.

Stability: Very unstable in sand

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP120 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.10	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.30			Dark brown slightly clayey fine to medium SAND with plant debris.
0.40							
	0.80	HVP	20	0.70			Soft greyish brown sandy CLAY.
				1.00			Grey silty clayey fine to medium SAND.
				1.70			Brownish grey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
				2.10			End of Pit at 2.10m

1 2 3 4

Trial Pit Photographs

Trial Pit 120

Trial Pit 120 Spoil

Remarks: 1. Complete. 2. Perched water at 0.40 m bgl.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP121 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.00	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
	0.80	ES					Orangish light brown clayey fine to medium SAND.
				2.00			End of Pit at 2.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 121

Trial Pit 121 Spoil

Remarks: 1. Terminated due to instability.

Stability: Very unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP122 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 2.30	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
	0.70	HVP	71				Firm brown mottled grey very sandy CLAY.
	0.80	B					
	1.00	ES		1.10			
	1.30	HVP	115				Stiff brown mottled grey slightly sandy CLAY.
1.90				1.90			Reddish brown slightly silty fine to medium SAND.
				2.30			End of Pit at 2.30m

1 2 3 4

Trial Pit Photographs

Trial Pit 122

Trial Pit 122 Spoil

Remarks: 1. Complete. 2. Water encountered as seepage at 1.90m bgl.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP123 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 1.10	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine to coarse subangular of brick.
				0.60			MADE GROUND: Orangish light brown clayey fine to medium sand (reworked).
				1.10			End of Pit at 1.10m

1 2 3 4

Trial Pit Photographs

Trial Pit 123

Trial Pit 123 Spoil

Remarks: 1. Terminated due to land drain encountered at 1.10 m bgl.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP124 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 1.20	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.35			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
1.00	0.70 0.70	B ES		1.20			Orangish light brown slightly silty fine to medium SAND.
							End of Pit at 1.20m

1 2 3 4

Trial Pit Photographs

Trial Pit 124

Trial Pit 124 Spoil

Remarks: 1. Terminated due to instability. 2. Water strike encountered at 1.00 m bgl.

Stability: Very unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP125 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.20	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
				0.35			Stiff brown mottled grey slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Firm from 1.60 to 2.00 m bgl
	0.80	HVP	139				
	1.30	HVP	142				
1.70	1.60	HVP	71				
	2.00	HVP	123				
				2.20			End of Pit at 2.20m

1 2 3 4

Trial Pit Photographs

Trial Pit 125

Trial Pit 125 Spoil

Remarks: 1. Complete. 2. Water encountered as seepage at 1.70m bgl.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP126 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60 Depth 3.50	Scale 1:30
Client: MCI Developments			Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown sandy CLAY with rootlets (TOPSOIL).
				0.40			Brown clayey fine to medium SAND with plant debris.
				0.70			Dark brown pseudo fibrous PEAT.
				1.80			Brown pseudo fibrous PEAT.
	2.00	D					
				2.60			Brown amorphous PEAT (very wet).
	2.80	D					
				3.00			Grey clayey sandy SILT.
	3.10	ES					
				3.50			End of Pit at 3.50m

1 2 3 4

Trial Pit Photographs

Trial Pit 126

Trial Pit 126 Spoil

Remarks: 1. Complete.

Stability: Slightly unstable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP127 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.30	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			MADE GROUND: Dark brown sandy clay with rootlets (Topsoil).
	0.60	ES		0.80			MADE GROUND: Brown slightly gravelly clayey fine to medium sand (reworked). Gravel is fine to medium subangular of brick.
				1.20			MADE GROUND: Greyish dark brown gravelly clayey fine to medium sand. Gravel is fine to medium subangular of brick.
				1.70			Firm brown mottled grey very sandy CLAY.
				2.30			Dark brownish grey clayey fine to medium SAND.
							End of Pit at 2.30m

1 2 3 4

Trial Pit Photographs

Trial Pit 127

Trial Pit 127 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP128 Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: - Level:	Date 16/04/2024
Location: Rochdale		Dimensions (m): 2.50 × 0.60	Scale 1:30
Client: MCI Developments		Depth 2.20	Logged J.Beer

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
	1.00 1.00	B HVP	91	1.30			Firm to stiff orangish brown mottled grey gravelly very sandy CLAY. Gravel is fine to coarse subrounded to rounded of mudstone.
				2.20			Brownish grey gravelly very sandy CLAY with rare cobbles and plant debris. Gravel is fine to coarse subrounded to rounded of mudstone. Cobbles are rounded of mudstone.
							End of Pit at 2.20m

1 2 3 4

Trial Pit Photographs

Trial Pit 128

Trial Pit 128 Spoil

Remarks: 1. Complete.

Stability: Stable

e3p

Borehole Log

e3p	Borehole Log		Borehole No. **WS101** Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
					0.80			Brown sandy CLAY with rare plant debris.
		1.00		N=4 (1,0/1,1,1,1)	1.20			Loose grey slightly clayey fine to medium SAND.
					1.70			Loose grey slightly silty fine to medium SAND.
		1.80	ES					Medium dense grey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
		2.00		N=15 (1,3/2,4,5,4)				
		3.00		50 (5,8/50 for 285mm)	2.80			Dense greyish brown SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone
					3.44			End of borehole at 3.44 m

Remarks
1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

e3p

Borehole Log

Borehole No.
WS102
Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
								Grey clayey fine to medium SAND.
		0.80	ES					
		1.00		N=6 (1,1/1,2,1,2)	1.00			Dark brown pseudo fibrous PEAT.
		2.00		N=8 (2,1/2,2,2,2)	1.90			Loose grey clayey fine to medium SAND (saturated).
		3.00		50 (5,7/50 for 295mm)	2.90			Dense grey SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone.
					3.45			End of borehole at 3.45 m

Remarks
1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 2.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30			MADE GROUND: Dark brown slightly gravelly clayey fine to medium sand with rootlets. Gravel is fine subangular of brick. (Topsoil).
		0.80	ES		0.80			MADE GROUND: Brown clayey gravelly fine to medium sand (reworked). Gravel is fine to coarse subangular to rounded of mudstone and brick.
		1.00		N=41 (5,9/8,9,11,13)				Dense light brown gravelly fine to medium SAND. Gravel is fine to medium subangular to rounded of mudstone.
					1.70			Stiff medium strength brownish grey sandy CLAY.
		2.00		N=16 (3,2/3,4,4,5)				
					2.40			Dense grey slightly sandy GRAVEL. Gravel is fine to coarse subrounded to rounded of mudstone.
		3.00		N=50 (6,8/12,14,15,9)				
					3.45			End of borehole at 3.45 m

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS104** Sheet 1 of 1			
Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			Dark brown sandy CLAY with rootlets (TOPSOIL).
		1.00		N=7 (1,1/1,2,2,2)				Loose light brown mottled grey slightly gravelly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
		1.60	ES		1.40			Stiff medium strength brown gravelly very sandy CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Sand band 2.20 to 2.40 m bgl.
		2.00 2.00	D	N=10 (2,2/2,2,3,3)				
		3.00		50 (8,7/50 for 240mm)	2.60			Dense brown gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
					3.39			End of borehole at 3.39 m

Remarks
1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10	ES		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
								Very soft brown very sandy CLAY with plant debris.
	▼	1.00		N=7 (1,1/1,2,2,2)	1.00			Loose brownish grey clayey fine to medium SAND.
					1.40			Stiff medium strength grey sandy silty CLAY.
		2.00		N=10 (2,2/2,3,3,2)				
					2.70			Dense grey slightly gravelly fine to medium SAND.
		3.00		50 (8,9/50 for 245mm)				
					3.40			End of borehole at 3.40 m

Remarks

1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS106**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
		1.00		N=5 (1,1/1,1,1,2)				Brown pseudo fibrous PEAT (saturated).
		2.00		N=0 (0,0/0,0,0,0)				
		3.00		N=0 (0,0/0,0,0,0)				
					3.50			Medium dense grey slightly gravelly slightly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone.
		3.70	ES					
		4.00		N=17 (3,3/4,4,4,5)				
		5.00		N=27 (4,4/4,7,8,8)				
					5.45			End of borehole at 5.45 m

Remarks

1. Complete. 2. Monitoring well installed. Response zone 3.50 to 4.50 m bgl.

Borehole Log

Borehole No. **WS107**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
					0.90			Brown pseudo fibrous PEAT.
		1.00		N=7 (1,1/2,2,2,1)				Loose greyish brown silty clayey fine to medium SAND.
		1.50 - 1.80	U		1.40			Stiff medium strength brown mottled grey sandy gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone. Becoming very stiff high strength at 4.00 m bgl. Becoming very stiff very high strength at 5.00 m bl.
		2.00 2.00	D	N=10 (1,1/2,2,2,4)				
		2.70	ES					
		3.00 3.00	D	N=13 (2,2/2,3,4,4)				
		4.00 4.00	D	N=20 (3,3/4,4,6,6)				
		5.00 5.00	D	N=47 (6,8/10,12,12,13)				
					5.45			End of borehole at 5.45 m

Remarks

1. Complete. 2. Monitoring well installed. Response zone 1.00 to 4.00 m bgl.

Borehole Log

Borehole No. **WS108**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.25			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
					0.90			Brown mottled grey sandy CLAY.
		1.00 1.00	D	N=7 (1,1/1,2,2,2)				Firm low strength brown slightly sandy gravelly CLAY. Gravel is fine subrounded to rounded of mudstone.
		1.50 - 2.00	U					
		2.00 2.00	D	N=9 (1,1/2,2,2,3)	2.00			Loose brown clayey fine to medium SAND. Clay band 2.50 to 3.00 m bgl. Becoming medium dense at 3.00 m bgl.
		2.50	ES					
		3.00		N=16 (2,2/3,4,4,5)				
		4.00		N=30 (3,4/6,6,8,10)				
					4.45			End of borehole at 4.45 m

Remarks

1. Terminated due to blowing sands and hole collapse at 4.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS109**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.10	ES		0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).
					0.70			Brown clayey fine to medium SAND with plant debris.
		1.00 1.00	D	N=4 (1,1/1,1,1,1)	1.00			Greyish light brown clayey fine to medium SAND.
		1.50 - 2.00	U					Firm low strength greyish brown silty sandy CLAY.
		2.00 2.00	D	N=6 (1,1/1,2,2,1)	2.00			Loose greyish light brown slightly clayey gravelly fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone. Becoming medium dense at 3.00 m bgl.
		3.00		N=16 (2,3/3,4,4,5)				
		4.00		N=25 (3,3/4,6,6,9)				
					4.45			End of borehole at 4.45 m

Remarks

1. Terminated due to blowing sands and hole collapse at 4.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

e3p	Borehole Log		Borehole No. **WS110** Sheet 1 of 1
Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30			Dark brown sandy CLAY with rootlets (TOPSOIL).
		1.00		N=1 (1,0/0,0,1,0)				Brown pseudo fibrous PEAT (saturated).
	▼	2.00		N=7 (1,0/1,1,2,3)	2.20			
		2.50	ES					Dense grey SAND and GRAVEL. Gravel is fine to medium subrounded to rounded of mudstone.
		3.00		N=50 (4,8/12,12,13,13)				
					3.45			End of borehole at 3.45 m

Remarks
1. Terminated due to refusal in SPT test at 3.00 m bgl. 2. Monitoring well installed. Response zone 2.20 to 3.00 m bgl.

e3p

Borehole Log

Borehole No. **WS111** Sheet 1 of 1			
Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
					1.10			Brown pseudo fibrous PEAT (saturated).
		1.00		N=2 (1,0/1,1,0,0)				Very loose grey gravelly clayey fine to medium SAND. Gravel is fine to medium subrounded to rounded of mudstone. Becoming medium dense at 2.00 m bgl.
		1.50	ES					
		2.00		N=11 (3,2/3,2,2,4)				
		3.00		N=25 (5,6/5,7,6,7)				
					3.45			End of borehole at 3.45 m

Remarks
1. Terminated due to blowing sands and hole collapse at 3.00 m bgl. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Borehole No. **WS112**

Sheet 1 of 1

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type WS
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 17/04/2024 -	Logged By J.Beer

Samples and In Situ Testing						
Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
0.10	ES					Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).
			0.30			Brown clayey fine to medium SAND.
			0.50			Dark brown pseudo fibrous PEAT.
1.00		N=1 (1,0/0,1,0,0)				
2.00		N=4 (1,0/1,1,1,1)				
3.00		N=7 (1,2/1,2,2,2)	3.00			Loose grey silty fine to medium SAND with plant debris.
			3.70			Very loose grey fine to medium SAND. Becoming loose at 5.00 m bgl. (Blowing sands).
4.00		N=2 (1,0/1,1,0,0)				
5.00		N=9 (2,1/3,2,2,2)				
			5.45			End of borehole at 5.45 m

Well | Water Strikes

1 2 3 4 5 6 7 8 9 10

Remarks
1. Complete. 2. Monitoring well installed. Response zone 1.00 to 3.00 m bgl.

Borehole Log

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Borehole No. **CP101** Sheet 1 of 2
Location: Rochdale		Level:	Hole Type CP
			Scale 1:50
Client: MCI Developments		Dates: 15/04/2024 - 18/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.00 - 0.50	B					Dark brown sandy CLAY with rootlets (TOPSOIL).	
		0.50 - 1.00	B		0.50			Stiff medium strength brown silty sandy CLAY. Becoming very soft extremely low strength at 2.00 m bgl.	1
	▼	1.20		N=11 (1,2/2,3,3,3)					
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=2 (0,0/1,0,1,0)					2
		2.00 - 2.45	D						
		2.00 - 2.50	B						
					2.50			Brown pseudo fibrous PEAT.	
		2.80	D		2.80			Very loose light brown fine to medium SAND (blowing). Becoming medium dense at 5.00 m bgl.	3
		3.00		N=1 (1,0/0,1,0,0)					
		3.00 - 3.45	D						
		3.00 - 3.50	B						
		3.80	D						
		4.00		N=1 (0,0/1,0,0,0)					4
		4.00 - 4.45	D						
		4.00 - 4.50	B						
		4.80	D						
		5.00		N=30 (3,3/4,6,10,10)					5
		5.00 - 5.45	D						
		5.00 - 5.50	B						
		5.80	D						
		6.00		N=25 (2,3/3,5,7,10)					6
		6.00 - 6.45	D						
		6.00 - 6.50	B						
		7.00	D						7
		7.50		N=34 (1,3/5,7,10,12)					
		7.50 - 7.95	D						
		7.50 - 8.00	B						8
		9.00		N=37 (4,5/7,9,9,12)					9
		9.00 - 9.45	D						
		10.00 - 10.50	B						10

Continued on next sheet

Remarks
1. Complete. 2. Hole originally terminated due to blowing sands at 8.00 m bgl. Re drilled with water from tractor and bowser.

Borehole Log

Borehole No. **CP101**

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type CP
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 15/04/2024 - 18/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		10.50		N=38 (5,5/5,10,10,13)				
		10.50 - 10.95	D					
					11.20			Dense light brown gravelly fine to medium SAND. Gravel is fine to medium subangular to rounded of mudstone.
		12.00		N=42 (4,5/6,9,12,15)				
		12.00 - 12.45	D					
		12.50 - 13.00	B		12.40			Very stiff high strength brown CLAY.
		14.00		N=30 (3,4/7,7,7,9)				
		14.00 - 14.45	D					
					15.00			End of borehole at 15.00 m

Remarks
1. Complete. 2. Hole originally terminated due to blowing sands at 8.00 m bgl. Re drilled with water from tractor and bowser.

Borehole Log

Borehole No. **CP102**

Sheet 1 of 2

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type CP
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 15/04/2024 - 16/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.00 - 0.50	B		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
		0.50 - 1.00	B		1.10			Greyish brown sandy CLAY.	1
		1.20		N=5 (1,1/2,1,1,1)				Firm low strength grey silty sandy CLAY. Becoming stiff medium strength at 2.00 m bgl. Becoming very soft extremely low strength at 3.00 m bgl. Becoming stiff medium strength 4.00 m bl.	
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=11 (2,2/2,3,3,3)					2
		2.00 - 2.45	D						
		2.50 - 3.00	B						
		3.00		N=1 (1,0/0,0,1,0)					3
		3.00 - 3.45	D						
		4.00		N=11 (2,2/2,3,3,3)					4
		4.00 - 4.45	D						
					4.80			Stiff medium strength brown CLAY. Becoming very stiff high strength at 9.00 m bgl.	
		5.00		N=15 (2,2/3,3,4,5)					5
		5.00 - 5.45	D						
		5.00 - 5.50	B						
		6.00		N=16 (2,3/3,4,4,5)					6
		6.00 - 6.45	D						
									7
		7.50 - 7.95	U						
									8
		9.00		N=20 (3,3/4,4,5,7)					9
		9.00 - 9.45	D						
									10

Continued on next sheet

Remarks

1. Terminated due to blowing sands at 13.20 m bgl.

Borehole Log

Borehole No. **CP102**

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type CP
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 15/04/2024 - 16/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		10.50 - 10.95	U					
		12.00 12.00 - 12.45	D	N=37 (4,5/7,7,9,14)				
	▼	13.20	D		13.20 13.30			Light brown fine to medium SAND (blowing). End of borehole at 13.30 m

Remarks
1. Terminated due to blowing sands at 13.20 m bgl.

Borehole Log

Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Borehole No. **CP103** Sheet 1 of 2
Location: Rochdale		Level:	Hole Type CP
			Scale 1:50
Client: MCI Developments		Dates: 16/04/2024 - 17/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.00 - 0.50	B		0.30			Dark brown clayey fine to medium SAND with rootlets. (TOPSOIL).	
		0.50 - 1.00	B					Dark brown pseudo fibrous PEAT.	1
		1.20		N=1 (0,0/0,0,1,0)					
		1.20 - 1.65	D						
		1.20 - 1.70	B						
		2.00		N=2 (0,0/1,0,0,1)					2
		2.00 - 2.45	D						
		3.00		N=2 (1,0/1,0,0,1)					3
		3.00 - 3.45	D						
		3.50 - 4.00	B						
		4.00		N=3 (1,0/1,0,1,1)					4
		4.00 - 4.45	D						
		5.00		N=12 (2,2/3,3,3,3)	4.90			Stiff medium strength grey silty sandy CLAY.	5
		5.00 - 5.45	D						
		5.50 - 6.00	B						
		6.00		N=17 (2,2/3,4,4,6)					6
		6.00 - 6.45	D						
									7
		7.50 - 7.95	U						
									8
		9.00		N=31 (3,4/6,7,9,9)	8.80			Very stiff high strength greyish brown silty sandy gravelly CLAY.	9
		9.00 - 9.45	D						
		9.50 - 10.00	B						
									10

Continued on next sheet

Remarks
1. Complete.

Borehole Log

Borehole No. **CP103** Sheet 2 of 2			
Project Name: Trubs Farm	Project No. 17524	Co-ords: -	Hole Type CP
Location: Rochdale		Level:	Scale 1:50
Client: MCI Developments		Dates: 16/04/2024 - 17/04/2024	Logged By JB Site Investigation

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
	▼	10.50 10.50 - 10.95	D	N=35 (3,5/7,9,10,9)					11
		12.00 12.00 - 12.45	D	N=37 (5,5/8,8,11,10)					12
		13.50 13.50 - 13.95	D	N=38 (5,7/7,9,11,11)					13
									14
					15.00			End of borehole at 15.00 m	15
									16
									17
									18
									19
									20

Remarks
1. Complete.

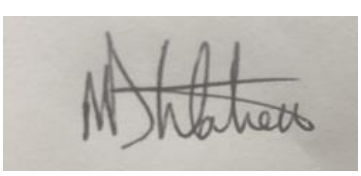
APPENDIX VIII CHEMICAL TESTING RESULTS

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	24-12170-1		
Initial Date of Issue:	26-Apr-2024		
Re-Issue Details:			
Client	E3P		
Client Address:	Taylor Road Trafford Park Urmston Manchester M41 7JQ		
Contact(s):	mdee@e3p.co.uk; jbeer@e3p.co.uk		
Project	Trubs Farm 17-524		
Quotation No.:	Q23-31421	**Date Received:**	19-Apr-2024
Order No.:	007990	**Date Instructed:**	19-Apr-2024
No. of Samples:	15		
Turnaround (Wkdays):	5	**Results Due:**	25-Apr-2024
Date Approved:	26-Apr-2024		

Approved By:



Details: David Smith, Technical Director
Nick Watson, Operations Director

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

Results - Leachate

Project: Trubs Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795834	1795839	1795843
Order No.: 007990					Client Sample Ref.:	TP109	TP119	TP127
					Client Sample ID.:	TP109	TP119	TP127
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	0.4	0.6
					Date Sampled:	15-Apr-2024	16-Apr-2024	16-Apr-2024
					Time Sampled:	12:00	12:00	12:00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
pH at 20C	U	1010	2:1		4.0	7.4	7.1	6.9
Cyanide (Total) Low-Level	N	1300	2:1	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050
Arsenic (Dissolved)	U	1455	2:1	µg/l	0.20	6.5	8.3	11
Cadmium (Dissolved)	U	1455	2:1	µg/l	0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	2:1	µg/l	0.50	3.6	1.2	1.7
Copper (Dissolved)	U	1455	2:1	µg/l	0.50	16	14	15
Mercury (Dissolved)	U	1455	2:1	µg/l	0.05	0.10	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	2:1	µg/l	0.50	1.6	1.4	1.9
Lead (Dissolved)	U	1455	2:1	µg/l	0.50	28	29	14
Selenium (Dissolved)	U	1455	2:1	µg/l	0.50	1.4	0.77	0.80
Zinc (Dissolved)	U	1455	2:1	µg/l	2.5	16	6.5	9.7
Chromium (Hexavalent)	U	1490	2:1	µg/l	20	< 20	< 20	< 20
C2 Aliphatic TPH >C5-C6	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C6-C8	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C8-C10	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C10-C12	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C12-C16	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C16-C21	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C21-C35	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aliphatic TPH >C35-C44	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	2:1	µg/l	5.0	< 5.0	< 5.0	< 5.0
C2 Aromatic TPH >C5-C7	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C7-C8	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C8-C10	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C10-C12	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C12-C16	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C16-C21	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C21-C35	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Aromatic TPH >C35-C44	N	1675	2:1	µg/l	0.10	< 0.10	< 0.10	< 0.10
C2 Total Aromatic Hydrocarbons	N	1675	2:1	µg/l	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	2:1	µg/l	10	< 10	< 10	< 10
Benzene	U	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
Toluene	U	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	U	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	U	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
o-Xylene	U	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
Methyl Tert-Butyl Ether	N	1760	2:1	µg/l	1.0	< 1.0	< 1.0	< 1.0
Naphthalene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010

Results - Leachate

Project: Trubs Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795834	1795839	1795843
Order No.: 007990					Client Sample Ref.:	TP109	TP119	TP127
					Client Sample ID.:	TP109	TP119	TP127
					Sample Type:	SOIL	SOIL	SOIL
					Top Depth (m):	0.3	0.4	0.6
					Date Sampled:	15-Apr-2024	16-Apr-2024	16-Apr-2024
					Time Sampled:	12:00	12:00	12:00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**			
Acenaphthylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Acenaphthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluorene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Phenanthrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Chrysene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[b]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[k]fluoranthene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[a]pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Indeno(1,2,3-c,d)Pyrene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Dibenz(a,h)Anthracene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Benzo[g,h,i]perylene	N	1800	2:1	µg/l	0.010	< 0.010	< 0.010	< 0.010
Total Of 16 PAH's	N	1800	2:1	µg/l	0.20	< 0.20	< 0.20	< 0.20
Total Phenols	U	1920	2:1	mg/l	0.030	< 0.030	< 0.030	< 0.030

Results - Soil

Project: Trubs Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990					Client Sample Ref.:	TP101	TP101	TP107	TP108	TP109	TP113	TP114
					Client Sample ID.:	TP101	TP101	TP107	TP108	TP109	TP113	TP114
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.1	1.5	0.4	0.1	0.3	1	2
					Date Sampled:	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
					Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	12:00
					Asbestos Lab:	NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type		U	2192		N/A	-			-	-		
Asbestos Identification		U	2192		N/A	No Asbestos Detected			No Asbestos Detected	No Asbestos Detected		
Moisture		N	2030	%	0.020	13	19	23	30	8.5	6.8	6.8
Soil Colour		N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	None	None	Roots	Roots	Stones	None	None
Soil Texture		N	2040		N/A	Loam	Sand	Clay	Clay	Sand	Clay	Clay
pH at 20C		M	2010		4.0	8.0	7.5	7.7	7.3	7.7	7.9	8.0
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40							
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	< 0.010	< 0.010	0.018	0.021	0.015	< 0.010	0.017
Total Sulphur		U	2175	%	0.010	0.057	0.036	0.070	0.090	0.017	0.038	0.081
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	9.7	3.0	3.2	2.9	2.6	3.9	3.9
Sulphate (Total)		U	2430	%	0.010	0.096	0.12	0.12	0.13	0.039	0.11	0.069
Arsenic		M	2455	mg/kg	0.5	17	1.6	8.6	13	3.9	9.5	11
Barium		M	2455	mg/kg	0.5							
Beryllium		U	2455	mg/kg	0.5							
Cadmium		M	2455	mg/kg	0.10	< 0.10	< 0.10	0.11	0.23	< 0.10	< 0.10	< 0.10
Chromium		M	2455	mg/kg	0.5	21	4.4	15	42	8.0	27	32
Copper		M	2455	mg/kg	0.50	42	3.8	29	38	13	30	36
Mercury		M	2455	mg/kg	0.05	0.67	< 0.05	0.33	0.58	0.05	0.24	0.20
Nickel		M	2455	mg/kg	0.50	10	5.1	9.0	7.7	7.5	33	41
Lead		M	2455	mg/kg	0.50	74	3.2	51	83	11	26	30
Selenium		M	2455	mg/kg	0.25	0.58	< 0.25	0.46	0.60	< 0.25	0.90	0.89
Vanadium		U	2455	mg/kg	0.5							
Zinc		M	2455	mg/kg	0.50	45	10	51	69	25	85	93
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05							
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05							
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05							
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05							
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25							
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00							
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00							
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00							
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00							
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00							

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990				Client Sample Ref.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Client Sample ID.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1.5	0.4	0.1	0.3	1	2
				Date Sampled:		15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00							
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00							
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05							
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05							
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05							
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25							
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00							
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00							
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00							
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00							
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00							
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00							
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00							
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50							
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00							
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00							
Total Organic Carbon		M	2625	%	0.20	3.0	0.37	7.4	6.5	0.52	0.60	0.53
TPH >C6-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	12	< 1.0	8.1	11	< 1.0	< 1.0	< 1.0
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	34	< 1.0	27	15	< 1.0	< 1.0	< 1.0
TPH >C21-C25	EH_1D_Total	N	2670	mg/kg	1.0	21	< 1.0	18	8.9	< 1.0	< 1.0	< 1.0
TPH >C25-C35	EH_1D_Total	N	2670	mg/kg	1.0	50	< 1.0	54	22	< 1.0	< 1.0	< 1.0
TPH >C35-C40	EH_1D_Total	N	2670	mg/kg	1.0	12	< 1.0	8.0	< 1.0	< 1.0	< 1.0	< 1.0
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	130	< 10	120	56	< 10	< 10	< 10
Dichlorodifluoromethane		U	2760	µg/kg	1.0							
Chloromethane		M	2760	µg/kg	1.0							
Vinyl Chloride		M	2760	µg/kg	1.0							
Bromomethane		M	2760	µg/kg	20							
Chloroethane		U	2760	µg/kg	2.0							
Trichlorofluoromethane		M	2760	µg/kg	1.0							
1,1-Dichloroethene		M	2760	µg/kg	1.0							
Dichloromethane		N	2760	µg/kg	50							
Trans 1,2-Dichloroethene		M	2760	µg/kg	1.0							
1,1-Dichloroethane		M	2760	µg/kg	1.0							
cis 1,2-Dichloroethene		M	2760	µg/kg	1.0							

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990				Client Sample Ref.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Client Sample ID.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1.5	0.4	0.1	0.3	1	2
				Date Sampled:		15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Bromochloromethane		U	2760	µg/kg	5.0							
Trichloromethane		M	2760	µg/kg	1.0							
1,1,1-Trichloroethane		M	2760	µg/kg	1.0							
Tetrachloromethane		M	2760	µg/kg	1.0							
1,1-Dichloropropene		U	2760	µg/kg	1.0							
Benzene		M	2760	µg/kg	1.0							
1,2-Dichloroethane		M	2760	µg/kg	2.0							
Trichloroethene		N	2760	µg/kg	1.0							
1,2-Dichloropropane		M	2760	µg/kg	1.0							
Dibromomethane		M	2760	µg/kg	1.0							
Bromodichloromethane		M	2760	µg/kg	5.0							
cis-1,3-Dichloropropene		N	2760	µg/kg	10							
Toluene		M	2760	µg/kg	1.0							
Trans-1,3-Dichloropropene		N	2760	µg/kg	10							
1,1,2-Trichloroethane		M	2760	µg/kg	10							
Tetrachloroethene		M	2760	µg/kg	1.0							
1,3-Dichloropropane		U	2760	µg/kg	2.0							
Dibromochloromethane		U	2760	µg/kg	10							
1,2-Dibromoethane		M	2760	µg/kg	5.0							
Chlorobenzene		M	2760	µg/kg	1.0							
1,1,1,2-Tetrachloroethane		M	2760	µg/kg	2.0							
Ethylbenzene		M	2760	µg/kg	1.0							
m & p-Xylene		M	2760	µg/kg	1.0							
o-Xylene		M	2760	µg/kg	1.0							
Styrene		M	2760	µg/kg	1.0							
Tribromomethane		U	2760	µg/kg	1.0							
Isopropylbenzene		M	2760	µg/kg	1.0							
Bromobenzene		M	2760	µg/kg	1.0							
1,2,3-Trichloropropane		N	2760	µg/kg	50							
N-Propylbenzene		U	2760	µg/kg	1.0							
2-Chlorotoluene		M	2760	µg/kg	1.0							
1,3,5-Trimethylbenzene		M	2760	µg/kg	1.0							
4-Chlorotoluene		U	2760	µg/kg	1.0							
Tert-Butylbenzene		U	2760	µg/kg	1.0							
1,2,4-Trimethylbenzene		M	2760	µg/kg	1.0							
Sec-Butylbenzene		U	2760	µg/kg	1.0							
1,3-Dichlorobenzene		M	2760	µg/kg	1.0							

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990				Client Sample Ref.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Client Sample ID.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1.5	0.4	0.1	0.3	1	2
				Date Sampled:		15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
4-Isopropyltoluene		U	2760	µg/kg	1.0							
1,4-Dichlorobenzene		M	2760	µg/kg	1.0							
N-Butylbenzene		U	2760	µg/kg	1.0							
1,2-Dichlorobenzene		M	2760	µg/kg	1.0							
1,2-Dibromo-3-Chloropropane		U	2760	µg/kg	50							
1,2,4-Trichlorobenzene		M	2760	µg/kg	1.0							
Hexachlorobutadiene		N	2760	µg/kg	1.0							
1,2,3-Trichlorobenzene		U	2760	µg/kg	2.0							
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0							
N-Nitrosodimethylamine		M	2790	mg/kg	0.50							
Phenol		M	2790	mg/kg	0.50							
2-Chlorophenol		N	2790	mg/kg	0.50							
Bis-(2-Chloroethyl)Ether		M	2790	mg/kg	0.50							
1,3-Dichlorobenzene		M	2790	mg/kg	0.50							
1,4-Dichlorobenzene		N	2790	mg/kg	0.50							
1,2-Dichlorobenzene		M	2790	mg/kg	0.50							
2-Methylphenol		M	2790	mg/kg	0.50							
Bis(2-Chloroisopropyl)Ether		M	2790	mg/kg	0.50							
Hexachloroethane		N	2790	mg/kg	0.50							
N-Nitrosodi-n-propylamine		M	2790	mg/kg	0.50							
4-Methylphenol		M	2790	mg/kg	0.50							
Nitrobenzene		N	2790	mg/kg	0.50							
Isophorone		M	2790	mg/kg	0.50							
2-Nitrophenol		N	2790	mg/kg	0.50							
2,4-Dimethylphenol		N	2790	mg/kg	0.50							
Bis(2-Chloroethoxy)Methane		M	2790	mg/kg	0.50							
2,4-Dichlorophenol		N	2790	mg/kg	0.50							
1,2,4-Trichlorobenzene		M	2790	mg/kg	0.50							
Naphthalene		M	2790	mg/kg	0.50							
4-Chloroaniline		N	2790	mg/kg	0.50							
Hexachlorobutadiene		M	2790	mg/kg	0.50							
4-Chloro-3-Methylphenol		N	2790	mg/kg	0.50							
2-Methylnaphthalene		M	2790	mg/kg	0.50							
4-Nitrophenol		N	2790	mg/kg	0.50							
Hexachlorocyclopentadiene		N	2790	mg/kg	0.50							
2,4,6-Trichlorophenol		N	2790	mg/kg	0.50							
2,4,5-Trichlorophenol		N	2790	mg/kg	0.50							

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990				Client Sample Ref.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Client Sample ID.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1.5	0.4	0.1	0.3	1	2
				Date Sampled:		15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
2-Chloronaphthalene		M	2790	mg/kg	0.50							
2-Nitroaniline		N	2790	mg/kg	0.50							
Acenaphthylene		M	2790	mg/kg	0.50							
Dimethylphthalate		M	2790	mg/kg	0.50							
2,6-Dinitrotoluene		N	2790	mg/kg	0.50							
Acenaphthene		M	2790	mg/kg	0.50							
3-Nitroaniline		N	2790	mg/kg	0.50							
Dibenzofuran		M	2790	mg/kg	0.50							
4-Chlorophenylphenylether		M	2790	mg/kg	0.50							
2,4-Dinitrotoluene		N	2790	mg/kg	0.50							
Fluorene		M	2790	mg/kg	0.50							
Diethyl Phthalate		M	2790	mg/kg	0.50							
4-Nitroaniline		N	2790	mg/kg	0.50							
Azobenzene		M	2790	mg/kg	0.50							
4-Bromophenylphenyl Ether		M	2790	mg/kg	0.50							
Hexachlorobenzene		M	2790	mg/kg	0.50							
Phenanthrene		M	2790	mg/kg	0.50							
Anthracene		M	2790	mg/kg	0.50							
Carbazole		M	2790	mg/kg	0.50							
Di-N-Butyl Phthalate		N	2790	mg/kg	0.50							
Fluoranthene		M	2790	mg/kg	0.50							
Pyrene		M	2790	mg/kg	0.50							
Butylbenzyl Phthalate		N	2790	mg/kg	0.50							
Benzo[a]anthracene		M	2790	mg/kg	0.50							
Chrysene		M	2790	mg/kg	0.50							
Bis(2-Ethylhexyl)Phthalate		N	2790	mg/kg	0.50							
Di-N-Octyl Phthalate		N	2790	mg/kg	0.50							
Benzo[b]fluoranthene		M	2790	mg/kg	0.50							
Benzo[k]fluoranthene		M	2790	mg/kg	0.50							
Benzo[a]pyrene		M	2790	mg/kg	0.50							
Indeno(1,2,3-c,d)Pyrene		N	2790	mg/kg	0.50							
Dibenz(a,h)Anthracene		N	2790	mg/kg	0.50							
Benzo[g,h,i]perylene		M	2790	mg/kg	0.50							
Naphthalene		M	2800	mg/kg	0.10	< 0.10	< 0.10	0.24	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795830	1795831	1795832	1795833	1795834	1795835	1795836
Order No.: 007990				Client Sample Ref.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Client Sample ID.:		TP101	TP101	TP107	TP108	TP109	TP113	TP114
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1.5	0.4	0.1	0.3	1	2
				Date Sampled:		15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024	15-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB			NEW-ASB	NEW-ASB		
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Phenanthrene		M	2800	mg/kg	0.10	1.9	< 0.10	3.0	0.96	< 0.10	< 0.10	< 0.10
Anthracene		M	2800	mg/kg	0.10	0.50	< 0.10	1.2	0.29	< 0.10	< 0.10	< 0.10
Fluoranthene		M	2800	mg/kg	0.10	3.1	< 0.10	11	1.9	0.21	< 0.10	< 0.10
Pyrene		M	2800	mg/kg	0.10	3.1	< 0.10	9.1	1.8	0.21	< 0.10	< 0.10
Benzo[a]anthracene		M	2800	mg/kg	0.10	1.6	< 0.10	3.2	0.94	< 0.10	< 0.10	< 0.10
Chrysene		M	2800	mg/kg	0.10	1.7	< 0.10	3.9	1.2	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	1.9	< 0.10	3.6	1.4	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	0.63	< 0.10	1.5	0.57	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		M	2800	mg/kg	0.10	1.8	< 0.10	3.0	1.1	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	0.85	< 0.10	1.9	0.71	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	0.22	< 0.10	0.74	0.26	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	0.99	< 0.10	2.0	0.78	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0	18	< 2.0	44	12	< 2.0	< 2.0	< 2.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Trubs Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990					Client Sample Ref.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Client Sample ID.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.1	1	0.4	0.1	0.1	0.1	0.6
					Date Sampled:	15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
					Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	12:00
					Asbestos Lab:	NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type		U	2192		N/A	-		-	-	-	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture		N	2030	%	0.020	23	17	30	32	15	37	6.4
Soil Colour		N	2040		N/A	Brown	Brown		Brown	Brown	Brown	Brown
Other Material		N	2040		N/A	Roots	None		Roots	Roots	Roots	Roots
Soil Texture		N	2040		N/A	Clay	Clay		Clay	Clay	Clay	Sand
pH at 20C		M	2010		4.0	7.0	7.5		8.0	9.0	8.3	8.2
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40			0.50				
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.021	0.022		0.017	< 0.010	< 0.010	< 0.010
Total Sulphur		U	2175	%	0.010	0.081	0.16		0.23	0.070	0.15	< 0.010
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50	0.60	0.60	< 0.50	0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	2.9	4.0		2.4	3.8	5.1	6.4
Sulphate (Total)		U	2430	%	0.010	0.24	0.23		0.31	0.13	0.24	0.13
Arsenic		M	2455	mg/kg	0.5	13	5.2	24	33	21	28	5.4
Barium		M	2455	mg/kg	0.5			150				
Beryllium		U	2455	mg/kg	0.5			< 0.5				
Cadmium		M	2455	mg/kg	0.10	0.22	< 0.10	0.19	0.11	0.26	0.50	< 0.10
Chromium		M	2455	mg/kg	0.5	28	17	20	18	35	38	12
Copper		M	2455	mg/kg	0.50	57	16	41	37	58	80	11
Mercury		M	2455	mg/kg	0.05	0.61	< 0.05	0.27	0.22	0.59	0.82	0.05
Nickel		M	2455	mg/kg	0.50	11	21	8.0	7.6	13	15	13
Lead		M	2455	mg/kg	0.50	99	8.6	67	49	110	140	8.8
Selenium		M	2455	mg/kg	0.25	0.71	0.58	0.59	0.51	0.76	0.87	0.35
Vanadium		U	2455	mg/kg	0.5			11				
Zinc		M	2455	mg/kg	0.50	91	45	49	39	88	150	33
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05			< 0.05				
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05			< 0.05				
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05			< 0.05				
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05			< 0.05				
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25			< 0.25				
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00			3.7				
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00			1.7				
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00			7.5				
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00			54				
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00			35				

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990				Client Sample Ref.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Client Sample ID.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1	0.4	0.1	0.1	0.1	0.6
				Date Sampled:		15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00			66				
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00			100				
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05			< 0.05				
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05			< 0.05				
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05			< 0.05				
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25			< 0.25				
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00			< 1.0				
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00			< 1.0				
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00			13				
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00			190				
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00			39				
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00			200				
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00			240				
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50			< 0.50				
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00			270				
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00			340				
Total Organic Carbon		M	2625	%	0.20	6.5	1.4		7.8	4.6	10	0.58
TPH >C6-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	5.2	< 1.0		< 1.0	8.4	9.7	< 1.0
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	8.0	< 1.0		< 1.0	17	12	< 1.0
TPH >C21-C25	EH_1D_Total	N	2670	mg/kg	1.0	4.9	< 1.0		< 1.0	11	11	< 1.0
TPH >C25-C35	EH_1D_Total	N	2670	mg/kg	1.0	20	< 1.0		< 1.0	23	22	< 1.0
TPH >C35-C40	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0		< 1.0	3.0	< 1.0	< 1.0
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	38	< 10		< 10	62	54	< 10
Dichlorodifluoromethane		U	2760	µg/kg	1.0			< 1.0				
Chloromethane		M	2760	µg/kg	1.0			< 1.0				
Vinyl Chloride		M	2760	µg/kg	1.0			< 1.0				
Bromomethane		M	2760	µg/kg	20			< 20				
Chloroethane		U	2760	µg/kg	2.0			< 2.0				
Trichlorofluoromethane		M	2760	µg/kg	1.0			< 1.0				
1,1-Dichloroethene		M	2760	µg/kg	1.0			< 1.0				
Dichloromethane		N	2760	µg/kg	50			< 50				
Trans 1,2-Dichloroethene		M	2760	µg/kg	1.0			< 1.0				
1,1-Dichloroethane		M	2760	µg/kg	1.0			< 1.0				
cis 1,2-Dichloroethene		M	2760	µg/kg	1.0			< 1.0				

Results - Soil

Project: Trubs Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990					Client Sample Ref.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Client Sample ID.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.1	1	0.4	0.1	0.1	0.1	0.6
					Date Sampled:	15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
					Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	12:00
					Asbestos Lab:	NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Bromochloromethane		U	2760	µg/kg	5.0			< 5.0				
Trichloromethane		M	2760	µg/kg	1.0			< 1.0				
1,1,1-Trichloroethane		M	2760	µg/kg	1.0			< 1.0				
Tetrachloromethane		M	2760	µg/kg	1.0			< 1.0				
1,1-Dichloropropene		U	2760	µg/kg	1.0			< 1.0				
Benzene		M	2760	µg/kg	1.0			< 1.0				
1,2-Dichloroethane		M	2760	µg/kg	2.0			< 2.0				
Trichloroethene		N	2760	µg/kg	1.0			< 1.0				
1,2-Dichloropropane		M	2760	µg/kg	1.0			< 1.0				
Dibromomethane		M	2760	µg/kg	1.0			< 1.0				
Bromodichloromethane		M	2760	µg/kg	5.0			< 5.0				
cis-1,3-Dichloropropene		N	2760	µg/kg	10			< 10				
Toluene		M	2760	µg/kg	1.0			< 1.0				
Trans-1,3-Dichloropropene		N	2760	µg/kg	10			< 10				
1,1,2-Trichloroethane		M	2760	µg/kg	10			< 10				
Tetrachloroethene		M	2760	µg/kg	1.0			< 1.0				
1,3-Dichloropropane		U	2760	µg/kg	2.0			< 2.0				
Dibromochloromethane		U	2760	µg/kg	10			< 10				
1,2-Dibromoethane		M	2760	µg/kg	5.0			< 5.0				
Chlorobenzene		M	2760	µg/kg	1.0			< 1.0				
1,1,1,2-Tetrachloroethane		M	2760	µg/kg	2.0			< 2.0				
Ethylbenzene		M	2760	µg/kg	1.0			< 1.0				
m & p-Xylene		M	2760	µg/kg	1.0			< 1.0				
o-Xylene		M	2760	µg/kg	1.0			< 1.0				
Styrene		M	2760	µg/kg	1.0			< 1.0				
Tribromomethane		U	2760	µg/kg	1.0			< 1.0				
Isopropylbenzene		M	2760	µg/kg	1.0			< 1.0				
Bromobenzene		M	2760	µg/kg	1.0			< 1.0				
1,2,3-Trichloropropane		N	2760	µg/kg	50			< 50				
N-Propylbenzene		U	2760	µg/kg	1.0			< 1.0				
2-Chlorotoluene		M	2760	µg/kg	1.0			< 1.0				
1,3,5-Trimethylbenzene		M	2760	µg/kg	1.0			< 1.0				
4-Chlorotoluene		U	2760	µg/kg	1.0			< 1.0				
Tert-Butylbenzene		U	2760	µg/kg	1.0			< 1.0				
1,2,4-Trimethylbenzene		M	2760	µg/kg	1.0			< 1.0				
Sec-Butylbenzene		U	2760	µg/kg	1.0			< 1.0				
1,3-Dichlorobenzene		M	2760	µg/kg	1.0			< 1.0				

Results - Soil

Project: Trubs Farm 17-524

Client: E3P												
					Chemtest Job No.:	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990					Client Sample Ref.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Client Sample ID.:	TP110	TP118	TP119	TP119	TP120	TP125	TP127
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.1	1	0.4	0.1	0.1	0.1	0.6
					Date Sampled:	15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
					Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	12:00
					Asbestos Lab:	NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
4-Isopropyltoluene		U	2760	µg/kg	1.0			< 1.0				
1,4-Dichlorobenzene		M	2760	µg/kg	1.0			< 1.0				
N-Butylbenzene		U	2760	µg/kg	1.0			< 1.0				
1,2-Dichlorobenzene		M	2760	µg/kg	1.0			< 1.0				
1,2-Dibromo-3-Chloropropane		U	2760	µg/kg	50			< 50				
1,2,4-Trichlorobenzene		M	2760	µg/kg	1.0			< 1.0				
Hexachlorobutadiene		N	2760	µg/kg	1.0			< 1.0				
1,2,3-Trichlorobenzene		U	2760	µg/kg	2.0			< 2.0				
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0			< 1.0				
N-Nitrosodimethylamine		M	2790	mg/kg	0.50			< 0.50				
Phenol		M	2790	mg/kg	0.50			< 0.50				
2-Chlorophenol		N	2790	mg/kg	0.50			< 0.50				
Bis-(2-Chloroethyl)Ether		M	2790	mg/kg	0.50			< 0.50				
1,3-Dichlorobenzene		M	2790	mg/kg	0.50			< 0.50				
1,4-Dichlorobenzene		N	2790	mg/kg	0.50			< 0.50				
1,2-Dichlorobenzene		M	2790	mg/kg	0.50			< 0.50				
2-Methylphenol		M	2790	mg/kg	0.50			< 0.50				
Bis(2-Chloroisopropyl)Ether		M	2790	mg/kg	0.50			< 0.50				
Hexachloroethane		N	2790	mg/kg	0.50			< 0.50				
N-Nitrosodi-n-propylamine		M	2790	mg/kg	0.50			< 0.50				
4-Methylphenol		M	2790	mg/kg	0.50			< 0.50				
Nitrobenzene		N	2790	mg/kg	0.50			< 0.50				
Isophorone		M	2790	mg/kg	0.50			< 0.50				
2-Nitrophenol		N	2790	mg/kg	0.50			< 0.50				
2,4-Dimethylphenol		N	2790	mg/kg	0.50			< 0.50				
Bis(2-Chloroethoxy)Methane		M	2790	mg/kg	0.50			< 0.50				
2,4-Dichlorophenol		N	2790	mg/kg	0.50			< 0.50				
1,2,4-Trichlorobenzene		M	2790	mg/kg	0.50			< 0.50				
Naphthalene		M	2790	mg/kg	0.50			< 0.50				
4-Chloroaniline		N	2790	mg/kg	0.50			< 0.50				
Hexachlorobutadiene		M	2790	mg/kg	0.50			< 0.50				
4-Chloro-3-Methylphenol		N	2790	mg/kg	0.50			< 0.50				
2-Methylnaphthalene		M	2790	mg/kg	0.50			< 0.50				
4-Nitrophenol		N	2790	mg/kg	0.50			< 0.50				
Hexachlorocyclopentadiene		N	2790	mg/kg	0.50			< 0.50				
2,4,6-Trichlorophenol		N	2790	mg/kg	0.50			< 0.50				
2,4,5-Trichlorophenol		N	2790	mg/kg	0.50			< 0.50				

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990				Client Sample Ref.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Client Sample ID.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1	0.4	0.1	0.1	0.1	0.6
				Date Sampled:		15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
2-Chloronaphthalene		M	2790	mg/kg	0.50			< 0.50				
2-Nitroaniline		N	2790	mg/kg	0.50			< 0.50				
Acenaphthylene		M	2790	mg/kg	0.50			< 0.50				
Dimethylphthalate		M	2790	mg/kg	0.50			< 0.50				
2,6-Dinitrotoluene		N	2790	mg/kg	0.50			< 0.50				
Acenaphthene		M	2790	mg/kg	0.50			< 0.50				
3-Nitroaniline		N	2790	mg/kg	0.50			< 0.50				
Dibenzofuran		M	2790	mg/kg	0.50			< 0.50				
4-Chlorophenylphenylether		M	2790	mg/kg	0.50			< 0.50				
2,4-Dinitrotoluene		N	2790	mg/kg	0.50			< 0.50				
Fluorene		M	2790	mg/kg	0.50			< 0.50				
Diethyl Phthalate		M	2790	mg/kg	0.50			< 0.50				
4-Nitroaniline		N	2790	mg/kg	0.50			< 0.50				
Azobenzene		M	2790	mg/kg	0.50			< 0.50				
4-Bromophenylphenyl Ether		M	2790	mg/kg	0.50			< 0.50				
Hexachlorobenzene		M	2790	mg/kg	0.50			< 0.50				
Phenanthrene		M	2790	mg/kg	0.50			< 0.50				
Anthracene		M	2790	mg/kg	0.50			< 0.50				
Carbazole		M	2790	mg/kg	0.50			< 0.50				
Di-N-Butyl Phthalate		N	2790	mg/kg	0.50			< 0.50				
Fluoranthene		M	2790	mg/kg	0.50			< 0.50				
Pyrene		M	2790	mg/kg	0.50			< 0.50				
Butylbenzyl Phthalate		N	2790	mg/kg	0.50			< 0.50				
Benzo[a]anthracene		M	2790	mg/kg	0.50			< 0.50				
Chrysene		M	2790	mg/kg	0.50			< 0.50				
Bis(2-Ethylhexyl)Phthalate		N	2790	mg/kg	0.50			< 0.50				
Di-N-Octyl Phthalate		N	2790	mg/kg	0.50			< 0.50				
Benzo[b]fluoranthene		M	2790	mg/kg	0.50			< 0.50				
Benzo[k]fluoranthene		M	2790	mg/kg	0.50			< 0.50				
Benzo[a]pyrene		M	2790	mg/kg	0.50			< 0.50				
Indeno(1,2,3-c,d)Pyrene		N	2790	mg/kg	0.50			< 0.50				
Dibenz(a,h)Anthracene		N	2790	mg/kg	0.50			< 0.50				
Benzo[g,h,i]perylene		M	2790	mg/kg	0.50			< 0.50				
Naphthalene		M	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170	24-12170	24-12170	24-12170	24-12170	24-12170	24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795837	1795838	1795839	1795840	1795841	1795842	1795843
Order No.: 007990				Client Sample Ref.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Client Sample ID.:		TP110	TP118	TP119	TP119	TP120	TP125	TP127
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		0.1	1	0.4	0.1	0.1	0.1	0.6
				Date Sampled:		15-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024	16-Apr-2024
				Time Sampled:		12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:		NEW-ASB		NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**							
Phenanthrene		M	2800	mg/kg	0.10	0.38	< 0.10		0.67	1.4	2.4	< 0.10
Anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.34	0.43	< 0.10
Fluoranthene		M	2800	mg/kg	0.10	0.68	< 0.10		1.1	2.5	3.6	< 0.10
Pyrene		M	2800	mg/kg	0.10	0.60	< 0.10		0.93	2.4	3.1	< 0.10
Benzo[a]anthracene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.51	1.0	1.5	< 0.10
Chrysene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.61	1.3	1.8	< 0.10
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.69	1.3	2.1	< 0.10
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.24	0.43	0.78	< 0.10
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.48	1.1	1.7	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.36	0.68	1.1	< 0.10
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.20	0.29	< 0.10
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10	< 0.10		0.35	0.69	0.96	< 0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0	< 2.0		5.9	13	20	< 2.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795844
Order No.: 007990				Client Sample Ref.:		WS103
				Client Sample ID.:		WS103
				Sample Type:		SOIL
				Top Depth (m):		0.8
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
				Asbestos Lab:		NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
ACM Type		U	2192		N/A	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected
Moisture		N	2030	%	0.020	14
Soil Colour		N	2040		N/A	
Other Material		N	2040		N/A	
Soil Texture		N	2040		N/A	
pH at 20C		M	2010		4.0	
Boron (Hot Water Soluble)		M	2120	mg/kg	0.40	0.41
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	
Total Sulphur		U	2175	%	0.010	
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	
Sulphate (Total)		U	2430	%	0.010	
Arsenic		M	2455	mg/kg	0.5	5.6
Barium		M	2455	mg/kg	0.5	48
Beryllium		U	2455	mg/kg	0.5	< 0.5
Cadmium		M	2455	mg/kg	0.10	< 0.10
Chromium		M	2455	mg/kg	0.5	10
Copper		M	2455	mg/kg	0.50	17
Mercury		M	2455	mg/kg	0.05	0.13
Nickel		M	2455	mg/kg	0.50	6.9
Lead		M	2455	mg/kg	0.50	22
Selenium		M	2455	mg/kg	0.25	0.29
Vanadium		U	2455	mg/kg	0.5	14
Zinc		M	2455	mg/kg	0.50	46
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50
Aliphatic VPH >C5-C6	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C6-C7	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C7-C8	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C8-C10	HS_2D_AL	U	2780	mg/kg	0.05	< 0.05
Total Aliphatic VPH >C5-C10	HS_2D_AL	U	2780	mg/kg	0.25	< 0.25
Aliphatic EPH >C10-C12 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	4.4
Aliphatic EPH >C12-C16 MC	EH_2D_AL_#1	M	2690	mg/kg	1.00	5.1
Aliphatic EPH >C16-C21 MC	EH_2D_AL_#1	M	2690	mg/kg	2.00	3.1
Aliphatic EPH >C21-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	3.00	37
Aliphatic EPH >C35-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	25

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795844
Order No.: 007990				Client Sample Ref.:		WS103
				Client Sample ID.:		WS103
				Sample Type:		SOIL
				Top Depth (m):		0.8
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
				Asbestos Lab:		NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
Total Aliphatic EPH >C10-C35 MC	EH_2D_AL_#1	M	2690	mg/kg	5.00	49
Total Aliphatic EPH >C10-C40 MC	EH_2D_AL_#1	N	2690	mg/kg	10.00	74
Aromatic VPH >C5-C7	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05
Aromatic VPH >C7-C8	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05
Aromatic VPH >C8-C10	HS_2D_AR	U	2780	mg/kg	0.05	< 0.05
Total Aromatic VPH >C5-C10	HS_2D_AR	U	2780	mg/kg	0.25	< 0.25
Aromatic EPH >C10-C12 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C12-C16 MC	EH_2D_AR_#1	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C16-C21 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	3.4
Aromatic EPH >C21-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	2.00	54
Aromatic EPH >C35-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	1.00	30
Total Aromatic EPH >C10-C35 MC	EH_2D_AR_#1	U	2690	mg/kg	5.00	57
Total Aromatic EPH >C10-C40 MC	EH_2D_AR_#1	N	2690	mg/kg	10.00	87
Total VPH >C5-C10	HS_2D_Total	U	2780	mg/kg	0.50	< 0.50
Total EPH >C10-C35 MC	EH_2D_Total_#1	U	2690	mg/kg	10.00	110
Total EPH >C10-C40 MC	EH_2D_Total_#1	N	2690	mg/kg	10.00	160
Total Organic Carbon		M	2625	%	0.20	
TPH >C6-C8	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C21-C25	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C25-C35	EH_1D_Total	N	2670	mg/kg	1.0	
TPH >C35-C40	EH_1D_Total	N	2670	mg/kg	1.0	
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	
Dichlorodifluoromethane		U	2760	µg/kg	1.0	< 1.0
Chloromethane		M	2760	µg/kg	1.0	< 1.0
Vinyl Chloride		M	2760	µg/kg	1.0	< 1.0
Bromomethane		M	2760	µg/kg	20	< 20
Chloroethane		U	2760	µg/kg	2.0	< 2.0
Trichlorofluoromethane		M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethene		M	2760	µg/kg	1.0	< 1.0
Dichloromethane		N	2760	µg/kg	50	< 50
Trans 1,2-Dichloroethene		M	2760	µg/kg	1.0	< 1.0
1,1-Dichloroethane		M	2760	µg/kg	1.0	< 1.0
cis 1,2-Dichloroethene		M	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795844
Order No.: 007990				Client Sample Ref.:		WS103
				Client Sample ID.:		WS103
				Sample Type:		SOIL
				Top Depth (m):		0.8
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
				Asbestos Lab:		NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
Bromochloromethane		U	2760	µg/kg	5.0	< 5.0
Trichloromethane		M	2760	µg/kg	1.0	< 1.0
1,1,1-Trichloroethane		M	2760	µg/kg	1.0	< 1.0
Tetrachloromethane		M	2760	µg/kg	1.0	< 1.0
1,1-Dichloropropene		U	2760	µg/kg	1.0	< 1.0
Benzene		M	2760	µg/kg	1.0	< 1.0
1,2-Dichloroethane		M	2760	µg/kg	2.0	< 2.0
Trichloroethene		N	2760	µg/kg	1.0	< 1.0
1,2-Dichloropropane		M	2760	µg/kg	1.0	< 1.0
Dibromomethane		M	2760	µg/kg	1.0	< 1.0
Bromodichloromethane		M	2760	µg/kg	5.0	< 5.0
cis-1,3-Dichloropropene		N	2760	µg/kg	10	< 10
Toluene		M	2760	µg/kg	1.0	< 1.0
Trans-1,3-Dichloropropene		N	2760	µg/kg	10	< 10
1,1,2-Trichloroethane		M	2760	µg/kg	10	< 10
Tetrachloroethene		M	2760	µg/kg	1.0	< 1.0
1,3-Dichloropropane		U	2760	µg/kg	2.0	< 2.0
Dibromochloromethane		U	2760	µg/kg	10	< 10
1,2-Dibromoethane		M	2760	µg/kg	5.0	< 5.0
Chlorobenzene		M	2760	µg/kg	1.0	< 1.0
1,1,1,2-Tetrachloroethane		M	2760	µg/kg	2.0	< 2.0
Ethylbenzene		M	2760	µg/kg	1.0	< 1.0
m & p-Xylene		M	2760	µg/kg	1.0	< 1.0
o-Xylene		M	2760	µg/kg	1.0	< 1.0
Styrene		M	2760	µg/kg	1.0	< 1.0
Tribromomethane		U	2760	µg/kg	1.0	< 1.0
Isopropylbenzene		M	2760	µg/kg	1.0	< 1.0
Bromobenzene		M	2760	µg/kg	1.0	< 1.0
1,2,3-Trichloropropane		N	2760	µg/kg	50	< 50
N-Propylbenzene		U	2760	µg/kg	1.0	< 1.0
2-Chlorotoluene		M	2760	µg/kg	1.0	< 1.0
1,3,5-Trimethylbenzene		M	2760	µg/kg	1.0	< 1.0
4-Chlorotoluene		U	2760	µg/kg	1.0	< 1.0
Tert-Butylbenzene		U	2760	µg/kg	1.0	< 1.0
1,2,4-Trimethylbenzene		M	2760	µg/kg	1.0	< 1.0
Sec-Butylbenzene		U	2760	µg/kg	1.0	< 1.0
1,3-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795844
Order No.: 007990				Client Sample Ref.:		WS103
				Client Sample ID.:		WS103
				Sample Type:		SOIL
				Top Depth (m):		0.8
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
				Asbestos Lab:		NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
4-Isopropyltoluene		U	2760	µg/kg	1.0	< 1.0
1,4-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0
N-Butylbenzene		U	2760	µg/kg	1.0	< 1.0
1,2-Dichlorobenzene		M	2760	µg/kg	1.0	< 1.0
1,2-Dibromo-3-Chloropropane		U	2760	µg/kg	50	< 50
1,2,4-Trichlorobenzene		M	2760	µg/kg	1.0	< 1.0
Hexachlorobutadiene		N	2760	µg/kg	1.0	< 1.0
1,2,3-Trichlorobenzene		U	2760	µg/kg	2.0	< 2.0
Methyl Tert-Butyl Ether		M	2760	µg/kg	1.0	< 1.0
N-Nitrosodimethylamine		M	2790	mg/kg	0.50	< 0.50
Phenol		M	2790	mg/kg	0.50	< 0.50
2-Chlorophenol		N	2790	mg/kg	0.50	< 0.50
Bis-(2-Chloroethyl)Ether		M	2790	mg/kg	0.50	< 0.50
1,3-Dichlorobenzene		M	2790	mg/kg	0.50	< 0.50
1,4-Dichlorobenzene		N	2790	mg/kg	0.50	< 0.50
1,2-Dichlorobenzene		M	2790	mg/kg	0.50	< 0.50
2-Methylphenol		M	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroisopropyl)Ether		M	2790	mg/kg	0.50	< 0.50
Hexachloroethane		N	2790	mg/kg	0.50	< 0.50
N-Nitrosodi-n-propylamine		M	2790	mg/kg	0.50	< 0.50
4-Methylphenol		M	2790	mg/kg	0.50	< 0.50
Nitrobenzene		N	2790	mg/kg	0.50	< 0.50
Isophorone		M	2790	mg/kg	0.50	< 0.50
2-Nitrophenol		N	2790	mg/kg	0.50	< 0.50
2,4-Dimethylphenol		N	2790	mg/kg	0.50	< 0.50
Bis(2-Chloroethoxy)Methane		M	2790	mg/kg	0.50	< 0.50
2,4-Dichlorophenol		N	2790	mg/kg	0.50	< 0.50
1,2,4-Trichlorobenzene		M	2790	mg/kg	0.50	< 0.50
Naphthalene		M	2790	mg/kg	0.50	< 0.50
4-Chloroaniline		N	2790	mg/kg	0.50	< 0.50
Hexachlorobutadiene		M	2790	mg/kg	0.50	< 0.50
4-Chloro-3-Methylphenol		N	2790	mg/kg	0.50	< 0.50
2-Methylnaphthalene		M	2790	mg/kg	0.50	< 0.50
4-Nitrophenol		N	2790	mg/kg	0.50	< 0.50
Hexachlorocyclopentadiene		N	2790	mg/kg	0.50	< 0.50
2,4,6-Trichlorophenol		N	2790	mg/kg	0.50	< 0.50
2,4,5-Trichlorophenol		N	2790	mg/kg	0.50	< 0.50

Results - Soil

Project: Trubs Farm 17-524

Client: E3P						**Chemtest Job No.:**	24-12170
Quotation No.: Q23-31421						**Chemtest Sample ID.:**	1795844
Order No.: 007990						Client Sample Ref.:	WS103
						Client Sample ID.:	WS103
						Sample Type:	SOIL
						Top Depth (m):	0.8
						Date Sampled:	17-Apr-2024
						Time Sampled:	12:00
						Asbestos Lab:	NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**		
2-Chloronaphthalene		M	2790	mg/kg	0.50	< 0.50	
2-Nitroaniline		N	2790	mg/kg	0.50	< 0.50	
Acenaphthylene		M	2790	mg/kg	0.50	< 0.50	
Dimethylphthalate		M	2790	mg/kg	0.50	< 0.50	
2,6-Dinitrotoluene		N	2790	mg/kg	0.50	< 0.50	
Acenaphthene		M	2790	mg/kg	0.50	< 0.50	
3-Nitroaniline		N	2790	mg/kg	0.50	< 0.50	
Dibenzofuran		M	2790	mg/kg	0.50	< 0.50	
4-Chlorophenylphenylether		M	2790	mg/kg	0.50	< 0.50	
2,4-Dinitrotoluene		N	2790	mg/kg	0.50	< 0.50	
Fluorene		M	2790	mg/kg	0.50	< 0.50	
Diethyl Phthalate		M	2790	mg/kg	0.50	< 0.50	
4-Nitroaniline		N	2790	mg/kg	0.50	< 0.50	
Azobenzene		M	2790	mg/kg	0.50	< 0.50	
4-Bromophenylphenyl Ether		M	2790	mg/kg	0.50	< 0.50	
Hexachlorobenzene		M	2790	mg/kg	0.50	< 0.50	
Phenanthrene		M	2790	mg/kg	0.50	< 0.50	
Anthracene		M	2790	mg/kg	0.50	< 0.50	
Carbazole		M	2790	mg/kg	0.50	< 0.50	
Di-N-Butyl Phthalate		N	2790	mg/kg	0.50	< 0.50	
Fluoranthene		M	2790	mg/kg	0.50	< 0.50	
Pyrene		M	2790	mg/kg	0.50	< 0.50	
Butylbenzyl Phthalate		N	2790	mg/kg	0.50	< 0.50	
Benzo[a]anthracene		M	2790	mg/kg	0.50	< 0.50	
Chrysene		M	2790	mg/kg	0.50	< 0.50	
Bis(2-Ethylhexyl)Phthalate		N	2790	mg/kg	0.50	< 0.50	
Di-N-Octyl Phthalate		N	2790	mg/kg	0.50	< 0.50	
Benzo[b]fluoranthene		M	2790	mg/kg	0.50	< 0.50	
Benzo[k]fluoranthene		M	2790	mg/kg	0.50	< 0.50	
Benzo[a]pyrene		M	2790	mg/kg	0.50	< 0.50	
Indeno(1,2,3-c,d)Pyrene		N	2790	mg/kg	0.50	< 0.50	
Dibenz(a,h)Anthracene		N	2790	mg/kg	0.50	< 0.50	
Benzo[g,h,i]perylene		M	2790	mg/kg	0.50	< 0.50	
Naphthalene		M	2800	mg/kg	0.10		
Acenaphthylene		N	2800	mg/kg	0.10		
Acenaphthene		M	2800	mg/kg	0.10		
Fluorene		M	2800	mg/kg	0.10		

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12170
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1795844
Order No.: 007990				Client Sample Ref.:		WS103
				Client Sample ID.:		WS103
				Sample Type:		SOIL
				Top Depth (m):		0.8
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
				Asbestos Lab:		NEW-ASB
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
Phenanthrene		M	2800	mg/kg	0.10	
Anthracene		M	2800	mg/kg	0.10	
Fluoranthene		M	2800	mg/kg	0.10	
Pyrene		M	2800	mg/kg	0.10	
Benzo[a]anthracene		M	2800	mg/kg	0.10	
Chrysene		M	2800	mg/kg	0.10	
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	
Benzo[a]pyrene		M	2800	mg/kg	0.10	
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	
Total Of 16 PAH's		N	2800	mg/kg	2.0	
Total Phenols		M	2920	mg/kg	0.10	

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
1010	pH Value of Waters	pH at 20°C	pH Meter	
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.	
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection	
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.	
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection	
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection	
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.	
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8-C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection	
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge	
650	Characterisation of Waste (Leaching WAC)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge	

Report Information

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

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.
Any comments or interpretations are outside the scope of UKAS accreditation.
The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.
Uncertainty of measurement for the determinands tested are available upon request .
None of the results in this report have been recovery corrected.
All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at ≤ 30°C prior to analysis.
All Asbestos testing is performed at the indicated laboratory .
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.
All water samples will be retained for 14 days from the date of receipt.
Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

DW - Drinking Water
GW - Ground Water
LE - Land Leachate
NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

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

HWOL Acronym System

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

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	24-12569-1		
Initial Date of Issue:	29-Apr-2024		
Re-Issue Details:			
Client	E3P		
Client Address:	Taylor Road Trafford Park Urmston Manchester M41 7JQ		
Contact(s):	mdee@e3p.co.uk; jbeer@e3p.co.uk		
Project	Trubs Farm 17-524		
Quotation No.:	Q23-31421	**Date Received:**	23-Apr-2024
Order No.:	007990	**Date Instructed:**	23-Apr-2024
No. of Samples:	1		
Turnaround (Wkdays):	5	**Results Due:**	29-Apr-2024
Date Approved:	29-Apr-2024		

Approved By:

Details: David Smith, Technical Director

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

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12569
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1797570
Order No.: 007990				Client Sample Ref.:		WS106
				Client Sample ID.:		WS106
				Sample Type:		SOIL
				Top Depth (m):		3.7
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
Moisture		N	2030	%	0.020	14
Soil Colour		N	2040		N/A	Brown
Other Material		N	2040		N/A	Roots and Stones
Soil Texture		N	2040		N/A	Sand
pH at 20C		M	2010		4.0	8.5
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.058
Total Sulphur		U	2175	%	0.010	0.083
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	18
Sulphate (Total)		U	2430	%	0.010	0.31
Arsenic		M	2455	mg/kg	0.5	7.4
Cadmium		M	2455	mg/kg	0.10	< 0.10
Chromium		M	2455	mg/kg	0.5	11
Copper		M	2455	mg/kg	0.50	12
Mercury		M	2455	mg/kg	0.05	< 0.05
Nickel		M	2455	mg/kg	0.50	18
Lead		M	2455	mg/kg	0.50	8.2
Selenium		M	2455	mg/kg	0.25	< 0.25
Zinc		M	2455	mg/kg	0.50	32
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50
Total Organic Carbon		M	2625	%	0.20	0.70
TPH >C6-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C21-C25	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C25-C35	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
TPH >C35-C40	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	< 10
Naphthalene		M	2800	mg/kg	0.10	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10
Acenaphthene		M	2800	mg/kg	0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10
Phenanthrene		M	2800	mg/kg	0.10	< 0.10
Anthracene		M	2800	mg/kg	0.10	< 0.10
Fluoranthene		M	2800	mg/kg	0.10	< 0.10

Results - Soil

Project: Trubs Farm 17-524

Client: E3P				**Chemtest Job No.:**		24-12569
Quotation No.: Q23-31421				**Chemtest Sample ID.:**		1797570
Order No.: 007990				Client Sample Ref.:		WS106
				Client Sample ID.:		WS106
				Sample Type:		SOIL
				Top Depth (m):		3.7
				Date Sampled:		17-Apr-2024
				Time Sampled:		12:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**	
Pyrene		M	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene		M	2800	mg/kg	0.10	< 0.10
Chrysene		M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene		M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0	< 2.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

Report Information

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

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.
Any comments or interpretations are outside the scope of UKAS accreditation.
The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.
Uncertainty of measurement for the determinands tested are available upon request .
None of the results in this report have been recovery corrected.
All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at ≤ 30°C prior to analysis.
All Asbestos testing is performed at the indicated laboratory .
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.
All water samples will be retained for 14 days from the date of receipt.
Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

DW - Drinking Water
GW - Ground Water
LE - Land Leachate
NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

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

HWOL Acronym System

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

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

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

2183

Amended Report

Report No.:	24-14928-2		
Initial Date of Issue:	17-May-2024	**Date of Re-Issue:**	03-Jun-2024
Re-Issue Details:	This report has been revised and directly supersedes 24-14928-1 in its entirety		
Client	E3P		
Client Address:	Taylor Road Trafford Park Urmston Manchester M41 7JQ		
Contact(s):	jbeer@e3p.co.uk; mdee@e3p.co.uk		
Project	Trub Farm 17-524		
Quotation No.:	Q23-31421	**Date Received:**	13-May-2024
Order No.:	8197	**Date Instructed:**	13-May-2024
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	17-May-2024
Date Approved:	17-May-2024		

Approved By:

Details: David Smith, Technical Director

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

Results - Water

Project: Trub Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-14928	24-14928	24-14928	24-14928	24-14928
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1806240	1806241	1806242	1806243	1806244
					Client Sample ID.:	WS103	WS105	WS1112	Brook East	Brook West
					Sample Type:	WATER	WATER	WATER	WATER	WATER
					Sample Sub Type:					
					Date Sampled:	09-May-2024	09-May-2024	09-May-2024	09-May-2024	09-May-2024
					Time Sampled:	0:00	0:00	0:00	0:00	0:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**					
pH at 20C		U	1010		4.0	6.6	6.3	6.5	7.7	7.3
Cyanide (Total) Low-Level		N	1300	mg/l	0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050
Calcium (Dissolved)		U	1455	mg/l	2.00				8.2	7.8
Arsenic (Dissolved)		U	1455	µg/l	0.20	0.49	10	6.0	0.60	0.77
Cadmium (Dissolved)		U	1455	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)		U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper (Dissolved)		U	1455	µg/l	0.50	1.6	< 0.50	< 0.50	4.3	3.9
Manganese (Dissolved)		U	1455	µg/l	0.50	6200	590	1200	5.2	2.1
Nickel (Dissolved)		U	1455	µg/l	0.50	2.8	5.8	1.3	1.5	0.96
Lead (Dissolved)		U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.82
Selenium (Dissolved)		U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Zinc (Dissolved)		U	1455	µg/l	2.5	15	11	11	11	15
Mercury Low Level		U	1460	µg/l	0.010	0.020	< 0.010	< 0.010	< 0.010	< 0.010
Chromium (Hexavalent)		U	1490	µg/l	20	[B] < 20	[B] < 20	[B] < 20	[B] < 20	[B] < 20
Dissolved Organic Carbon		U	1610	mg/l	2.0				5.1	5.1
Aliphatic TPH >C5-C6	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	EH_2D_AL_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	EH_2D_AL_#1	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	EH_2D_AR_#1	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	EH_2D_AR_#1	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	EH_2D_Total_#1	N	1675	µg/l	10	< 10	< 10	< 10	< 10	< 10
Dichlorodifluoromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5
Chloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Results - Water

Project: Trub Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-14928	24-14928	24-14928	24-14928	24-14928
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1806240	1806241	1806242	1806243	1806244
					Client Sample ID.:	WS103	WS105	WS1112	Brook East	Brook West
					Sample Type:	WATER	WATER	WATER	WATER	WATER
					Sample Sub Type:					
					Date Sampled:	09-May-2024	09-May-2024	09-May-2024	09-May-2024	09-May-2024
					Time Sampled:	0:00	0:00	0:00	0:00	0:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**					
Trichlorofluoromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5
Trichloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene		N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10
Toluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene		N	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane		U	1760	µg/l	10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane		U	1760	µg/l	5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane		N	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Water

Project: Trub Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-14928	24-14928	24-14928	24-14928	24-14928
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1806240	1806241	1806242	1806243	1806244
					Client Sample ID.:	WS103	WS105	WS1112	Brook East	Brook West
					Sample Type:	WATER	WATER	WATER	WATER	WATER
					Sample Sub Type:					
					Date Sampled:	09-May-2024	09-May-2024	09-May-2024	09-May-2024	09-May-2024
					Time Sampled:	0:00	0:00	0:00	0:00	0:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**					
1,2,4-Trimethylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane		U	1760	µg/l	50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene		U	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene		U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether		N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Nitrosodimethylamine		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Chlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis-(2-Chloroethyl)Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,3-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,4-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylphenol (o-Cresol)		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroisopropyl)Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachloroethane		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
N-Nitrosodi-n-propylamine		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Methylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Nitrobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Isophorone		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dimethylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Chloroethoxy)Methane		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2,4-Trichlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Naphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobutadiene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chloro-3-Methylphenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methylnaphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorocyclopentadiene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,6-Trichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4,5-Trichlorophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50

Results - Water

Project: Trub Farm 17-524

Client: E3P					**Chemtest Job No.:**	24-14928	24-14928	24-14928	24-14928	24-14928
Quotation No.: Q23-31421					**Chemtest Sample ID.:**	1806240	1806241	1806242	1806243	1806244
					Client Sample ID.:	WS103	WS105	WS1112	Brook East	Brook West
					Sample Type:	WATER	WATER	WATER	WATER	WATER
					Sample Sub Type:					
					Date Sampled:	09-May-2024	09-May-2024	09-May-2024	09-May-2024	09-May-2024
					Time Sampled:	0:00	0:00	0:00	0:00	0:00
Determinand	**HWOL Code**	**Accred.**	**SOP**	**Units**	**LOD**					
2-Chloronaphthalene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthylene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dimethylphthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,6-Dinitrotoluene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Acenaphthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
3-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenzofuran		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Chlorophenylphenylether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2,4-Dinitrotoluene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluorene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Diethyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitroaniline		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Methyl-4,6-Dinitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Azobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Bromophenylphenyl Ether		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Hexachlorobenzene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Phenanthrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbazole		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Butyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Butylbenzyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chrysene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bis(2-Ethylhexyl)Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Di-N-Octyl Phthalate		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[b]fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[k]fluoranthene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[a]pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Indeno(1,2,3-c,d)Pyrene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dibenz(a,h)Anthracene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Benzo[g,h,i]perylene		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
4-Nitrophenol		N	1790	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Phenols		U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1806240		WS103		09-May-2024	B	Coloured Winchester 1000ml
1806240		WS103		09-May-2024	B	EPA Vial 40ml
1806240		WS103		09-May-2024	B	Plastic Bottle 1000ml
1806241		WS105		09-May-2024	B	Coloured Winchester 1000ml
1806241		WS105		09-May-2024	B	EPA Vial 40ml
1806241		WS105		09-May-2024	B	Plastic Bottle 1000ml
1806242		WS1112		09-May-2024	B	Coloured Winchester 1000ml
1806242		WS1112		09-May-2024	B	EPA Vial 40ml
1806242		WS1112		09-May-2024	B	Plastic Bottle 1000ml
1806243		Brook East		09-May-2024	B	Coloured Winchester 1000ml
1806243		Brook East		09-May-2024	B	EPA Vial 40ml
1806243		Brook East		09-May-2024	B	Plastic Bottle 1000ml
1806244		Brook West		09-May-2024	B	Coloured Winchester 1000ml
1806244		Brook West		09-May-2024	B	EPA Vial 40ml
1806244		Brook West		09-May-2024	B	Plastic Bottle 1000ml

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
1010	pH Value of Waters	pH at 20°C	pH Meter	RE PW TE TS PL DW GW
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.	
1455	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	RE PW PL SW DW GW
1460	Mercury low-level in Waters by AFS	Mercury	Atomic Fluorescence Spectrometry, with collimated UV source, wavelength 253.7 nm.	PL GW
1490	Hexavalent Chromium in Waters	Chromium [VI]	Automated colorimetric analysis by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	PL GW
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation	PL SW GW
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	Aliphatics: >C5–C6, >C6–C8, >C8– C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Pentane extraction / GCxGC FID detection	
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.	PL GW
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection	
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	PL GW

Report Information

Key

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

This report shall not be reproduced except in full, and only with the prior approval of the laboratory.
Any comments or interpretations are outside the scope of UKAS accreditation.
The Laboratory is not accredited for any sampling activities and reported results relate to the samples 'as received' at the laboratory.
Uncertainty of measurement for the determinands tested are available upon request .
None of the results in this report have been recovery corrected.
All results are expressed on a dry weight basis.

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

For all other tests the samples were dried at ≤ 30°C prior to analysis.
All Asbestos testing is performed at the indicated laboratory .
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1.

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 30 days from the date of receipt.
All water samples will be retained for 14 days from the date of receipt.
Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

DW - Drinking Water
GW - Ground Water
LE - Land Leachate
NA - Not Applicable

Report Information

PL - Prepared Leachate
PW - Processed Water
RE - Recreational Water
SA - Saline Water
SW - Surface Water
TE - Treated Effluent
TS - Treated Sewage
UL - Unspecified Liquid

Clean Up Codes

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

HWOL Acronym System

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

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

APPENDIX IX
GEOTECHNICAL TESTING RESULTS

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client e3p

Address Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

Contract Trubs Farm, 17-524

Job Number MRN 24005/86
Date of Issue 23 May 2024

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

Andrew House, Hadfield Street, Dukinfield, Cheshire SK16 4QX Tel: 0161 475 0870
Email: enquiries@murrayrix.com Website: www.murrayrix.com

Also at: London: 020 8523 1999

UKAS TESTING 1580

Murray Rix is the trading name of Murray Rix (Northern) Limited. Registered in England 2878361

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

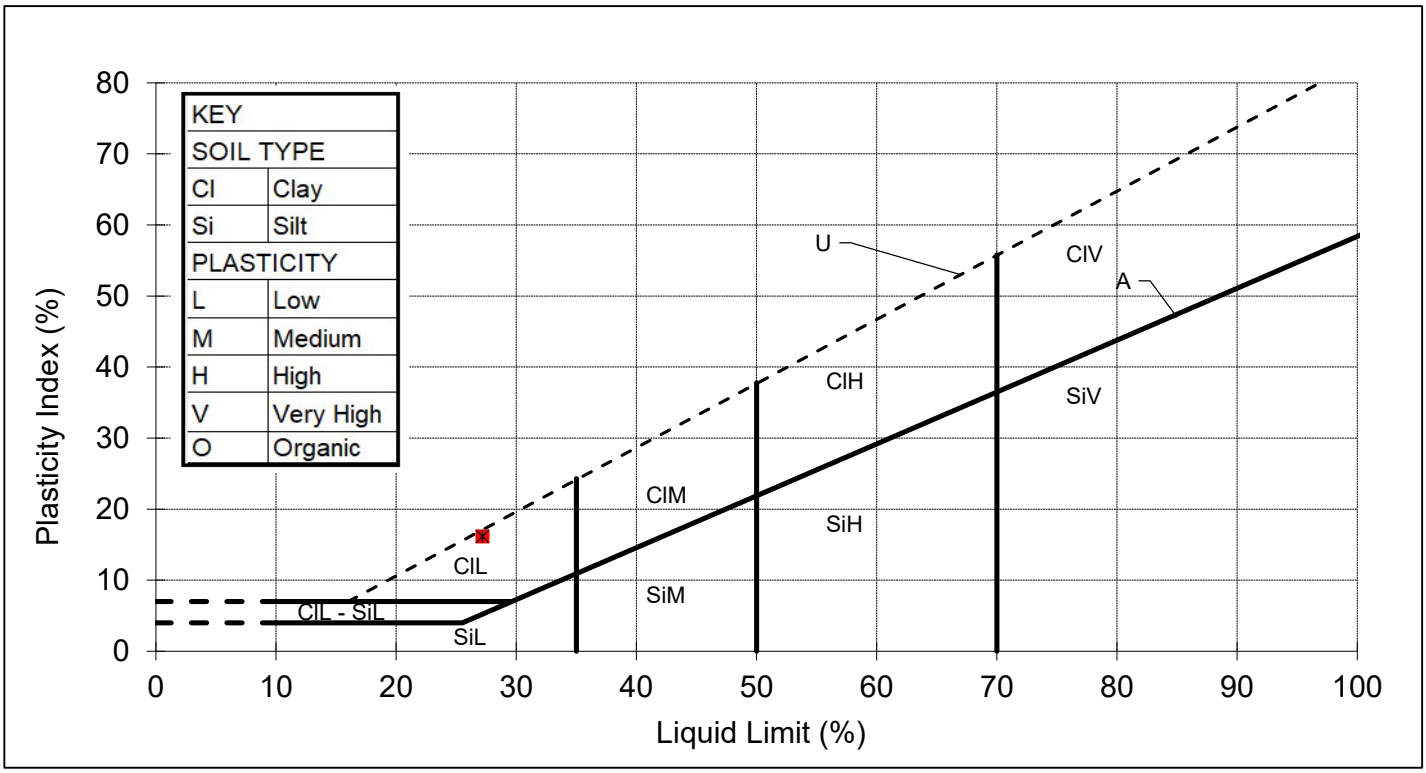
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS105 2 D	DATE SAMPLED	Not advised
SAMPLE No.	467504	DATE RECEIVED	02-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	17.0	26.1	1.044	
Determination 2 (avg)	16.7	26.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.9	27	11	16	100



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

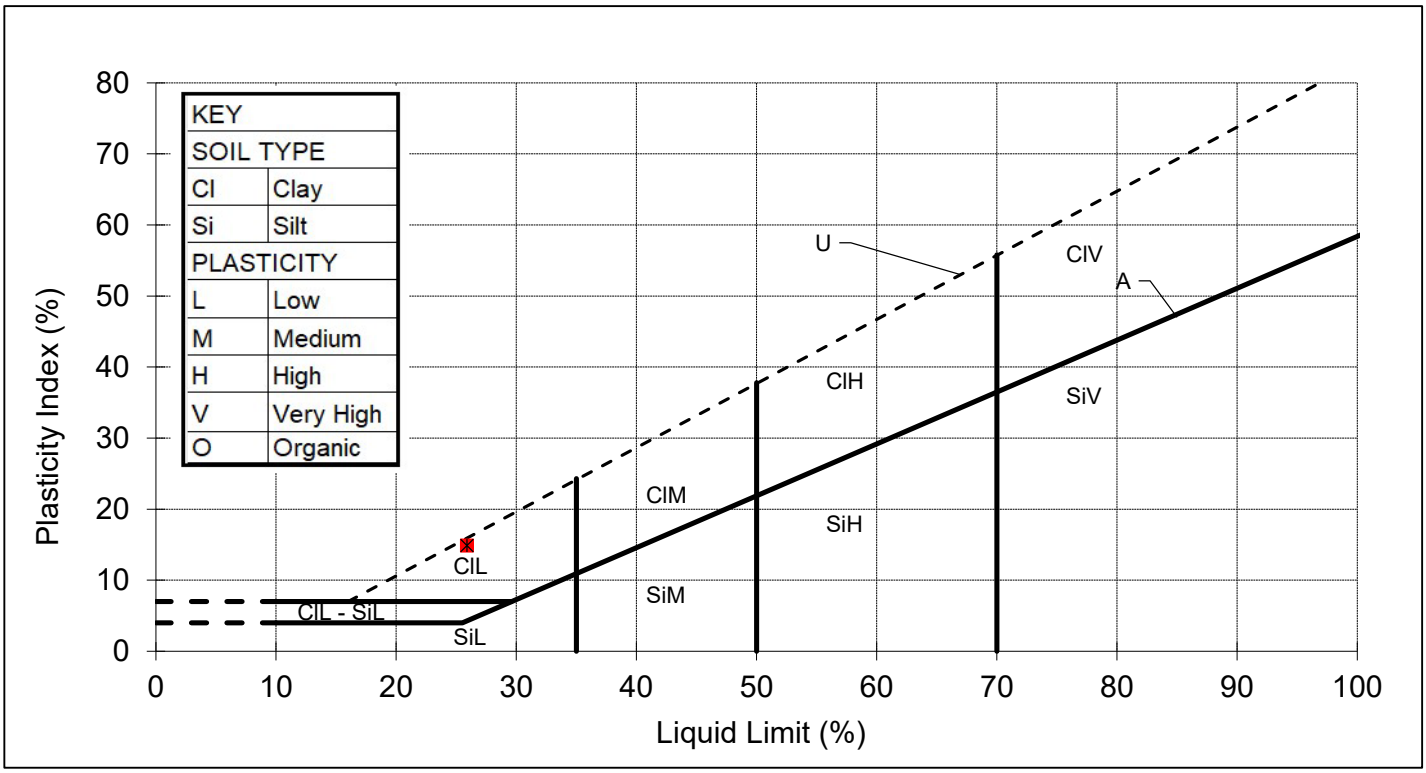
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS107 2 D	DATE SAMPLED	Not advised
SAMPLE No.	467506	DATE RECEIVED	02-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	18.6	25.5	1.022	
Determination 2 (avg)	18.5	25.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.9	26	11	15	100



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

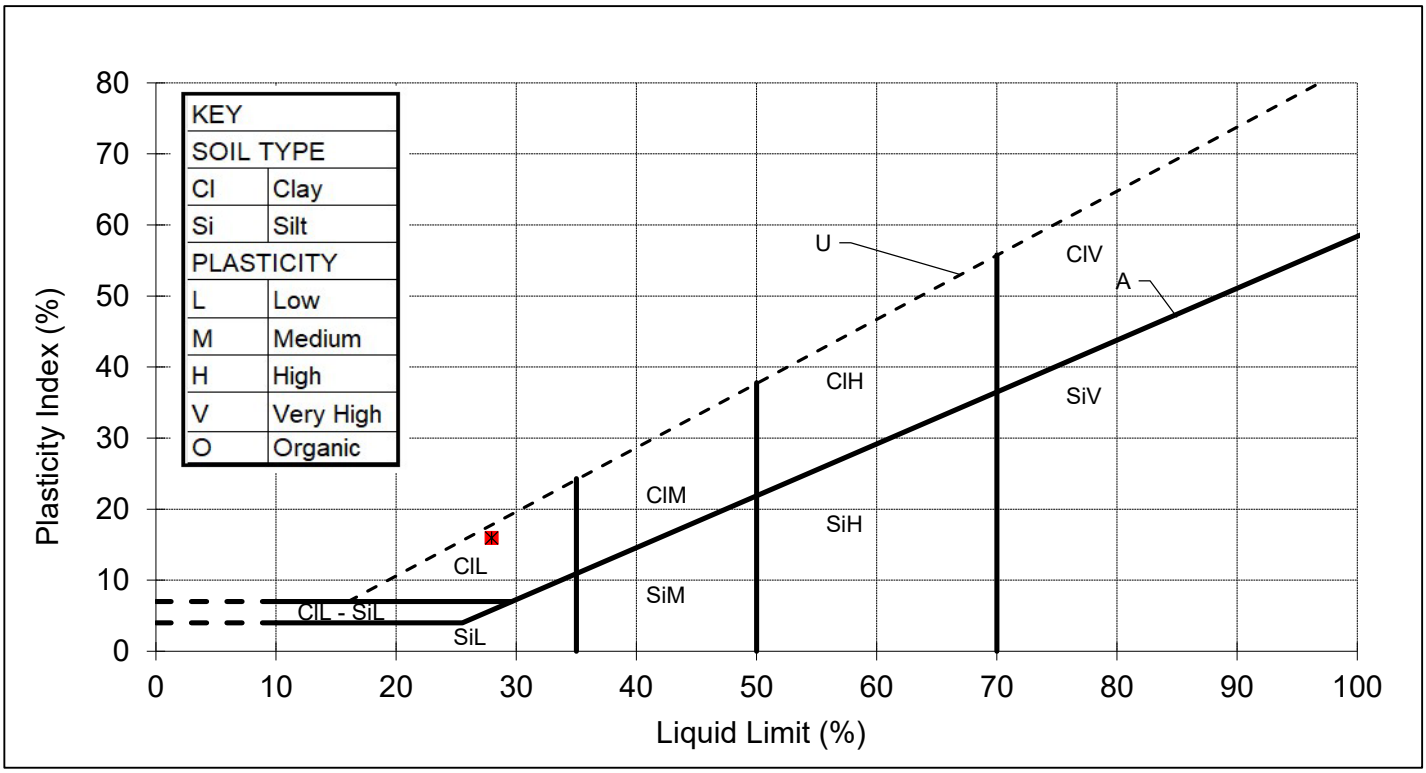
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS109 2 D	DATE SAMPLED	Not advised
SAMPLE No.	467508	DATE RECEIVED	02-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.0	28.2	1.000	
Determination 2 (avg)	20.0	27.7		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
14.9	28	12	16	100



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A2:2022 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014+A1:2022

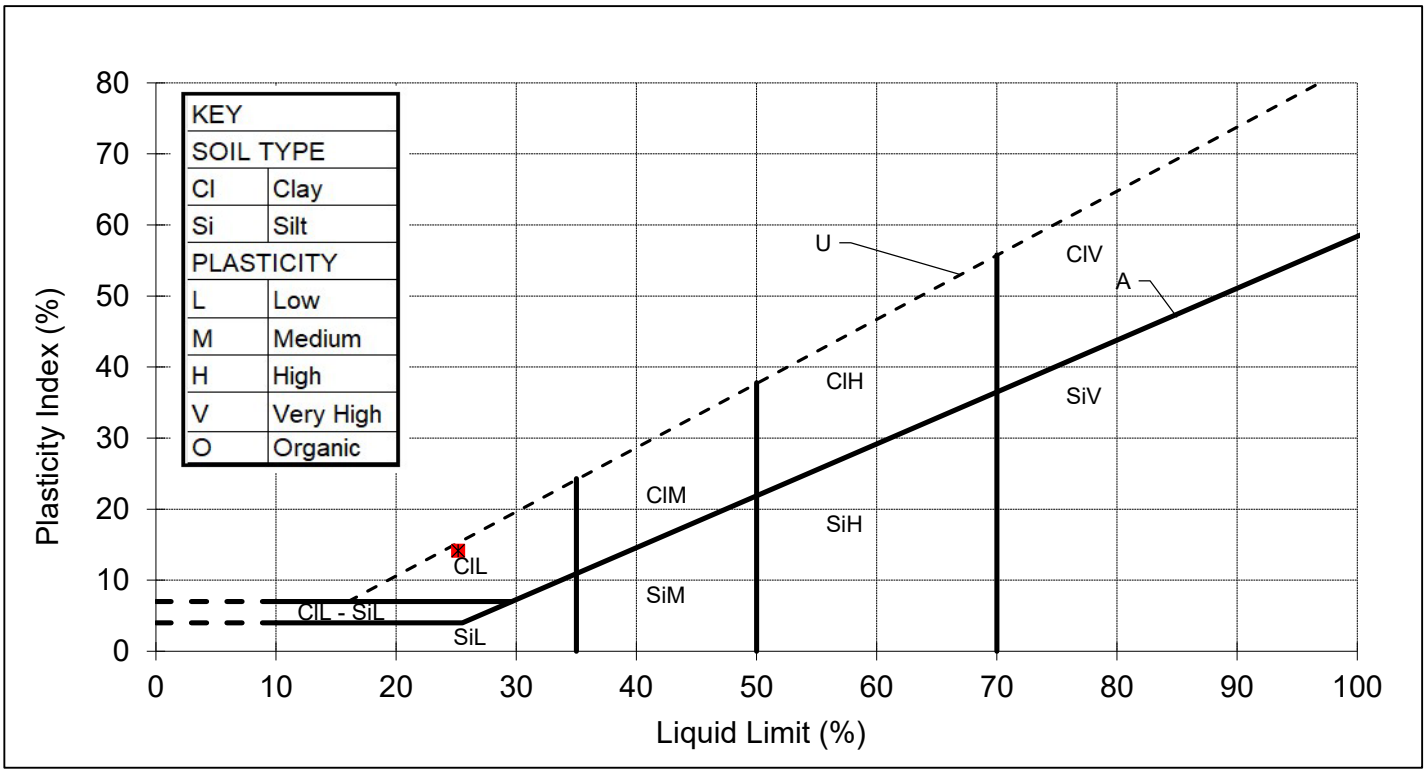
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	CP102 1.2-1.65 D	DATE SAMPLED	Not advised
SAMPLE No.	467509	DATE RECEIVED	02-May-24
DATE TESTED	07-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy CLAY		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Hand Picked

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	23.2	26.2	0.963	
Determination 2 (avg)	22.5	26.1		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
15.0	25	11	14	100



REMARKS

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager)

DATE 23-May-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

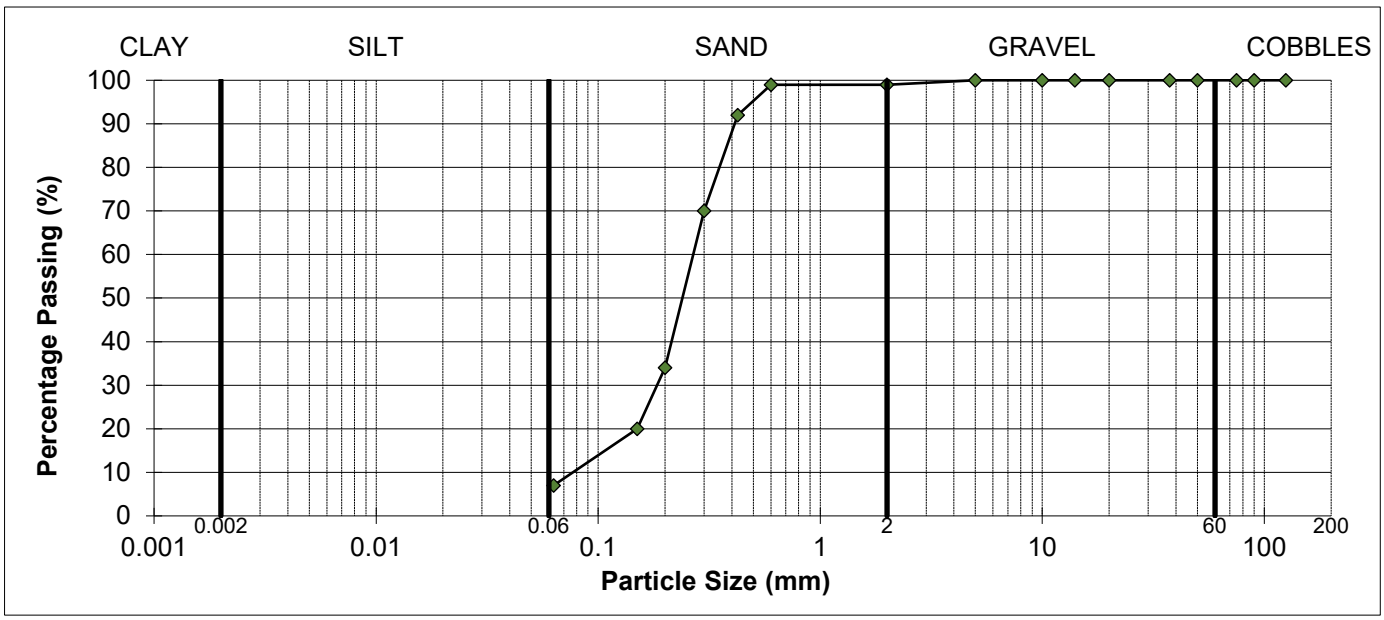
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP124 0.7 B	DATE SAMPLED	Not advised
LAB SAMPLE No	467501	DATE RECEIVED	02-May-24
DATE TESTED	08-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	100	
90	100		2	99	
75	100		0.6	99	
50	100		0.425	92	
37.5	100		0.3	70	
20	100		0.2	34	
14	100		0.15	20	
10	100		0.063	7	<15



SOIL FRACTIONS			
COBBLES	0%	SAND	92%
GRAVEL	1%	SILT / CLAY	7%

As received water content	22.6%

REMARKS

Sample complies with the advised grading specification for a 1B material (SHW 2016), Uniformity coefficient = <10

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

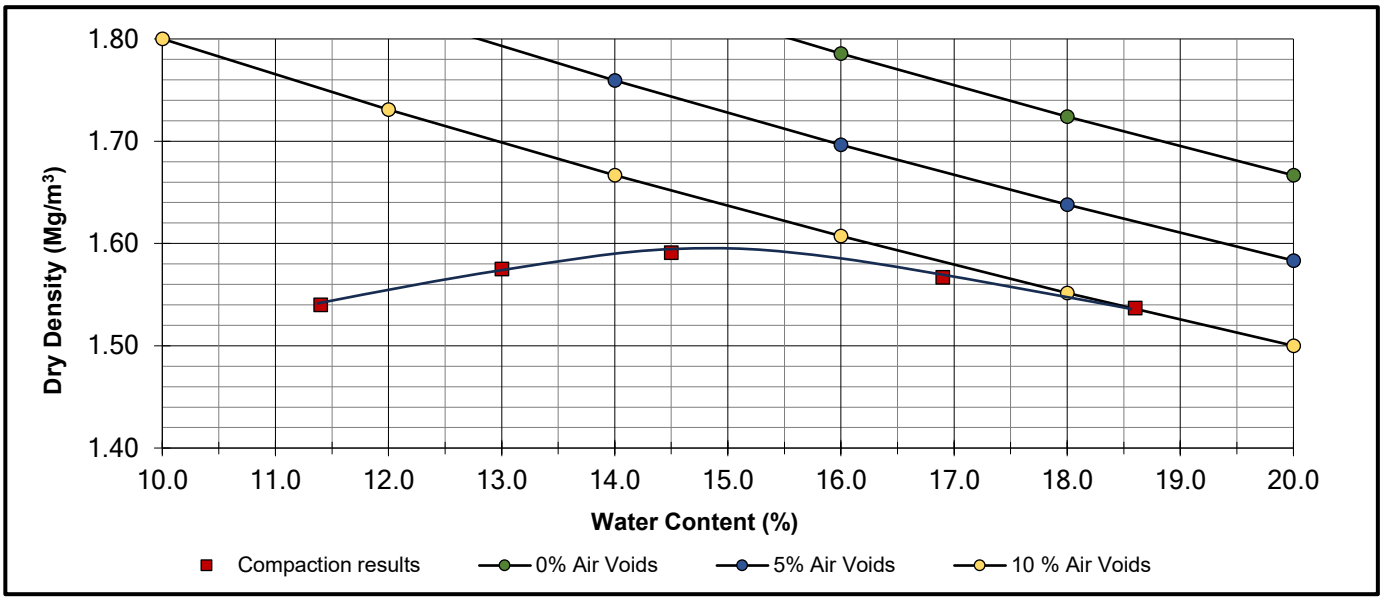
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP124 0.7 B	DATE SAMPLED	Not advised
SAMPLE NUMBER	467501	DATE RECEIVED	02-May-24
DATE TESTED	15-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly gravelly SAND
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.50 Mg/m3 (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	11.4	1.540
2	13.0	1.575
3	14.5	1.591
4	16.9	1.567
5	18.6	1.537



OPTIMUM WATER CONTENT	**15**	(%)
MAXIMUM DRY DENSITY	**1.59**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 23-May-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

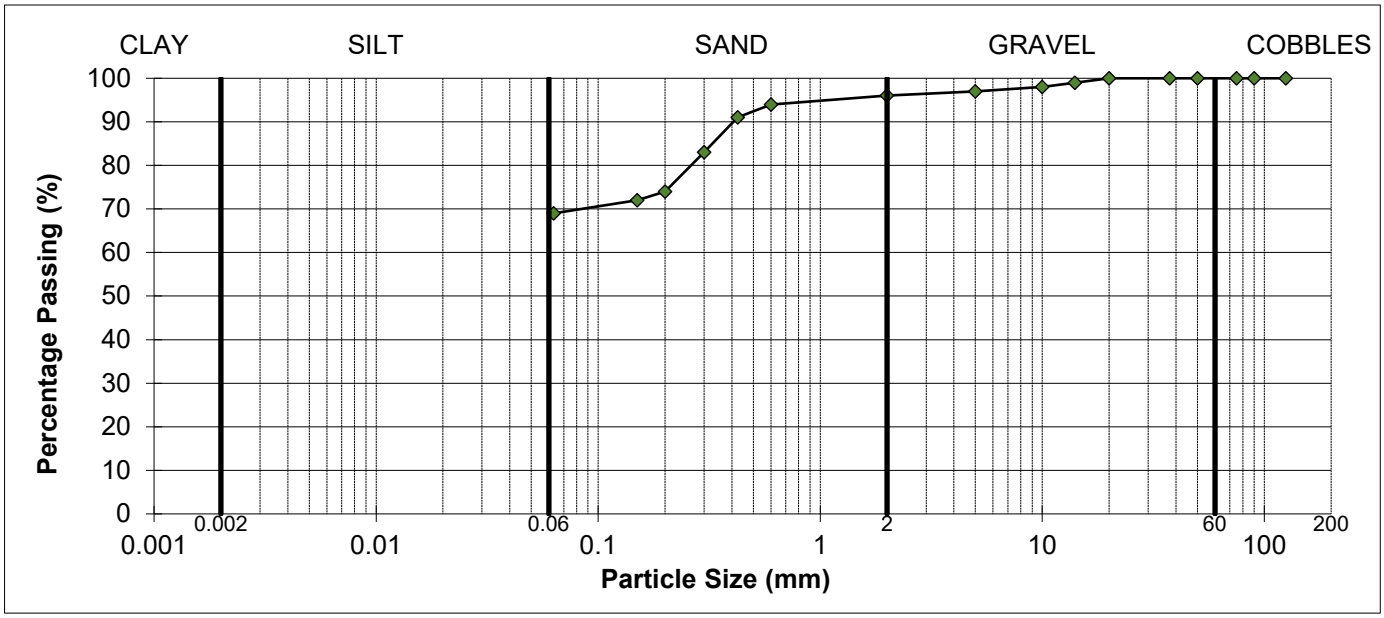
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS107 1.5-2 B	DATE SAMPLED	Not advised
LAB SAMPLE No	467502	DATE RECEIVED	02-May-24
DATE TESTED	08-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	97	
90	100		2	96	80-100
75	100		0.6	94	
50	100		0.425	91	
37.5	100		0.3	83	
20	100		0.2	74	
14	99		0.15	72	
10	98		0.063	69	15-100



SOIL FRACTIONS			
COBBLES	0%	SAND	27%
GRAVEL	4%	SILT / CLAY	69%

As received water content	13.5%

REMARKS
Sample complies with the advised grading specification for a 2A/2B material (SHW 2016)

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

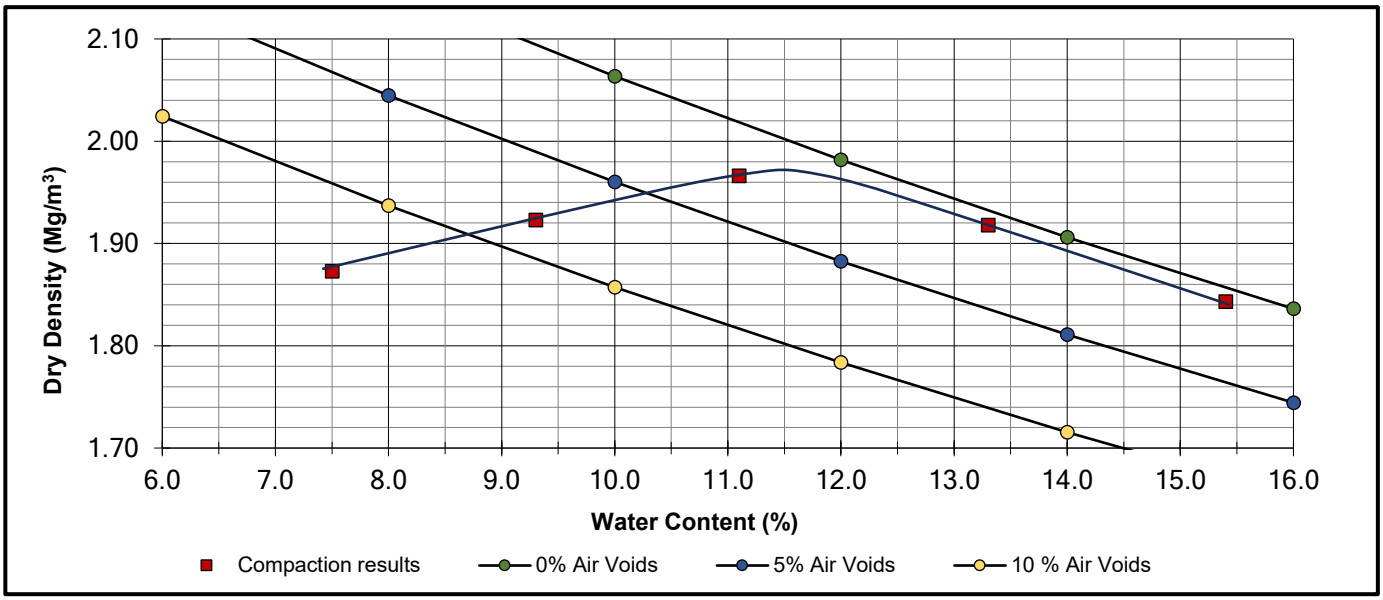
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS107 1.5-2 B	DATE SAMPLED	Not advised
SAMPLE NUMBER	467502	DATE RECEIVED	02-May-24
DATE TESTED	15-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 1
RETAINED 20mm	0 %	PARTICLE DENSITY	2.60 Mg/m3 (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	7.5	1.873
2	9.3	1.923
3	11.1	1.966
4	13.3	1.918
5	15.4	1.843



OPTIMUM WATER CONTENT	**12**	(%)
MAXIMUM DRY DENSITY	**1.97**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 23-May-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

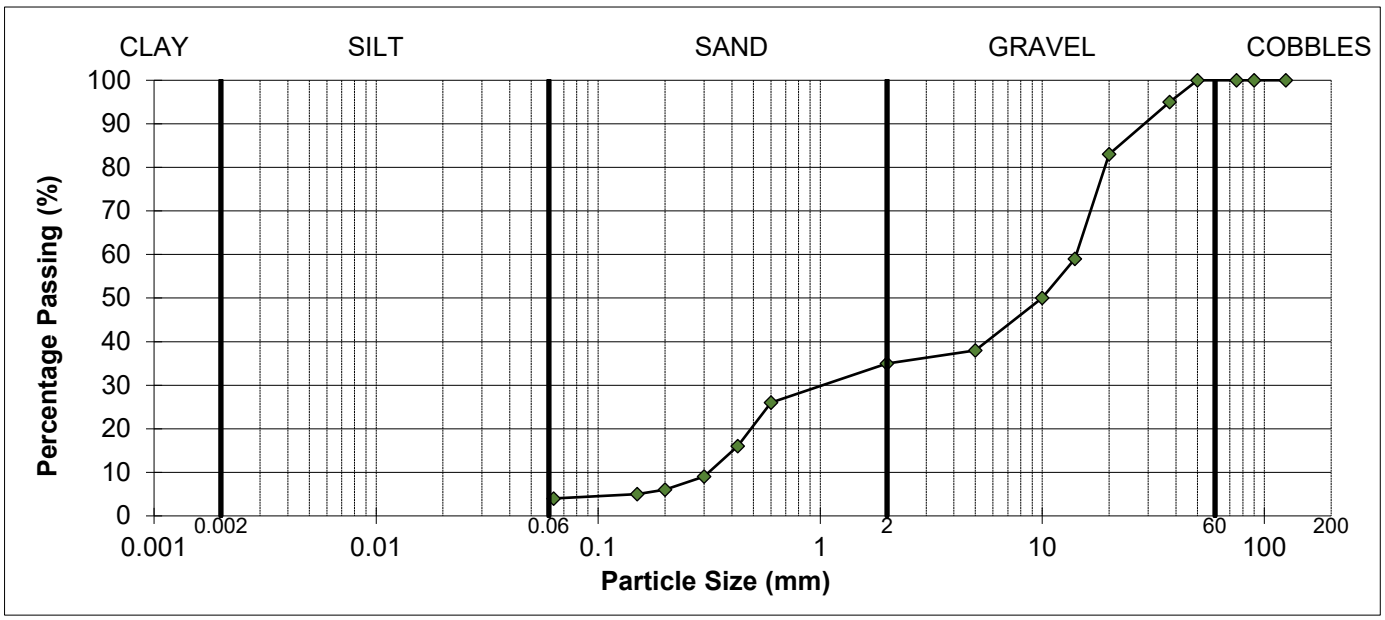
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP114 1.2 B	DATE SAMPLED	Not advised
LAB SAMPLE No	467503	DATE RECEIVED	02-May-24
DATE TESTED	08-May-24	SAMPLED BY	Client

MATERIAL	Brown silty sandy GRAVEL
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	95-100	5	38	
90	100		2	35	
75	100		0.6	26	
50	100		0.425	16	
37.5	95		0.3	9	
20	83		0.2	6	
14	59		0.15	5	
10	50		0.063	4	<15



SOIL FRACTIONS			
COBBLES	0%	SAND	31%
GRAVEL	65%	SILT / CLAY	4%

As received water content	7.8%

REMARKS
Sample complies with the advised grading specification for a 1A material (SHW 2016), Uniformity coefficient = >10

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

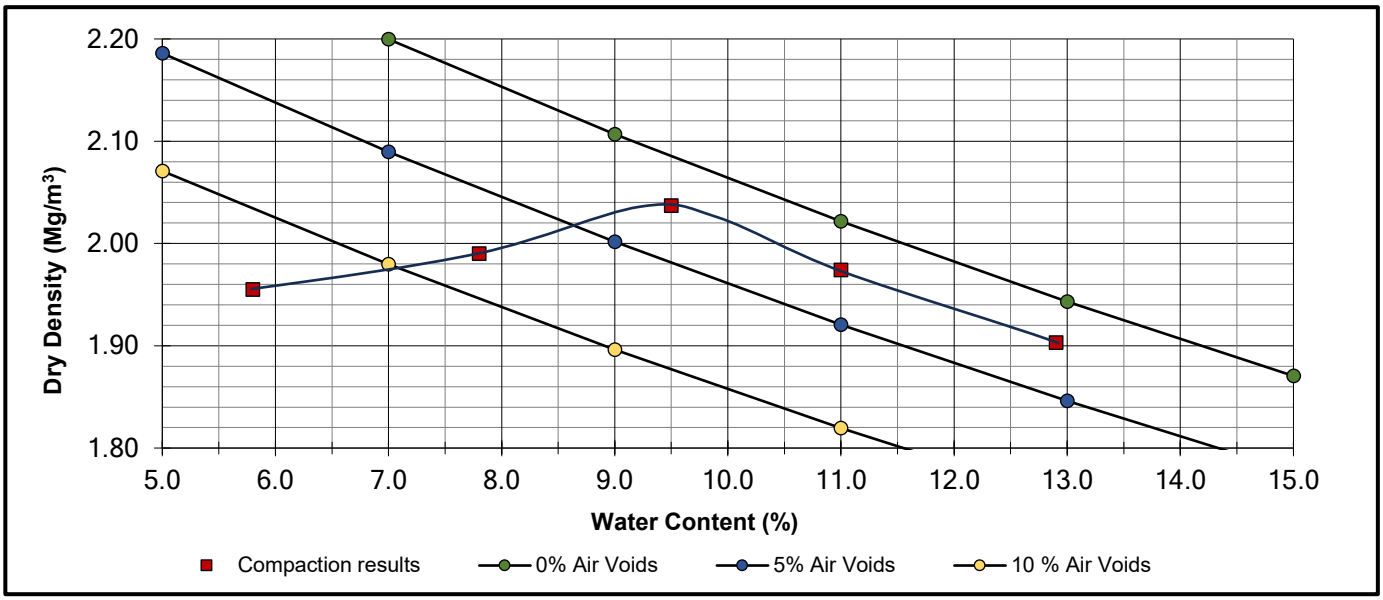
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP114 1.2 B	DATE SAMPLED	Not advised
SAMPLE NUMBER	467503	DATE RECEIVED	02-May-24
DATE TESTED	15-May-24	SAMPLED BY	Client

MATERIAL	Brown silty sandy GRAVEL
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	5 %	GRADING ZONE	Zone 4
RETAINED 20mm	17 %	PARTICLE DENSITY	2.60 Mg/m3 (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	5.8	1.955
2	7.8	1.990
3	9.5	2.037
4	11.0	1.974
5	12.9	1.903



OPTIMUM WATER CONTENT	**9.4**	(%)
MAXIMUM DRY DENSITY	**2.03**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 23-May-24

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

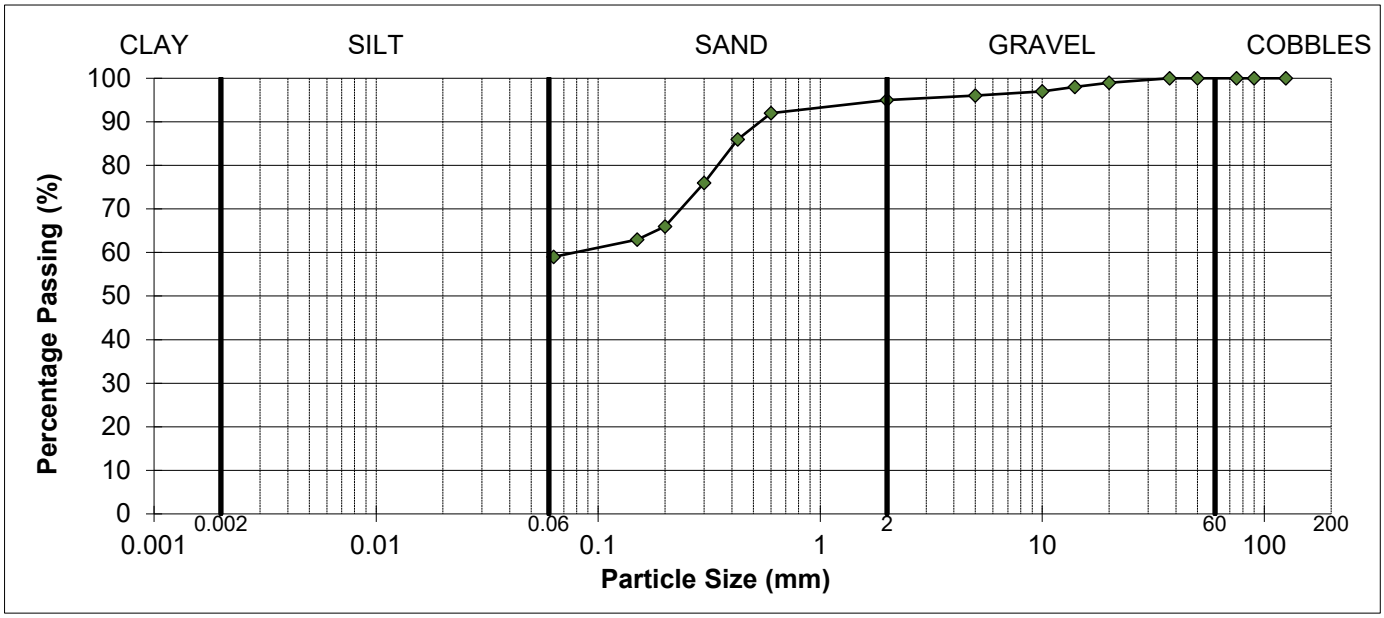
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP128 0.8 B	DATE SAMPLED	Not advised
LAB SAMPLE No	467507	DATE RECEIVED	02-May-24
DATE TESTED	08-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	96	
90	100		2	95	80-100
75	100		0.6	92	
50	100		0.425	86	
37.5	100		0.3	76	
20	99		0.2	66	
14	98		0.15	63	
10	97		0.063	59	15-100



SOIL FRACTIONS			
COBBLES	0%	SAND	36%
GRAVEL	5%	SILT / CLAY	59%

As received water content	14.9%

REMARKS
Sample complies with the advised grading specification for a 2A/2B material (SHW 2016)

SIGNED

NAME O.P. Davies BA (Hons) (Laboratory Manager) DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 4.5kg RAMMER
BS 1377-2:2022 Cl.11
PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

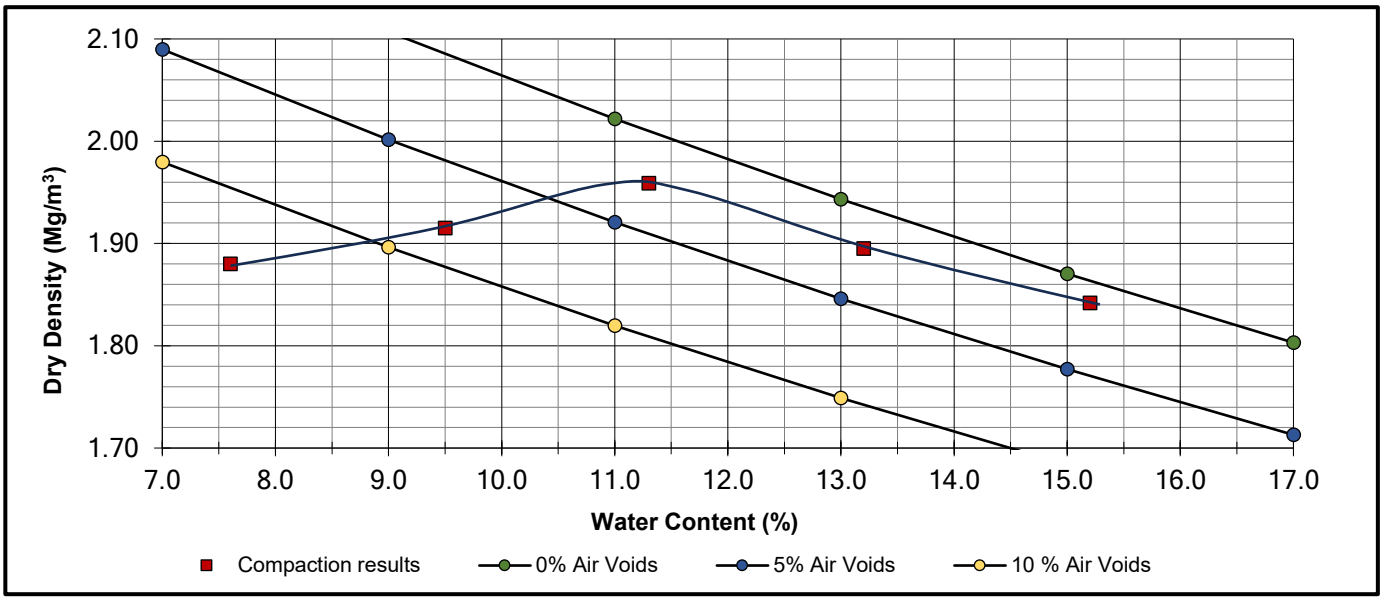
CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	TP128 0.8 B	DATE SAMPLED	Not advised
SAMPLE NUMBER	467507	DATE RECEIVED	02-May-24
DATE TESTED	15-May-24	SAMPLED BY	Client

MATERIAL	Brown silty slightly sandy slightly gravelly CLAY
ADVISED SOURCE	Site Investigation Sample
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 2
RETAINED 20mm	1 %	PARTICLE DENSITY	2.60 Mg/m3 (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m^3)
1	7.6	1.880
2	9.5	1.915
3	11.3	1.959
4	13.2	1.895
5	15.2	1.842



OPTIMUM WATER CONTENT	**11**	(%)
MAXIMUM DRY DENSITY	**1.96**	(Mg/m^3)

REMARKS

NAME O.P. Davies BA (Hons) (Laboratory Manager) SIGNED DATE 23-May-24

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

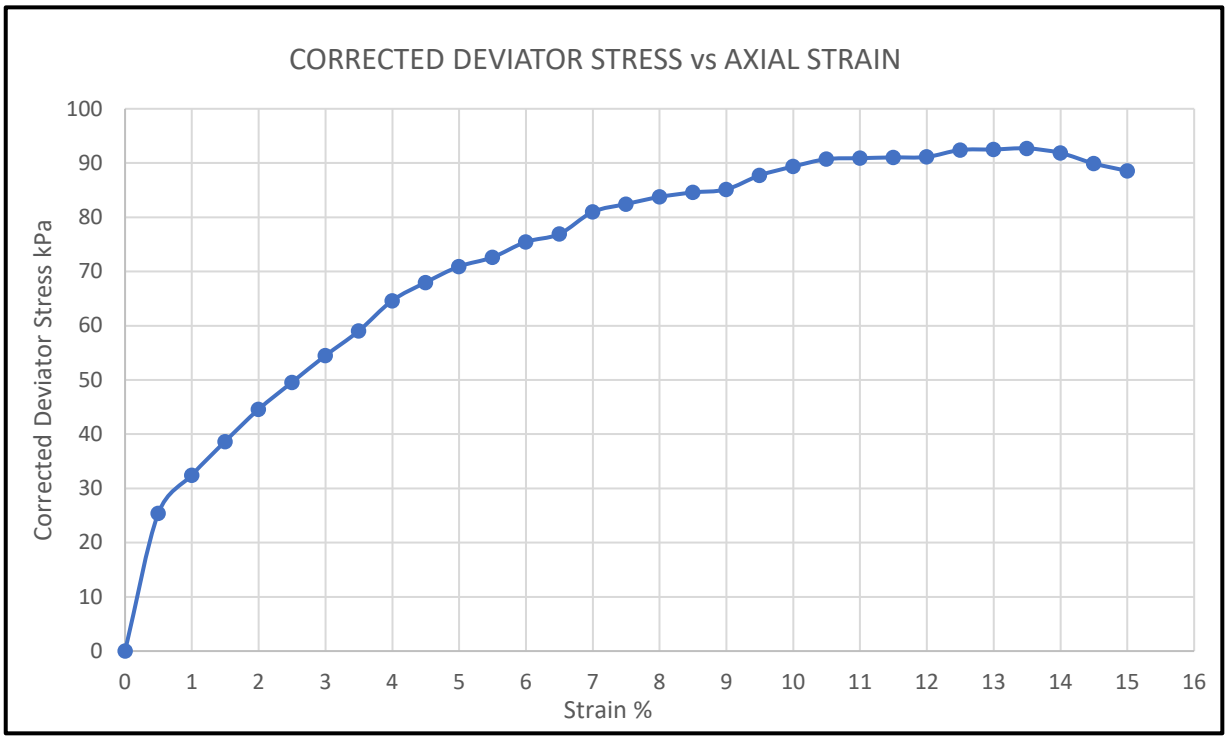
BS EN ISO 17892-8:2018

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	WS108 1.5-2 U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	467505	**DATE RECEIVED**	02-May-24
DATE TESTED	07-May-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

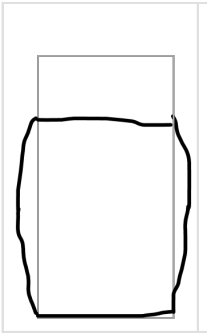
INITIAL CONDITIONS

Specimen Location	Sample Length (mm)	450	Specimen depth from top of Sample (mm)	50
	Sample Orientation	Vertical	Specimen Condition	Undisturbed
	Specimen Length (mm)	152	Specimen Water Content (%)	25.8
	Specimen Diameter (mm)	76	Specimen Bulk Density (Mg/m3)	2.49
	Membrane Thickness (mm)	0.4	Specimen Dry Density (Mg/m3)	1.98
	Membrane Correction	3.39		



TEST TYPE
SINGLE STAGE

SKETCH OF SPECIMEN AT FAILURE



PLASTIC

Cell Pressure (kPa)	Failure Strain (%)	Rate of Strain (%/min)	Corrected Deviator Stress (kPa)	Shear Strength Cu (kPa)
35	14.0	2.0	92	46

Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 23 May 2024

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

INCREMENTAL LOADING OEDOMETER TEST
BS EN ISO 17892-5:2017

CLIENT	e3p
SITE	Trubs Farm, 17-524
JOB NUMBER	MRN 24005/86

SAMPLE LABEL	CP103 7.5-7.95 U	**DATE SAMPLED**	Not advised
LAB SAMPLE No.	467510	**DATE RECEIVED**	02-May-24
DATE TESTED	07-May-24	**SAMPLED BY**	Client
MATERIAL	Brown silty slightly sandy slightly gravelly CLAY		
ADVISED SOURCE	Site Investigation Sample		

Specimen Location

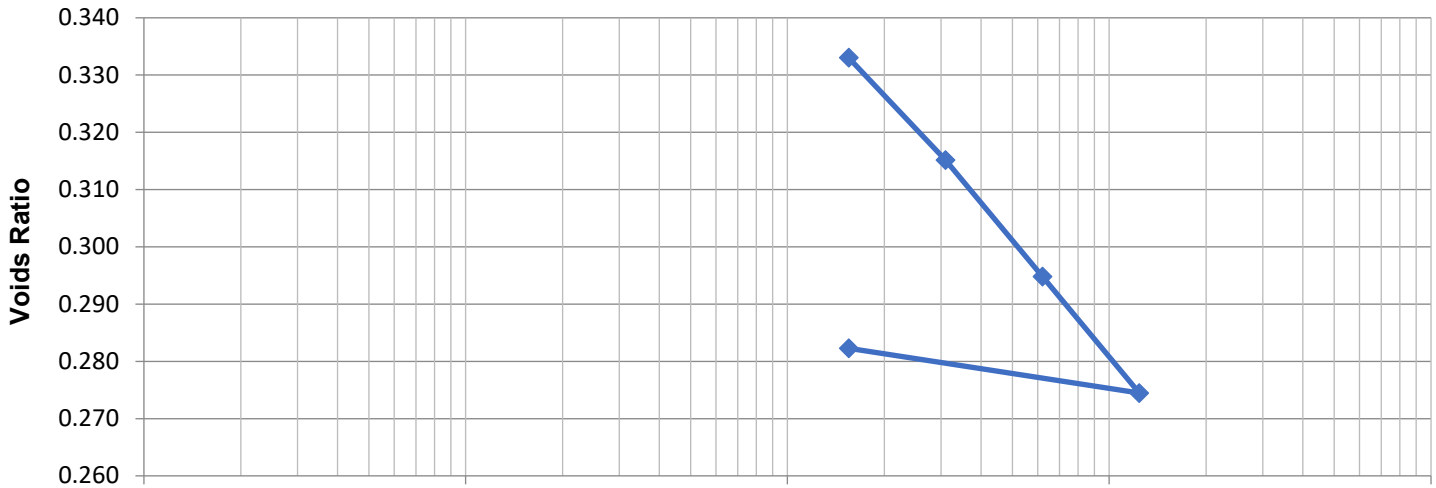
Sample Length (mm)	450	Specimen depth from top of Sample (mm)	50
Sample Orientation	Vertical	Specimen Condition	Undisturbed

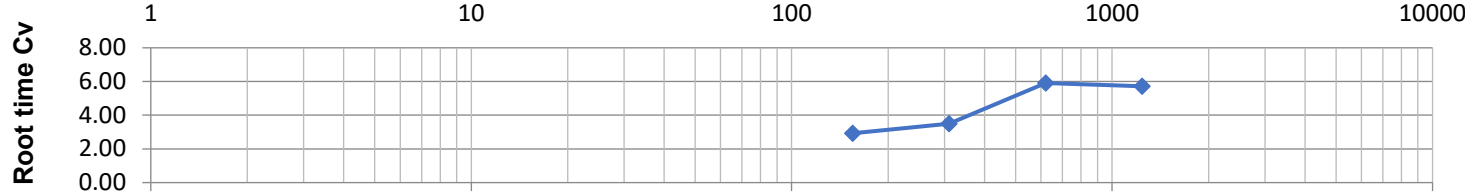
INITIAL CONDITIONS

Height	20.0	mm	Particle density	2.65	Ass
Diameter	70.0	mm	Initial void ratio	0.42	
Weight wet	164.9	g	Deg. of sat.	96	%
Water cont.*	15.2	%	Swell. press.	0	kN/m^2
Bulk Density	2.15	Mg/m^3	Dry density	1.87	Mg/m^3

*determined from specimen trimmings

Load No.	Applied Pressure kPa	Sample Height mm	Void Ratio	Mv m^2/MN	Temp °C	Cv t90 root m^2/yr	Cv t50 log m^2/yr
1	155	18.72	0.333	0.40	20	2.93	3.63
2	310	18.47	0.315	0.09	20	3.50	3.43
3	620	18.18	0.295	0.05	20	5.91	5.17
4	1240	17.89	0.274	0.03	20	5.73	5.01
5	155	18.00	0.282	0.01	20		
6							
7							





Remarks/Abnormalities

Name O.P Davies BA (Hons) (Laboratory Manager) Signed Date 23 May 2024

APPENDIX X
ORIGIN OF CHEMICAL ASSESSMENT CRITERIA

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene (iii)	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C_5-C_6 (aliphatic)	
TPH C_6-C_8 (aliphatic)	
TPH C_8-C_{10} (aliphatic)	
TPH C_{10}-C_{12} (aliphatic)	
TPH C_{12}-C_{16} (aromatic)	
TPH C_{16}-C_{21} (aromatic)	
TPH C_{21}-C_{35} (aromatic)	

APPENDIX XII
FALLING HEAD PERMEABILITY TESTS

APPENDIX XIII
COAL AUTHORITY REPORT AND MINING INFORMATION

e3p	Site:	Trub Farm	Trial Pit Number:	SA101	
	Job Number:	17524	Length:	2.50	m
	Date of Test:	15/04/2024	Width:	0.60	m
			Depth:	2.00	m
	Drafted	Rev	Auth	Groundwater Level:	N/A	m
	03/06/2024	1	MSD	Proportion of Pit Volume Occupied by Gravel Solids (Pg)	0.00	

Remarks

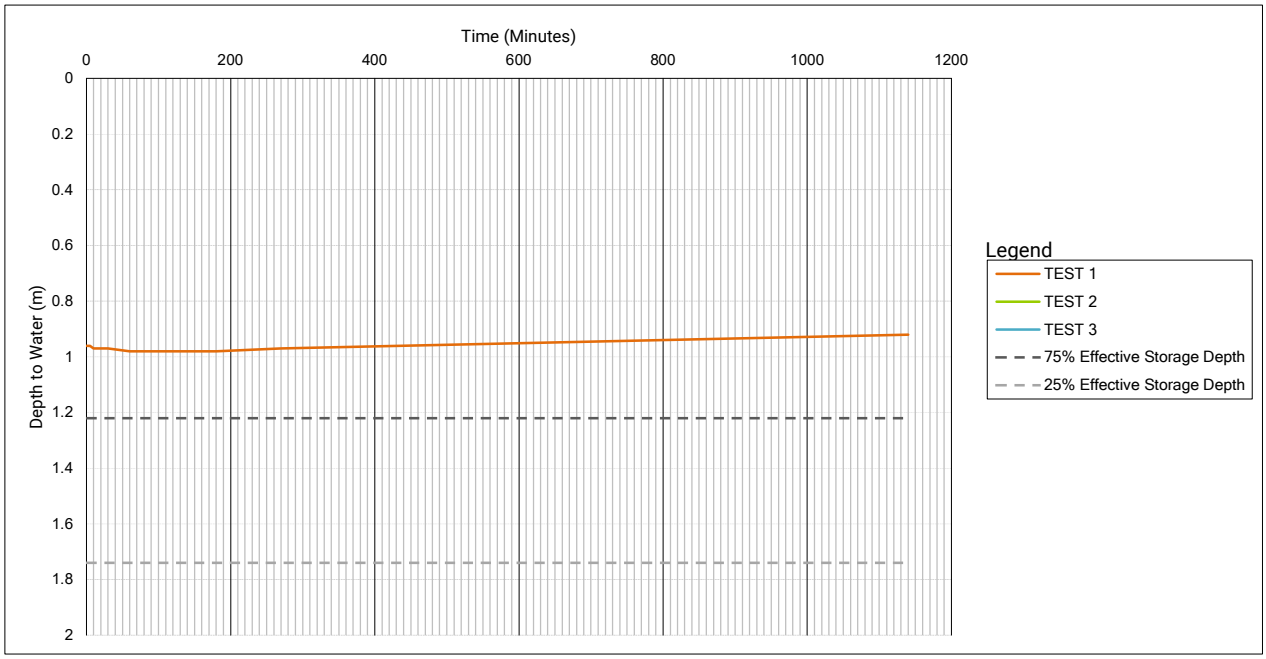
Effective Depth - For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

Gravel Filled Pits - Typically, the proportion of volume occupied by gravel is 0.70 (i.e. 70%), leaving 30% free storage volume. If the pit is left open (gravel is not used) then Pg = 0

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0	0.96				
1	0.96				
2	0.96				
3	0.96				
4	0.96				
5	0.96				
10	0.97				
20	0.97				
30	0.97				
60	0.98				
120	0.98				
180	0.98				
270	0.97				
1140	0.92				

Effective Storage Depth	m	1.04		
75% Effective Storage Depth	m	0.78		
(i.e. depth below GL)	m	1.22		
25% Effective Storage Depth	m	0.26		
(i.e. depth below GL)	m	1.74		
Effective Storage Depth 75%-25%	m	0.52		
Time to fall to 75% effective depth	mins	N/A		
Time to fall to 25% effective depth	mins	N/A		
Effective Volume of Pit - V(75%-25%) x (1-Pg)	m3	0.78		
Area of Pit - ap50 (50%)	m2	4.72		
t (75%-25%)	mins	N/A		
SOIL INFILTRATION RATE	m/s	**N/A**		

DESIGN SOIL INFILTRATION RATE, f : **NA - Failed to reach 25% effectove depth within 24 hours and therefore test terminated.**



Site:	Trub Farm	**Trial Pit Number:**	**SA102**		
Job Number:	17524	**Length:**	2.40	m	
Date of Test:	15/04/2024	**Width:**	0.60	m	
		Depth:	2.00	m	
Drafted	Rev	Auth	**Groundwater Level:**	1.80	m
03/06/2024	1	MSD	**Proportion of Pit Volume Occupied by Gravel Solids (Pg)**	0.00	

Remarks

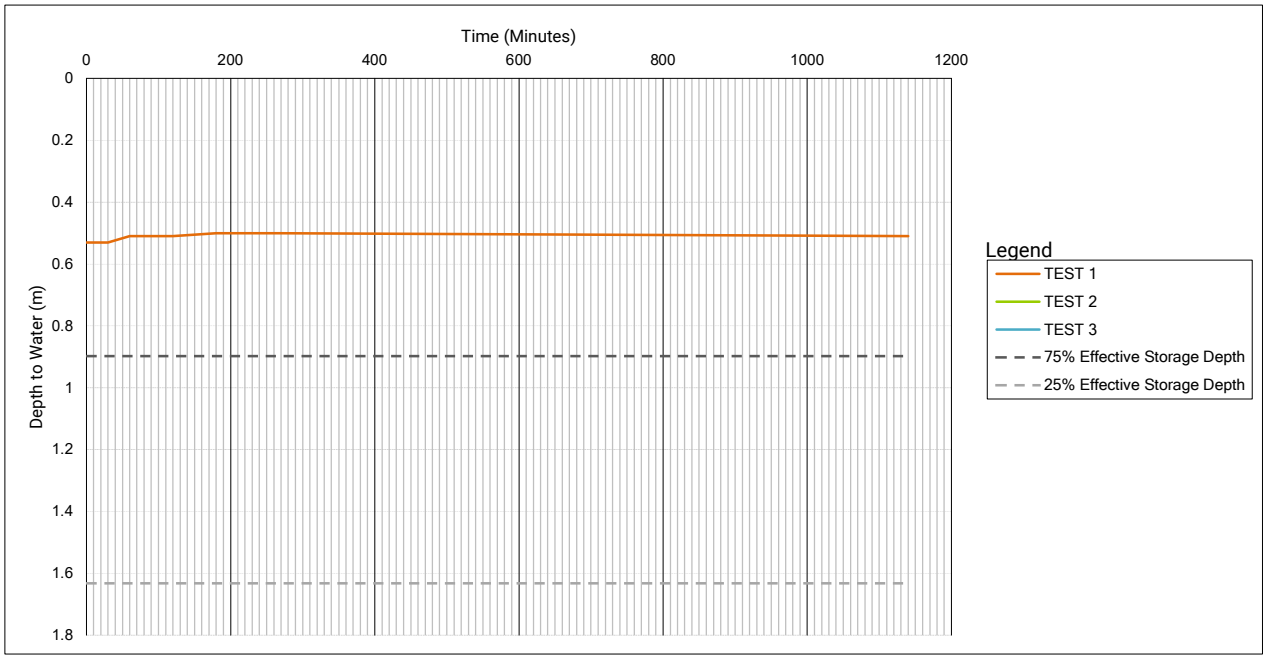
Effective Depth - For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

Gravel Filled Pits - Typically, the proportion of volume occupied by gravel is 0.70 (i.e. 70%), leaving 30% free storage volume. If the pit is left open (gravel is not used) then Pg = 0

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0	0.53				
1	0.53				
2	0.53				
3	0.53				
4	0.53				
5	0.53				
10	0.53				
20	0.53				
30	0.53				
60	0.51				
120	0.51				
180	0.50				
270	0.50				
1140	0.51				

		TEST 1	TEST 2	TEST 3
Effective Storage Depth	m	1.47		
75% Effective Storage Depth	m	1.10		
(i.e. depth below GL)	m	0.90		
25% Effective Storage Depth	m	0.37		
(i.e. depth below GL)	m	1.63		
Effective Storage Depth 75%-25%	m	0.74		
Time to fall to 75% effective depth	mins	N/A		
Time to fall to 25% effective depth	mins	N/A		
Effective Volume of Pit - V(75%-25%) x (1-Pg)	m3	1.06		
Area of Pit - ap50 (50%)	m2	5.85		
t (75%-25%)	mins	N/A		
SOIL INFILTRATION RATE	m/s	**N/A**		

DESIGN SOIL INFILTRATION RATE, f : **NA - Failed to reach 25% effectove depth within 24 hours and therefore test terminated.**



Site:	Trub Farm	**Trial Pit Number:**	**SA103**		
Job Number:	17524	**Length:**	2.40	m	
Date of Test:	15/04/2024	**Width:**	0.60	m	
		Depth:	2.00	m	
Drafted	Rev	Auth	**Groundwater Level:**	1.80	m
03/06/2024	1	MSD	**Proportion of Pit Volume Occupied by Gravel Solids (Pg)**	0.00	

Remarks

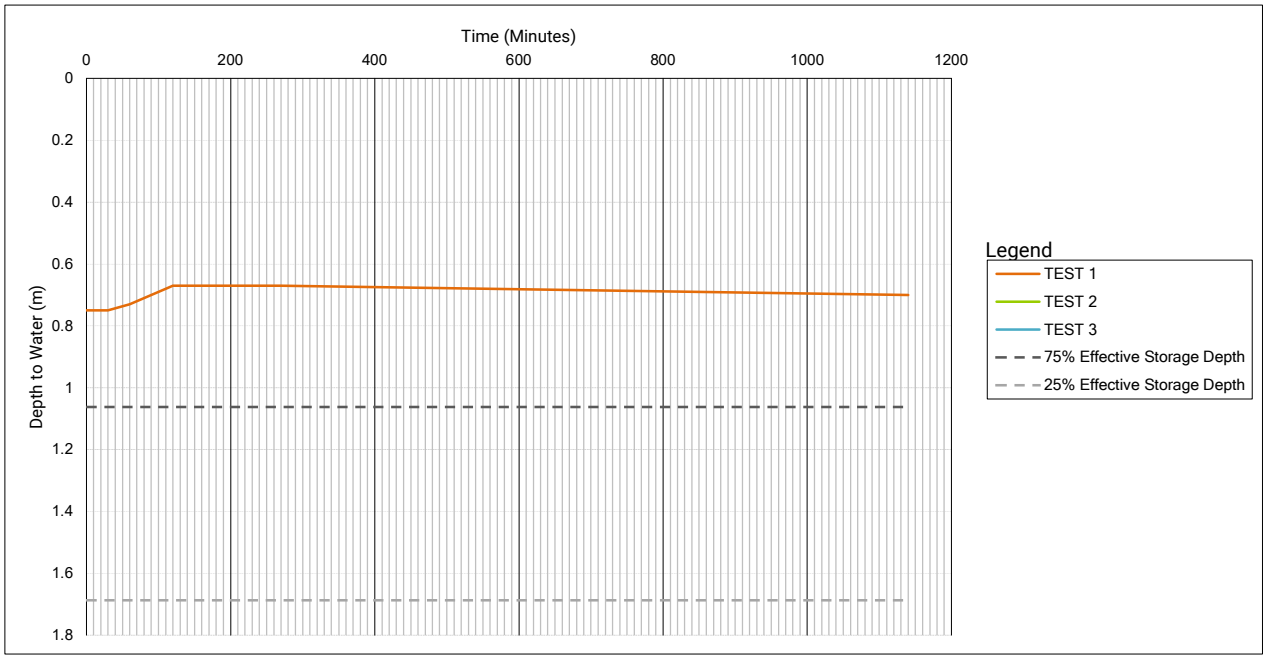
Effective Depth - For a standard test in which the pit is filled with water, the effective depth will be equal to the actual depth. If the pit is not completely filled, it will be equal to the depth at the start of each test.

Gravel Filled Pits - Typically, the proportion of volume occupied by gravel is 0.70 (i.e. 70%), leaving 30% free storage volume. If the pit is left open (gravel is not used) then Pg = 0

TEST 1		TEST 2		TEST 3	
Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
0	0.75				
1	0.75				
2	0.75				
3	0.75				
4	0.75				
5	0.75				
10	0.75				
20	0.75				
30	0.75				
60	0.73				
120	0.67				
180	0.67				
270	0.67				
1140	0.70				

Effective Storage Depth	m	1.25		
75% Effective Storage Depth	m	0.94		
(i.e. depth below GL)	m	1.06		
25% Effective Storage Depth	m	0.31		
(i.e. depth below GL)	m	1.69		
Effective Storage Depth 75%-25%	m	0.63		
Time to fall to 75% effective depth	mins	N/A		
Time to fall to 25% effective depth	mins	N/A		
Effective Volume of Pit - V(75%-25%) x (1-Pg)	m3	0.90		
Area of Pit - ap50 (50%)	m2	5.19		
t (75%-25%)	mins	N/A		
SOIL INFILTRATION RATE	m/s	**N/A**		

DESIGN SOIL INFILTRATION RATE, f : **NA - Failed to reach 25% effectove depth within 24 hours and therefore test terminated.**



APPENDIX XIV
M-BAT ASSESSMENT

INPUT DATA											RESULTS (Copper)				RESULTS (Zinc)				RESULTS (Mn)				RESULTS (Ni)			
ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l^{-1})	Measured Zn Concentration (dissolved) (µg l^{-1})	Measured Mn Concentration (dissolved) (µg l^{-1})	Measured Ni Concentration (dissolved) (µg l^{-1})	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l^{-1})	BioF	Bioavailable Copper Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l^{-1})	BioF	Bioavailable Zinc Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l^{-1})	BioF	Bioavailable Manganese Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l^{-1})	BioF	Bioavailable Nickel Concentration (µg l^{-1})	Risk Characterisation Ratio
1	East	Trub Brook	09/05/2024	4.3	11	5.2	1.5	7.7	5.1	8.2	20.46	0.05	0.21	0.21	26.44	0.41	4.53	0.42	217.00	0.57	2.95	0.02	11.59	0.35	0.52	0.13
2	West	Trub Brook	09/05/2024	3.9	15	2.1	0.96	7.3	5.1	7.8	22.02	0.05	0.18	0.18	24.42	0.45	6.70	0.61	429.39	0.29	0.60	0.00	13.17	0.30	0.29	0.07