



Generic Quantitative Risk Assessment

Rochdale Sixth Form College, Rochdale

July 2023

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Contents

Executive Summary

1. Introduction	1
1.1 Objectives	1
1.2 Proposed Development	1
1.3 Planning Context	2
2. Procedures.....	3
3. Preliminary Conceptual Model.....	4
3.1 Site Location	4
3.2 Site History	4
3.3 Previous Environmental Assessments	4
3.4 Anticipated Geology.....	5
3.5 Controlled Waters	6
3.6 Ground Gas Regime	6
3.7 Vapour Regime	7
3.8 Potentially Significant Pollution Linkages	8
4. Site Activities and Results	11
4.1 Deviations	11
4.2 Ground Conditions.....	12
4.2.1 Visual and Olfactory Evidence of Contamination	13
4.3 Controlled Waters	13
4.4 Ground Gas	15
4.5 Vapours	16
5. Human Health Risk – Soil	18
5.1 Generic Assessment Criteria – Soil.....	18
5.2 Quantitative Risk Assessment – Soil.....	18
6. Human Health Risk - Vapours	20
6.1 Generic Assessment Criteria - Vapours	20
6.2 Quantitative Risk Assessment – Vapours	20
7. Human Health Risk – Ground Gas.....	21
7.1 Generic Assessment Criteria – Ground Gas	21
7.2 Quantitative Risk Assessment – Ground Gas	21
8. Controlled Waters	23
8.1 Generic Assessment Criteria – Controlled Waters	23
8.2 Quantitative Risk Assessment – Controlled Waters	23
9. Geotechnical Testing	25
9.1 In-Situ Testing.....	25
9.2 Laboratory Testing.....	25
9.2.1 Natural Moisture Content and Plasticity Index	25
9.2.2 Particle Size Distribution Testing	26
9.2.3 pH Value and Water Soluble Sulphate (SD1 Suite)	26

9.2.4	Undrained Triaxial Testing	26
9.2.5	Point Load Strength Testing	27
10.	Preliminary Geotechnical Assessment	28
10.1	Proposed Development	28
10.2	Characteristic Values and Design Bearing Resistance	28
10.2.1	Piled Foundations	28
10.2.2	Design Class for Concrete	30
10.2.3	Shrinkability / Volume Change Potential	30
10.2.4	Earthworks / Pavement Design	30
10.2.5	Floor Slabs	31
10.2.6	Groundwater / Stability of Excavations	31
11.	Conclusions and Risk Evaluation	32
11.1	Human Health and Controlled Waters	32
11.2	Geotechnical	36
12.	Recommendations	38

Tables

Table 1:	Previous Reports	4
Table 2:	Ground Conditions	5
Table 3:	Summary of hydrogeological properties of the main geological strata	6
Table 4:	Preliminary Conceptual Model for the Site	8
Table 5:	Exploratory hole purposes	11
Table 6:	Geology	12
Table 7:	Groundwater Strikes	13
Table 8:	Groundwater Levels	14
Table 9:	Ground Gas Monitoring Summary	16
Table 10:	Elevated Concentrations of Volatile Groundwater Contaminants	20
Table 11:	Elevated Groundwater Concentrations	23
Table 12:	Standard penetration test results	25
Table 13:	Volume change potential	26
Table 14:	Summary of Particle Size Distribution Testing	26
Table 15:	Summary of SD1 suite analysis	26
Table 16:	Triaxial test results	27
Table 17:	Pennine Lower Coal Measures Formation – Point Load Tests	27
Table 18:	Characteristic values for geotechnical design	28
Table 19:	Estimated Pile Capacities	29
Table 20:	Final Conceptual Model	33

Appendices

Appendix A Site Plans

Appendix B Factual Report

Appendix C Laboratory Certificates

Appendix D Ground Gas Monitoring Results

Appendix E Risk Rating Matrix

Appendix G Waste Classification Process

Appendix H Limitations and Constraints

Executive Summary

Objectives	
Waterman Structures Limited instructed Waterman Infrastructure & Environment Limited (Waterman) to prepare a Generic Quantitative Risk Assessment (GQRA) for ground contamination for the proposed development at Rochdale Sixth Form College (hereafter termed "the Site").	
Site Setting	
History	A review of the available historical mapping indicates most of the Site was in use until the 1960s as Sunny Bank Mills (Cotton and Woollen), at which point the former buildings were cleared. The Site has been used for car parking since at least 1999. Between mapping from 1890 to 1930 the northern most corner of the Site was occupied by a Town Mill Dye Works. The River Roch is located to the east of the Site and would have been a useful asset to the wool and cotton mills in the area. The course of the River Roch was moved in the 1960s, such that the river now flows adjacent to the eastern site boundary. Within the surrounding area various industrial land uses were recorded including landfills, refuse heaps, engineering works, warehouses, iron works, mills and gas works
Ground Conditions	A ground investigation was undertaken in April 2023, the encountered geology generally recorded hardstanding of tarmac, concrete or paving slab up to depths of 0.15m bgl underlain by Made Ground of variable composition but generally consisting of sand and gravel. Layers of sand and clay were recorded underlying Made Ground at variable thickness followed by weak mudstone of Pennine Lower Coal Measures bedrock to a maximum depth of 12.91m bgl.
Human Health Risk	Laboratory testing of representative soil samples indicated no significantly elevated concentrations of contaminants recorded across the Site. Asbestos fibres were recorded in one location within the Made Ground. Based on development plans the Site will be covered by the proposed building footprints and hardstanding limiting the likelihood of exposure to any Made Ground. The risk to human health receptors is considered to be Low.
Controlled Waters	Groundwater was encountered during the ground investigation within the Glaciofluvial Deposits / Alluvium (Sand). Post works groundwater monitoring recorded groundwater levels between 1.24m bgl and 2.48m bgl. No visual or olfactory evidence of contamination was noted within the groundwater during the ground investigation and subsequent groundwater monitoring. The results of laboratory testing recorded slightly elevated PAHs, TPH in one location and metals. However, the risk is considered to be Low
Ground Gas Regime	6No. rounds of ground gas monitoring have been undertaken which designates the Site as Characteristic Situation 1, requiring no special protection measures.
Environmental	
Following the implementation of the ground investigation, the contaminant linkages identified during the Preliminary Environmental Risk Assessment have been re-evaluated and reclassified in relation to the additional information obtained. The Site's overall risk rating is considered to be Low. In addition, the Site is unlikely to be capable of being classified as Contaminated Land under the Environmental Protection Act 1990, thus meeting the requirements of paragraphs 183 to 188 of the National Planning Policy Framework.	
Geotechnical	
Due to the relatively low strength / density of the shallow natural soils and the increased loadings the proposed structure is expected to exert, it is considered that piled foundations will be required. Buried concrete should be to DS-1, AC-1. Based on the available site investigation information, end bearing piles would key into the mudstone bedrock between approximately 9m and 12.5m bgl. The final design of the piles will be the responsibility of the piling	

contractor. Dependant on whether all existing foundations are removed during demolition, an allowance for probing of pile positions and/or drilling of obstructions may be required.

It is recommended that suspended floor slabs be adopted due to the anticipated low CBR value of the shallow subgrade and the depth and variability of the Made Ground recorded across the site.

Based on observations made during fieldwork, when significant shallow obstructions were encountered during the hand pitting for the exploratory holes, even shallow excavations are likely to require shoring to maintain stability.

Recommendations

The following actions are recommended to address the potentially unacceptable risks that remain:

- The Site has been designated as Characteristic Situation 1 based on the recorded ground gas concentrations. However, this should be confirmed with Rochdale Council, as it is understood the existing buildings were designated as CS1, but had CS2 ground gas protection measure installed;
 - Should soft landscaping be incorporated into the design, the requirements for mitigating risks associated with proposals a suitable engineered cover system will be required in the areas of Made Ground was encountered;
 - A Materials Management Plan should be produced by contractors to ensure that materials that may be excavated during their works (including pile arisings) may be suitable for re-use on the Site. The re-use of materials should be identified and designated under the CL:AIRE Definition of Waste: Code of Practice (DoWCoP), i.e. the earthworks phase of the development should be planned and managed such that re-use of suitable site-won arisings is maximised and waste is minimised;
 - An Asbestos Risk Management and Discovery Plan should be prepared by contractors to include methods and measures for managing asbestos in soils during the earthworks;
 - An Environmental Management Plan (EMP) should be prepared including measures for managing waste, control run-off during earthworks, suppressing dust and asbestos fibres etc;
 - The conclusions of this report should be subject to review and approval by Rochdale Borough Council;
 - Barrier pipes will provide sufficient protection for potable water supply pipes in all brownfield conditions. The requirement for water barrier pipes should be confirmed with the local water provider;
 - Topsoil, Subsoil and any Engineered Fill imported for use at the Site should be certified as suitable for use. Samples of imported soils should be taken and scheduled for laboratory testing to verify certification. All supplier and verification chemical results should be collated by a contractor for inclusion in a Completion Report; and,
 - Construction and Maintenance workers should undertake risk assessments and prepare method statements before commencing work and should be provided with and make use of appropriate Personal Protective Equipment (PPE). Appropriate hygiene facilities should also be provided on Site and it should be ensured that all future construction personnel have been provided with asbestos awareness training;
 - Construction workers should avoid entering excavations. If entry cannot be avoided, a risk assessment should be undertaken with PPE and RPE used where appropriate, and in line with the Confined Space Entry Regulations 1997; and,
 - The overall level of risk associated with hazardous gas at the Site should be kept under review through the design process, particularly in the event that the end use of the site is changed or infrastructure is designed which could introduce pathways for gas (e.g. vibrated stone columns, deep drains, large/deep attenuation tanks, substantial earthworks etc). This may necessitate further monitoring of ground gas and/ or a review of the above recommendations for gas protection.
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1. Introduction

1.1 Objectives

Waterman Structures Limited instructed Waterman Infrastructure & Environment Limited (Waterman) on behalf of Rochdale College to prepare a Generic Quantitative Risk Assessment (GQRA) for ground contamination for the proposed development at Rochdale Sixth Form College (hereafter termed “the Site”).

This assessment follows on from the Preliminary Risk Assessment (PRA) prepared by Waterman in 2022 (Preliminary Environmental Risk Assessment Rochdale Sixth Form College, Rochdale. Reference: WIE19085-105-R-1-1-3-PERA).

The main objectives of the report are to:

- Provide an exploratory investigation as defined by BS10175;
- Assist in discharging planning conditions relating to the investigation and remediation of contaminated land;
- Derive representative geotechnical parameters in accordance with Eurocode 7 and characterize the ground for the purposes of geotechnical design;
- Provide an assessment of suitable foundation types for the proposed development;
- Investigate pavement design and provide CBR values at selected locations at formation level; and,
- Provide an assessment of hazardous gas risk in accordance with CIRIA Report C665 / BS8485 and preliminary recommendations relating to protective measures required in foundations (if any).

This assessment has been undertaken in general accordance with the Land Contamination: Risk Management Document (Environment Agency, 2021) and forms a decision record in relation to the assessment of the Site. The report also provides a refined conceptual based on the findings of the ground investigation, an evaluation of potential risks and recommendations relating to any necessary remediation.

The assessment was undertaken in accordance with the scope agreed between Waterman and Waterman Structures Limited, as documented in Waterman's fee letter (Ref. WIE19085-100-F-2201121-AM Fee Proposal, dated 1st December 2022), and with Waterman's standard Terms of Appointment. The benefit of this report is made to Waterman Structures Limited.

1.2 Proposed Development

The +Site is currently a car park, and it is proposed to redevelop the Site for an educational end use. The development proposals include construction of a new six-storey extension to the existing Rochdale Sixth Form College. In addition to the proposed building construction, it is also understood that there would be alterations to external surfaces; however, no new areas of soft landscaping are proposed. A roof garden is to be provided on the sixth floor.

The proposed development layout (Ref: 3940-A-1002P) is included in Appendix A.

1.3 Planning Context

The Site was granted the planning consent (Ref: 22/01441/PSID) by Rochdale Borough Council in April 2023), with a number of planning conditions. Planning conditions relating to ground contamination are expected [TEAM NOTE – please provide the Decision Notice].

A proposed development plan is presented in Appendix A.

2. Procedures

This GQRA report has been undertaken in general accordance with the Land contamination: risk management guidance (LCRM – Environment Agency, 2021). The report includes the following:

- Review and confirmation of the overall site objectives;
- Outline Conceptual Model for the Site;
- Results of Intrusive Ground Investigation;
- Confirmation of Generic Assessment Criteria used to assess risks;
- Assessment of results against Generic Assessment Criteria;
- Formulation of a new Conceptual Model for the Site;
- Identification of potentially unacceptable risks;
- Present a record of findings and recommendations for further action.

This report forms a decision record for the contaminant linkages identified, the generic assessment criteria used to assess risks, the unacceptable risks identified and the proposed next steps in relation to the site. The report also provides an explanation of the refinement of the outline conceptual model following the ground investigation, the selection of criteria and assumptions, an assessment of uncertainties, degree of confidence and limitations, the evaluation of potential risks and the basis for the decision on what happens next.

3. Preliminary Conceptual Model

The outline conceptual model is contained in the Preliminary Environmental Risk Assessment and Coal Mining Risk Assessment and is summarised in Section 3.

For a detailed review of the Site's environmental setting the previous reports identified in Table 1 should be reviewed.

Table 1: Previous Reports

Report Title	Author	Date	Report Reference
Preliminary Environmental Risk Assessment	Waterman	June 2022	WIE19085-105-R-1-1-3-PERA
Coal Mining Risk Assessment	Waterman	October 2022	WIE19085-100-R-5.1.3-CMRA

3.1 Site Location

The site is located at National Grid Reference (NGR) 389247, 413289 south of College Road, in the north of Rochdale. The Site comprises a small rectangular parcel of land running alongside the River Roch and extends to approximately 0.4 ha. A site location plan (WIE19085-105-GR-PRA-A1A) is presented in Appendix A.

3.2 Site History

A review of the available historical mapping indicates most of the Site was in use until the 1960s as Sunny Bank Mills (Cotton and Woollen), at which point the former buildings were cleared. The Site has been used for car parking since at least 1999. Between mapping from 1890 to 1930 the northern most corner of the Site was occupied by a Town Mill Dye Works. The River Roch is located to the east of the Site and would have been a useful asset to the wool and cotton mills in the area. The course of the River Roch was moved in the 1960s, such that the river now flows adjacent to the eastern site boundary.

Within the surrounding area various industrial land uses were recorded including landfills, refuse heaps, engineering works, warehouses, iron works, mills, and gas works.

3.3 Previous Environmental Assessments

The Site has been subject to historical investigation. The WYG Environment (White Young Green) Ltd completed ground investigation at the Site in 2008.

A summary of the WYG investigation report is provided below. Relevant factual data has been incorporated into this assessment.

WYG Geo-Environmental Ground Investigation Interpretative Report, Dated February 2008

The WYG ground investigation was primarily targeted at the area to the southeast of the Site where the main Rochdale Sixth Form College building is located. The GI was completed to characterise near surface and sub surface contamination, install ground gas and groundwater monitoring points and assess the risk to the proposed end users.

Ground conditions were found to comprise up to 2m of Made Ground, approximately 1.5m of alluvium, up to 4.7m of Glacial Deposits and Bedrock from between 8.1m bgl and 8.5m bgl with groundwater strikes recorded at variable depths (0.4m bgl to 16.9m bgl).

In summary, no visual or olfactory evidence of contamination was recorded during the GI and none of the contaminants were recorded above the commercial/industrial assessment criteria from soil samples. No asbestos was identified within the selected 5No. soil samples. Groundwater samples recorded elevated concentrations of Barium, Selenium, Copper and Nitrite when compared to EQS threshold values. However, WYG concluded that the exceedances could not be attributed to their wider site.

The ground gas undertaken by WYG determined the Site as Characteristic Situation 1. This differs from the information provided by Rochdale Borough Council Building Control. It is recommended that the inclusion of gas protection measures within the existing building is confirmed.

The report concluded that the Site poses a low risk to environmental receptor with no remediation recommended. Further ground investigation was recommended following the demolition of the existing structures at the time of this GI. It is unclear whether further investigation was completed.

3.4 Anticipated Geology

The following summary (Table 2) of anticipated ground conditions is presented in the PERA.

Table 2: Ground Conditions

Stratum	Area Covered	Estimated Thickness	Typical Description
Made Ground	The majority of the Site, with the exception of the area immediately adjacent to the River Roch	Variable, approx. 2m on adjacent site	Materials likely to be derived from the demolition of former structures at the Site, typically containing brick, concrete etc.
Alluvium	Whole Site	Variable, approx. 1.5m on adjacent site	Alluvium is a general term for clay, silt, sand and gravel comprising detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope.
Glacial Deposits	Whole Site	Variable, approx. 4.5m on adjacent site	Glacial Deposits comprising sand and gravel (Glaciofluvial Deposits) and clay (Glacial Till) are likely to be present beneath the Site.
Pennine Lower Coal Measures Formation	Whole Site	Up to 650m. Rockhead identified at between 8.1m bgl and 8.5m bgl on adjacent site	Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part. The Arley coal seam is indicated to subcrop to the north of the Site and is likely to be present at relatively shallow depth beneath the Site. Rockhead depth is indicated to be variable in the vicinity of the Site, with the closest historical borehole records indicating rockhead at between 8.0m and 12.5m depth.

3.5 Controlled Waters

Surface Water

The nearest surface water to the Site is the River Roch flowing from south to north on the eastern perimeter of the Site. The canalisation of the surface water will mean lateral migration of groundwater and contaminants into the canalised river is likely to be restricted.

No surface water abstraction licences are registered within 500m of the Site.

Groundwater

The Alluvium and solid geology (Pennine Lower Coal Measures) underlying the Site are classified as a Secondary A Aquifer, also represented in table below.

Table 3: Summary of hydrogeological properties of the main geological strata

Stratum	BGS Classification	Hydrogeological Significance
Alluvium	Secondary A	May be important in supporting local abstractions or in providing baseflow to rivers and streams
Pennine Lower Coal Measures Formation	Secondary A	May be important in supporting local abstractions or in providing baseflow to rivers and streams

The Site is not located within a groundwater Source Protection Zone.

3.6 Ground Gas Regime

Radon

Based on the information contained within the Landmark Envirocheck Report it has been confirmed that the Site is not located in an area of elevated radon gas levels and that radon protection measures would not be required in the development of new buildings or extensions. This approach should be confirmed with the Building Control Officer.

Ground Gas

Due to the historical development legacy at the Site, a thickness of Made Ground is anticipated at the Site, which may pose a ground gas hazard.

There is a historical landfill located 200m to the west of the Site, referred to as Central Tip. No information relating to the dates of operation, or the types of waste accepted is available.

The PERA reported that coal mining activities undertaken historically close to or beneath the Site indicate a potential risk from mines gas. A Coal Mining Risk Assessment was undertaken in October 2022 by WIE, which concluded that the Site is not located in an area of unrecorded mine workings, and it is considered unlikely that the Site is underlain by any coal seams at depths that have the potential to impact the proposed development. The risk to the development associated with potential shallow mine workings was assessed as very low, and it is considered that further works are not required to further explore the potential for coal seams underlying the Site. The risk from ground gas associated with underlying coal seams was designated as Low. The risk from ground gas from former mine working has not been investigated further as part of this assessment.

Consultation with the Building Control Department of Rochdale Borough Council (presented in the Preliminary Risk Assessment) suggests that the adjacent site was treated as Characteristic Situation 2 (CS2) and therefore full gas protection measures were included in the design.

The PERA concludes that a risk exists at the Site from ground gas associated with the presence of Made Ground, landfills and potential historic coal mining activity beneath the Site.

3.7 Vapour Regime

The potential exists for vapours to be present at the Site as a result of the following uses of the Site:

- Former on-site mill including tanks.

3.8 Potentially Significant Pollution Linkages

The preliminary conceptual model presented in the Phase 1 PRA is replicated below:

Table 4: Preliminary Conceptual Model for the Site

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Human Health					
Contamination in Made Ground	Dermal contact and inhalation of dust from contaminated soils during works Contact with potential contamination in shallow soils in areas of soft landscaping.	Future Site Users	Medium	The Site and surrounding area have an extensive history of potentially contaminative land uses, including an on-site wool and cotton mill and industrial activities, gasholders and various works in the surrounding area. However, the majority of the ground consists of hard standing limiting the likelihood of exposure to any Made Ground. Ground investigation should be completed targeting soils and groundwater in the development areas to identify any potential contamination.	Low
Ground Gas and vapours	Accumulation in confined spaces, leading to inhalation.	Future Site Users	Medium	The Site is indicated to be underlain by Made Ground and landfills are present in the vicinity of the Site, both are potential sources of ground gas. Potential historic coal mining activity may have occurred beneath the Site, also representing a potential source for ground gas. The proposed ground investigation should include an assessment of soil and groundwater conditions, and the potential to generate ground gas or vapours. Ground gas or vapour monitoring should be undertaken. This should inform any mitigation or remediation measures necessary at the proposed development.	Low
Contamination in Made Ground and shallow soils.	Windborne, potentially contaminated construction dust. Runoff from stockpiled soils.	Off-Site Users	Medium	A Construction Environmental Monitoring Plan (CEMP) should be prepared for the works, including measures to minimise runoff from stockpiled soils, manage groundwater in excavations and suppress the generation of dust. Construction materials brought on-Site as part of works will be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching off-Site residents.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Contamination in Made Ground, shallow soils, and shallow groundwater.	Dermal contact and ingestion. Dust inhalation. Ground gas and vapour Accumulation in trenches and confined spaces, leading to inhalation followed by asphyxiation and risk of explosion.	Construction Workers	Medium	Construction workers will be provided with personal protective equipment (PPE) and respiratory protective equipment (RPE) where appropriate. Workers should be aware of good hygiene measures as protection against direct contact with contaminated Made Ground, contaminated groundwater, ground gas, vapours, and dust inhalation. Works will be undertaken in accordance with the Control of Asbestos Regulations 2012.	Low
Property					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Site structures and services	Medium	Geotechnical investigation as part of design works for the development should include sampling and testing of soils to assess the risk posed by chemical attack. If required, appropriately designed buried concrete and barrier water supply pipes should be used at the development.	Low
Contamination in Made Ground, shallow soils, and shallow groundwater.	Direct contact with building foundations and buried services leading to chemical attack.	Off-Site Structures	Low	Surrounding superstore and carpark has been built since 1992 according to historical mapping. It is therefore likely that contamination would have been considered at the time of development.	Low
Controlled Waters					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Migration through granular deposits and via sewer bedding materials to the River Roch. Runoff from stockpiled soils.	River Roch	Low	The River Roch is a canalised structure in the vicinity of the Site as a result of the re-routing of the watercourse in the 1960s. The previous ground investigation identified relatively minor metals contamination in the River Roch and the shallow groundwater beneath the Site. The risk of contamination in shallow groundwater reaching the surface water body is considered to be low.	Low

Source	Pathways	Receptor	Risk	Justification / Mitigation	Residual Risk
Construction materials stored on-Site as part of development works.	Spills to ground, and the River Roch.	River Roch	Medium	A CEMP should be prepared for the demolition and construction works on-Site, detailing measures to minimise the potential risk to controlled waters. Construction materials brought on-Site as part of works should be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching the River Calder.	Low
Contamination in Made Ground and shallow soils.	Remobilisation of contamination by rainfall infiltration following removal of hardstanding during construction works.	Secondary A aquifer in the Alluvium and Pennine Lower Coal Measures	Low	The CEMP should include measures to minimise rainwater infiltration to exposed ground, or the potential for construction spills during the demolition and construction works. The previous ground investigation identified relatively minor metals contamination in the River Roch and the shallow groundwater beneath the Site. Rainwater infiltration via soft landscaping is possible at the completed Development. However, this is likely to be limited as the majority of the Site will be covered by buildings and hardstanding.	Low

4. Site Activities and Results

A ground investigation was completed at the Site between 13th and 15th April 2023. The ground investigation scope of works completed comprised;

- 2No. cable percussive boreholes to rockhead encountered at depths between 8.85m and 12.91m bgl;
- 4No. Window sample probeholes to a maximum depth of 5m bgl;

The ground investigation was undertaken in accordance with the Ground Investigation Specification which should be referred to for a detailed review of the ground investigation methodology. Pertinent details have been included in Section 4 as required only to avoid repetition between documents.

The purposes of exploratory hole locations and potential contamination sources are targeted are included in Table 5.

Table 5: Exploratory hole purposes

Layer / Target feature	Exploratory Holes	Groundwater Wells	Gas Wells	Comments
Made Ground	WS101, WS102, WS103, WS104 & CP102	CP102	WS101, WS103, WS104 & CP102	Boreholes to investigate the thickness of Made Ground, potential perched groundwater and to assess potential ground gas.
Made Ground	WS101, WS102, WS103, WS104	-	WS101, WS103 & WS104	Boreholes to investigate shallow ground conditions and provide coverage across the Site
Made Ground / historical on-Site Cotton Mill	WS101, WS102, WS103, WS104, CP101 & CP102	CP101 & CP102	WS101, WS103, WS104 & CP102	Coverage within proposed building footprints to investigate contamination from historical Site uses
Pennine Lower Coal Measures Formation	CP101 & CP102	CP101 & CP102	CP102	To investigate the depth of the underlying rockhead

4.1 Deviations

Due to access restrictions and below ground obstructions a number of constraints were encountered which resulted in the location of the exploratory holes being repositioned from the initial proposed location plan. The following deviations to the original ground investigation scope were encountered;

- CP102 was relocated to CP102A from the proposed location due to the railings and bollard present within the area of a ramp restricting access with the cable percussion drilling rig;
- CP102A terminated due on possible concrete slab encountered at 1.0m depth before repositioning to the CP102 to enable advancement of the borehole to the required depth;
- CP101 was relocated from the initial scope due to unexpected concrete encountered under the tarmac to enable advancement of the borehole to the required depth;
- WS102 was relocated into the original position of CP102 to provide environmental and geotechnical data in this location.

4.2 Ground Conditions

Ground conditions encountered during the ground investigation are summarised in Table 6.

Table 6: Geology

Strata	Typical Thickness (m)	Description
Tarmac	0.05	Recorded in WS102.
Paving Slab	0.05 – 0.1	Recorded in WS101, WS103, WS104, CP101 & CP102.
Concrete	0.15	Recorded in WS102.
Made Ground / Yellow Sand (sub-base)	0.15	Recorded in WS101, WS104, CP101. Yellow slightly gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of mixed lithologies including sandstone or concrete.
Made Ground / Granular (Sand)	0.8 – 0.1.2	Recorded in WS101, WS102, WS103. The granular Made Ground is variable across the site, generally comprising slightly to very gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick, concrete, sandstone or coal. Moderate cobble content was recorded in WS103. Possibly reworked clayey sand recorded in WS102.
Made Ground / Granular (Gravel)	0.35 – 1.9	Recorded in WS103, WS104, CP102. Dark brown or grey sandy subangular to subrounded fine to coarse gravel of mixed lithologies including brick, sandstone or concrete or limestone. Sand is fine to coarse. Gravel is slightly clayey in WS103.
Made Ground / Cohesive	1.8	Recorded in CP101. Dark brown very gravelly clay with a high cobble content. Gravel is Subangular to subrounded medium to coarse of mixed lithologies including brick and concrete.
Sand	0.65 - 1.6	Recorded in WS101, WS103, WS104 & CP102. Dark brown very clayey to slightly clayey fine to coarse sand. Pockets of soft grey silty sandy clay recorded in CP102.
Clay	1.2 - 2.1	Recorded in WS102, WS103. Soft brown silty sandy CLAY. Sand is fine to coarse.
Sand	1.2 – 2.9	Recorded in WS102, WS103, WS104, CP101 & CP102. Brown gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mixed lithologies including quartzite and/or sandstone. Sand is clayey in WS103 & CP101 and silty in WS104. And Grey brown very gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to coarse including quartzite.
Clay	1.9 – 3.6	Firm gravelly laminated clay recorded in CP101 & CP102. Clay is silty in CP102. Stiff grey gravelly CLAY recorded in CP101.
Pennine Lower Coal Measures Formation	>2.61	Recorded in CP101 & CP102. Weak grey micaceous MUDSTONE residually weathered recovered as slightly clayey silty angular to subangular fine to coarse gravel.

Soil samples were taken in accordance with the methodology set out in the Ground Investigation Specification and scheduled for the previously identified contaminants of concern given the Site's historical and current uses. The soil laboratory results are included in Appendix C.

4.2.1 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was encountered during the ground investigation.

Asbestos

No suspected Asbestos Containing Materials (ACM) were recorded during the ground investigation.

4.3 Controlled Waters

Groundwater Level

Groundwater was encountered in both cable percussive boreholes between 3m bgl and 5m bgl within gravelly sand. Groundwater was encountered in all window sample locations at depths of between 2.2m bgl and 3.0m bgl within clayey sand or sandy clay. It is considered this represents a groundwater body associated with the Alluvium.

A second groundwater strike was recorded in borehole CP102 within the mudstone at 8.1m bgl. It is considered a second water body associated with the Coal Measures is present at depth. Table 7 presents the recorded groundwater strikes.

Table 7: Groundwater Strikes

Location ID	Depth Groundwater Struck (m bgl)	Elevation Groundwater Struck (m AOD)	Strata
WS101	2.2	117.94-2.2	Loose dark brown clayey fine SAND
WS102	3.0	118.09-3.0	Soft brown silty sandy CLAY. Sand is medium to coarse
WS103	2.7	118.41-2.7	Soft dark brown silty sandy CLAY. Sand is fine to coarse.
WS104	2.8	118.33-2.8	Medium dense grey very clayey fine to coarse SAND.
CP101	5.0	118.88-5.0	Medium dense grey, brown very gravelly medium to coarse SAND.
CP102	3.0	117.65-3	Medium dense dark brown grey very gravelly medium to coarse SAND with low to moderate cobble content of quartzite.
	8.1	117.65-8.1	Weathered MUDSTONE.

Groundwater monitoring standpipes have been installed in 2No. cable percussive exploratory holes with response zones in the Alluvium Secondary A Aquifer and Made Ground. 3No. installations within window sample boreholes have response zones within the Made Ground to assess the potential presence of contaminated perched groundwater at shallow depths.

6No. groundwater level monitoring round was completed as part of the post fieldwork monitoring. The groundwater level monitoring results and relative ground levels are included in Table 8.

Groundwater levels recorded during the post works monitoring indicates the groundwater migrates locally to the north from CP101 to CP102 within the sand representing the Alluvium associated with the Secondary A Aquifer following the flow direction of the adjacent canalised River Roch.

Table 8: Groundwater Levels

Exploratory Hole – Response Zone	Ground Level (mAOD)	Round 1 – 28/04/2023		Round 2 – 09/05/2023		Round 3 – 18/05/2023		Round 4 – 26/05/2023		Round 5 – 31/05/2023		Round 6 – 14/06/2023	
		Depth (m bgl)	Level (mAOD)	Depth (m bgl)	Level (mAOD)	Depth (m bgl)	Level (mAOD)	Depth (m bgl)	Level (mAOD)	Depth (m bgl)	Level (mAOD)	Depth (m bgl)	Level (mAOD)
WS102 – Made Ground	118.09	0.83	117.26	0.78	117.31	0.94	117.96	1.22	117.68	1.28	117.62	Dry	-
WS103 – Made Ground	118.41	1.49	116.92	1.48	116.93	1.54	116.87	1.54	116.87	1.31	117.1	Dry	-
WS104 – Made Ground	118.33	Dry	-	Dry	-	Dry	-	Dry	-	Dry	-	Dry	-
CP101 – Sand (Alluvium)	118.88	1.24	117.64	2.24	116.64	2.38	116.5	2.43	116.45	Dry	-	2.48	116.4
CP102 – Made Ground	117.65	2.10	115.55	2.11	115.54	Dry	-	Dry	-	2.37	115.28	Dry	-
CP102 – Sand (Alluvium)		2.20	115.45	2.16	115.49	2.26	115.39	2.35	115.3	1.28	116.37	2.39	115.26

Groundwater Samples

Groundwater samples were obtained from the monitoring wells following purging of three well volumes using low-flow equipment. On-site testing of groundwater for temperature, pH, conductivity and dissolved oxygen was undertaken.

Groundwater samples were collected on a single occasion during a monitoring visit on 28th April 2023. The collected water samples were then sealed into bottles with pre-measured fixatives where necessary, as supplied by the specialist laboratory, and transported in cool boxes to the testing laboratory.

A full set of groundwater monitoring results, including the model type and detection limits of the onsite equipment used for the fieldwork, is presented in the respective fieldwork report sheet in Appendix B.

4.4 Ground Gas

6No. ground gas monitoring round has been completed following the investigation. In accordance with best practice the results from the ground gas monitoring were reviewed post completion of each monitoring round and where factors which may result in unrepresentative monitoring results were recorded these monitoring wells have been excluded from further consideration.

A discussion of the possible factors which could influence ground gas monitoring results include;

- Groundwater
 - Where groundwater is present in the monitoring well dissolved methane present in the groundwater will preferentially partition from the water to the air until an equilibrium in the well headspace is reached. The methane will be trapped in the well headspace until the next monitoring event when it will be sampled/monitored giving rise to high methane concentrations. The trapping of the gas in the well headspace is 100% effective when the response zone of the well is flooded. Outside a well methane will also partition out into the soil air space, however in the soil outside the well the methane will be oxidised/diluted as it migrates upwards in the soil profile, and a high methane concentration will exist only in the soil air spaces immediately above the groundwater. Thus, the overall methane concentration will be a substantially lower in the unsaturated zone than in the monitoring well headspace where groundwater is present. This effect is further increased when high dissolved methane concentrations are present, potentially caused by hydrocarbon degradation in the ground, carbon dioxide reduction, and within anaerobic groundwater environments.
- Petroleum Hydrocarbons
 - The degradation of petroleum hydrocarbons in a well headspace caused by the influx of oxygen during installation and monitoring can create high concentrations of carbon dioxide and methane. The degradation process occurs at slow rates and the resultant volume of hydrocarbons present in the well headspace is generally small, resulting in low methane and carbon dioxide volumes being generated. Within the relatively small well headspace volume the low methane and carbon dioxide volumes present are exaggerated giving high methane and carbon dioxide concentrations when monitored. In these situations, whilst a high concentration, is recorded in the monitoring well it relates to only a small ground gas volume and is unrepresentative of the ground gas risk to future built structures.
- Initial high concentration
 - An initial high concentration of carbon dioxide/methane during the first monitoring round can be caused by the release of trapped previously generated methane pockets in the soil matrix caused by the boreholes being drilled. Once released the pockets of trapped gas are depleted and are not replenished owing to the low ground gas generation potential of the material. In addition, the aerobic conditions created in the well annulus through the borehole drilling may

catalyse the breakdown of organic material and temporarily result in an increase in carbon dioxide. In these circumstances once the oxygen is depleted the high organic matter degradation rates decrease along with the carbon dioxide. The initial high concentrations of methane/carbon dioxide may therefore not be representative of normal ground gas regime in a monitoring well.

- Infrared analysers
 - Ground gas concentrations were monitored using an infrared bulb which can be influenced by petroleum hydrocarbon vapours leading to high methane concentrations which are unrepresentative of methane concentrations.

A full record of the ground gas monitoring results is included in Appendix D.

Total Organic Carbon (TOC) analysis was undertaken on Made Ground samples. Whilst forensic description of the Made Ground was not undertaken the relative homogeneity of the Made Ground, and absence of bulk material typically associated with landfills (wood, branches, textiles, cloth, vegetable matter etc) indicates the TOC fraction recorded is representative of the material.

As part of the site investigation, the 4No. installed boreholes were monitored in order to detect the presence of ground gas. The design of the borehole installation resulted in gas concentrations being recorded from granular horizons of Made Ground.

Ground Gas Monitoring Results Summary

A summary of the ground gas monitoring results representative of the Site's ground gas regime is included in Table 9.

Table 9: Ground Gas Monitoring Summary

BH ref / response zone (m)	Response zone stratum	Steady Concentration Range (%)	Steady Concentration Range (%)	Steady Range (l/hr)
		Methane	Carbon Dioxide	Flow Rate
WS102 / 0.5 – 1.5	Made Ground	<0.1	<0.1 – 0.2	<0.1
WS103 / 0.5 – 1.5	Made Ground	<0.1	<0.1	<0.1
WS104 / 0.5 – 1.5	Made Ground	<0.1	<0.1	<0.1
CP102 / 0.5 – 1.5	Made Ground	<0.1	0.1 – 0.5	<0.1

TOC Analysis

Total Organic Carbon (TOC) analysis was undertaken on Made Ground samples. Whilst forensic description of the Made Ground was not undertaken the relative homogeneity of the Made Ground, and absence of bulk material typically associated with landfills (wood, branches, textiles, cloth, vegetable matter etc) indicates the TOC fraction recorded is representative of the material.

The Total Organic Carbon (TOC) results from the Made Ground were generally low, averaging 2.55% M/M. The highest values recorded were 4.88% M/M at 0.8m bgl and 4.58% M/M at 0.5m bgl in boreholes WS101 and WS102 respectively. Both of these boreholes are located centrally at the Site. These results indicate that the Made Ground has the potential to generate ground gas in some areas of the Site.

WS102 was installed to target the Made Ground, with limited ground gas recorded.

4.5 Vapours

The Site's vapour regime will be assessed through multiple lines of evidence using soil headspace analysis, vapour monitoring, volatile soil and groundwater laboratory analysis, and vapour sample results. A qualitative review of the ground investigation data is included below.

Soil Headspace Analysis

A soils samples collected during the ground investigation were subject to a soil headspace screen to identify a potential vapour risk.

The PID readings recorded generally <1.0ppm within the Made Ground with the highest readings of 1.3ppm recorded at 1.2m bgl from WS102.

The PID readings within the natural soils were generally as zero with limited number of soil samples with recorded PID readings between 0.1ppm and 0.6ppm.

The PID readings do not indicate that elevated volatile concentrations may be present across the Site.

Soil Laboratory Analysis

Concentrations of volatile contaminants, including light chain total petroleum hydrocarbons, PAHs, VOCs and SVOCs, have been identified generally below the laboratory detection limits within the Made Ground and natural soil samples.

Groundwater Laboratory Analysis

Perched groundwater was recorded in two window sample boreholes (WS102 and WS103) and one shallow borehole CP102 during first monitoring visit with WS104 shallow borehole being consistently dry with response zones within the Made Ground.

Deeper boreholes CP101 and CP102 with response zones in the Alluvium (gravelly sand) recorded groundwater between depths of 1.24m bgl and 2.48m bgl.

The groundwater was sampled and scheduled for both VOC and sVOC analysis to characterise the groundwater.

5. Human Health Risk – Soil

5.1 Generic Assessment Criteria – Soil

The proposed Development will incorporate a new six-storey extension to the existing Rochdale Sixth Form College with no proposed soft landscaping at the ground level, only garden areas on the sixth floor. A College end-use is a non-standard land-use within the CLEA regime, however, to provide a conservative assessment of the data the soil laboratory data has been compared to Generic Assessment Criteria (GAC) for a residential without plant uptake end-use scenario. Where exceedances of the GAC occur, further assessment may be undertaken to assess whether the Site and its redevelopment would still indicate a risk is existent.

In areas of proposed hardstanding, future Site users will be prevented from coming into direct contact with contaminants. Valid pathways to future Site users in proposed hardstanding areas are therefore limited to the inhalation of vapours (indoor) pathway.

A Soil Organic Matter (SOM) content of 2.5% has been used given the organic matter concentrations recorded in the soil samples.

PAH Assessment GAC

The assessment of Poly-cyclic Aromatic Hydrocarbons (PAH) has been undertaken using benzo(a)pyrene as a surrogate marker for all carcinogenic PAHs. This approach was set out by the Health Protection Agency (Once Public Health England, now UK Health Security Agency and Office for Health Improvement and Disparities) and adopted in the 2013 C4SL guidance. The surrogate marker approach assumes the cancer risk of PAHs in a complex mixture is proportional to the concentration of a surrogate marker benzo(a)pyrene, and therefore accounts for the insufficiencies present in the toxicity database for the less well studied PAH contaminants.

The use of benzo(a)pyrene as a surrogate marker is only valid where the PAH soil profile is sufficiently like the coal tars mixtures used as the toxicological benchmarks in tests by Culp et al (1998). Screening of the PAH concentrations using the LQM 2015 profiling tool identifies all samples as being consistent with the coal tars making the application of the surrogate marker approach as valid.

Off-site Residents/Users

Commercial land bounds the Site to the west, River Roch and Hopwood Hall College bounds the site to the north and east, and the Rochdale Sixth Form College educational building to the south. The risk to receptors in the surrounding area will be assessed through analysis of soil, groundwater, and vapour levels, and their potential for migrating off-site.

Construction Workers

A qualitative assessment will be completed based on the concentrations of contamination recorded.

5.2 Quantitative Risk Assessment – Soil

Future Site Users

The initial assessment of the soil laboratory results against the residential without plant uptake GAC did not identify any contaminant exceedances.

Asbestos Fibres

Asbestos fibres were recorded in one Made Ground sample from WS101 at 0.8m bgl (Amosite fibre bundles). Asbestos quantification analysis indicates a concentration of 0.001%.

Future Site Users – Conclusion

No elevated concentrations of contaminants have been recorded in the selected soil samples collected from the Made Ground and underlying natural deposits when compared against the residential without plant uptake GAC.

In areas of hardstanding the pollutant linkages will be further broken through removal of the direct contact pathway mitigating the risk. If it was proposed to include areas of landscaping in the development a suitable cover system will be required to manage the risk from Made Ground composition.

Off-site Human Health Receptors - Conclusion

Proposed Development construction will include minor earthworks, which have the potential to liberate dust, asbestos fibres, or contaminants from the soil matrix and enable their lateral migration off-site. To mitigate this risk dust mitigation measures will be required throughout the development construction, notably during earthworks to minimise the creation and migration of dust, contaminants, or asbestos fibres. Details on how contaminants and dust will be managed during enabling works will be set out in a Construction Environmental Management Plan (CEMP).

As identified during the previous remediation works and as established from the ground investigations, potentially odorous material may be exposed during enabling works. Whilst the odour is unlikely to pose a significant risk to surrounding receptors it may pose a nuisance, which will require management to minimise odours as far as is reasonably practicable. The mitigation measures and working methodologies are included within an Odour Management Plan produced separately to this report.

Construction Workers – Conclusion

Asbestos fibres present in the Made Ground pose a risk to construction workers where robust health and safety measures are not employed. All construction works should be undertaken under a risk assessment which accounts for the ground conditions identified during previous remedial work and subsequent ground investigations. In addition, all works should be completed in accordance with the Control of Asbestos Regulations 2012 (CAR 2012) and an Asbestos Plan of Work completed and kept up to date as a live document throughout the works.

6. Human Health Risk - Vapours

6.1 Generic Assessment Criteria - Vapours

The risk from vapours to future Site users will be assessed qualitatively through using soil headspace analysis, and the VOC laboratory testing of soil, and groundwater. A quantitative assessment will also be taken through comparison of the groundwater sample results against the Society of Brownfield Risk Assessment (SoBRA) derived vapour GAC (VAP_{GW}).

The SoBRA VAP_{GW} builds in several precautionary assumptions into its model, including;

- No biodegradation is occurring between the source term, and the receptor;
- The groundwater is at 0.65mbgl;
- The geology on-site is a sandy stratum; and
- The omission of capillary fringe between the saturated and unsaturated zones.

Given the differences in the proposed Development and ground conditions on-site relative to the SoBRA model, the geological and hydrogeological conditions comparison of the groundwater results against the SoBRA VAP_{GW} will be conservative.

6.2 Quantitative Risk Assessment – Vapours

A review of the lines of evidence used to assess whether a significant vapour regime is present records the following;

- Soil headspace analysis from the Photo-Ionisation Detector (PID) records concentrations up to 1.3ppm;
- A review of the soil laboratory analysis records volatile contaminants at concentrations generally below the laboratory detection limits;

Comparison of the laboratory data to the SoBRA VAP_{GW} assessment criteria recorded elevated concentrations of contaminants, as detailed in the table 10 below.

Table 10: Elevated Concentrations of Volatile Groundwater Contaminants

Contaminant	Exploratory Hole Location	Concentration (µg/l)	SoBRA VAP _{GW} (µg/l)
TPH Aliphatic C8-C10	WS102	64	57
TPH Aliphatic C10-C12	WS102	54	37

It is noted above that two minor exceedances of Aliphatic C8-C10 and EC1-EC12 were recorded from the limited perched water within the Made Ground at WS102. Analysis of the laboratory data indicates all other TPH fractions were below the detection limit from WS102. It is considered this is a minor anomaly as the laboratory results from groundwater collected from boreholes CP101 and CP102 were also below detection limit.

The soil samples collected from WS102 were below detection limits for the same TPH bands, indicating the absence of a soil source.

It should also be noted that the assessment criteria used is for a residential end-use, targeting a receptor of between 0 and 6 years old. The proposed development is a sixth form college, with children between 16 and 21 years old present on the Site. The commercial assessment criteria is 5,700ug/l and 3,600ug/l, which is significantly greater than the concentrations recorded at the Site.

Based on the minor exceedance, the limited soil and lack of wider TPH concentrations in the soil and groundwater, together with the highly conservative assessment criteria, the risk from vapours from the groundwater is considered to be low based on the multiple lines of evidence.

7. Human Health Risk – Ground Gas

7.1 Generic Assessment Criteria – Ground Gas

The ground gas risk will be assessed utilising the TOC soil sample results and the ground gas monitoring results.

The TOC concentrations will be assessed in accordance with the requirements of CLAIRE Research Bulletin, November 2012, A Pragmatic Approach to Ground Gas Risk Assessment as an additional line of evidence to support the ground gas monitoring data.

The ground gas monitoring results will be assessed through calculation of the Site's Gas Screening Value (GSV) in accordance with the CIRIA C665. At all stages in the assessment only ground gas monitoring results representative of the Site's ground gas regime will be used.

7.2 Quantitative Risk Assessment – Ground Gas

As identified in the CL:AIRE 2012 RB17 guidance document and CIRIA C665 ground gases only pose a risk to developments when the following can be satisfied, which is in line with source – pathway – receptor model followed by LCRM.

- An accumulation of a large volume of gas in the ground in or near the buildings (source);
- A pathway that allows gas to migrate through and/or out of the ground into a building or other structure sufficiently quickly to allow it to build up inside the building (pathway);
- A confined space within the building or structure where gas can build up to unacceptable levels (receptor).

For a risk from ground gases a source – pathway – receptor linkage needs to be present. This requires sufficient gas to pose a hazard and one or more pathways by which it may cause significant harm to people. For sustained gas migration to occur gas must be replenished at the source to negate the effects of attenuating factors such as oxidation of the methane/carbon dioxide to oxygen in the aerobic zone or low permeability soils decreasing the migration potential. Therefore, sustained high levels of gas generation are required for ground gas to migrate via advective or diffusive flow and cause high ground gas concentrations at the surface/within built structures. The volume of ground gas is therefore the principal factor which should be considered rather than the ground gas concentration and not the gas concentration present in the ground (or monitoring well) which is commonly mistaken as posing a risk to future Site users.

A qualitative review of the Site's environmental setting and ground conditions records the following:

- Made Ground up to 1.95m in thickness has been encountered at the Site. However, the proportion of degradable material, such as wood, appears to be limited. Given the moderate thickness of Made Ground is considered to be a potential source of ground gas, however, based on the lack of substantial quantities of degradable material the potential for generation of significant quantities of ground gas is considered to be low;
- As identified in the 2019 Geoff Card, James Lucas, and Steve Wilson, Technical Paper "Risk and Reliability in Gas Protection Design – 20 years on: Part 1", and the 2018 Ambisense and Environmental Protection Group document, "Using Ternary Plots for Interpretation of Ground Gas Monitoring Results" Alluvium may contain small quantities of organic matter, which may degrade locally when exposed to oxygen generated during installation of boreholes. However, the rate of gas generation in these circumstances and the volume produced is extremely small and would not represent a risk to structures. The Alluvium is therefore not considered to represent a significant ground gas generating source;

- The Site is located in an area of coal mining, with no potential preferential pathways to the surface have been identified in relatively close proximity to the Site, however, potential historic mining activity that may have occurred beneath the Site, could represent a source for ground gas;
- Flow readings of 0.0l/h were recorded in all monitored boreholes.

An assessment of gas risk has been presented following 6No. rounds of ground gas monitoring completed at the Site. The Qhg (borehole hazardous gas flow rate) has been determined for each borehole monitored. Assessment of the results records a maximum Qhg of 0,0005 l/hr. Based solely on the Qhg the ground gas regime would be classified as Characteristic Situation 1 (CS1) – Very low risk in which ground gas protection measures.

The guidance in CIRIA C665 (2007) requires a potential increase to a Characteristic Situation 2 (CS2) classification (low risk) where methane >1.0% and carbon dioxide is >5.0% with the overall ground gas conceptual to be considered to determine the appropriate ground gas classification. As no methane or carbon dioxide were recorded at or above these concentrations an increase from CS1 to CS2 is not considered appropriate.

The overall level of risk associated with hazardous gas at the Site should be kept under review through the design process, particularly if the end use of the site is changed or infrastructure is designed which could introduce pathways for gas (e.g., vibrated stone columns, deep drains, large/deep attenuation tanks, substantial earthworks etc). This may necessitate further monitoring of ground gas and/or a review of the above recommendations for gas protection.

Additionally, based on the information contained within the Groundsure Report (presented within Appendix C in the Preliminary Risk Assessment, reference: WIE19085-105-R-1.1.1-PERA) have confirmed that the Site is not located in an area of elevated radon gas levels and that radon protection measures would not be required in the development of new buildings or extensions.

The consultations with the Building Control Officers at RBC (presented in Appendix C of the WIE19085-105-R-1.1.1-PERA) reported that the main college building to the southeast of the site was treated as Character Situation 2 (CS2) and therefore full gas protection measures were included in the design.

8. Controlled Waters

8.1 Generic Assessment Criteria – Controlled Waters

3No. groundwater samples have been assessed against the Environment Agency (EA) derived Environmental Quality Standards (EQS) for freshwater based on the proximity of the River Roch to the Site

The base EQS values for bioavailable contaminants have been applied given the absence of relevant surface water samples. This approach retains conservatism.

The EQS for benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene is based on the toxicity of benzo(a)pyrene, with the EQS for these PAH identifying the use of benzo(a)pyrene as a marker for these PAH. This approach will be followed with the assessment of benzo(a)pyrene as a marker of the risk posed by benzo(k)fluoranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene.

The threshold criteria are applicable at the surface water receptor, and do not account for contaminant attenuation along the migration pathway. Exceedances of the threshold criteria does not necessarily indicate a risk exists and means further qualitative/quantitative assessment of the results are required.

8.2 Quantitative Risk Assessment – Controlled Waters

Groundwater samples were collected on one occasion from the installed boreholes at the Site. 2No. groundwater samples were collected from the Alluvium Aquifer and 1No. grab sample was obtained from the borehole with installation in the Made Ground. Elevated contaminants when assessed against the EQS Values are summarised in Table 11.

Table 11: Elevated Groundwater Concentrations

Contaminant	Threshold Value (µg/l)	No. of Samples above EQS	Max. Concentration (µg/l)
Total Dissolved Iron	1000	2 (CP101 and CP102)	16,960.6
Dissolved Lead	1.2	1 (CP102)	5.7
Dissolved Nickel	4.0	1 (WS102)	9.8
Fluoranthene	0.00630	1 (WS102)	0.043
Benzo(bk)fluoranthene	0.00017	1 (WS102)	0.026
Indeno(123cd)pyrene	0.00017	1 (WS102)	0.005
Benzo(ghi)perylene	0.00017	1 (WS102)	0.006
Benzo(b)fluoranthene	0.00017	1 (WS102)	0.019
TPH Aliphatic C8-C10	N/A	1 (WS102)	64
TPH Aliphatic C10-C12	N/A	1 (WS102)	54

The groundwater samples were scheduled for a sVOC suite, and a VOC suite and the majority of determinants were recorded at the laboratory detection limit.

There is no published EQS for TPH, however the elevated concentrations are included in the table above. The recorded concentrations do not exceed the World Health Organization (WHO) guide values of 300µg/l for TPHCWG fractions in drinking water.

Slightly elevated concentrations of fluoranthene, benzo(bk)fluoranthene, benzo(b)fluoranthene, indeno(123cd)pyrene and benzo(ghi)perylene have been recorded in the groundwater at one location, WS102. Concentrations of similar contaminants were recorded in the site soils within the Made Ground.

Elevated concentrations of TPH were recorded in the groundwater at WS102. As stated in section 6.2, limited TPH was recorded in the site soils at the same carbon bands, and TPH was not recorded to be elevated in CP101 and CP102 with installations within the Alluvium Secondary A Aquifer indicating vertical migration is likely to be limited.

Several metal contaminants in exceedance of the EA derived EQS have been identified, these include; iron, lead and nickel. As detailed previously the EQS values are applicable at the surface water receptor and have been used to provide an assessment of the groundwater quality.

The direct assessment of groundwater laboratory results against the EQS does not account for the attenuation of contaminants along the contaminant migration route and is intentionally a conservative assessment. Consistent with contaminated land best practice exceedance of the EQS provide a guide as to whether further consideration of the risk posed by that contaminant is required. Exceedances of the EQS does not necessitate remedial actions bas being required. This approach has been applied when assessing the contaminants in exceedance of the EQS.

Limited exceedances were recorded from the water samples retrieved from the Alluvium, with a single elevated concentration of Iron recorded within the Alluvium Aquifer. Alluvium soils could be a possible background source of iron.

The nickel elevated concentrations are marginal exceedances and are recorded only in one location, WS102 installed within the Made Ground.

The majority of the exceedances (WS102) were recorded from a groundwater sample collected from a perched water body associated with the Made Ground. The perched water was recorded in WS102 and WS103 only, with WS104 dry on all monitoring occasions. WS102 was dry on the final monitoring round, indicating the volume of water is likely to be limited and is discontinuous across the Site. It is likely also that the perched water is limited in it connectivity to the underlying alluvium and River Roch. Overall, it is considered that the risk to the River Roch and the alluvium is considered to be low.

9. Geotechnical Testing

9.1 In-Situ Testing

Standard Penetration Tests (SPT's) were undertaken at regular intervals within the boreholes to provide 'N' values for empirical assessment of strength and density parameters. In line with BS5930:2015+A1:2020, all SPT-N values shown on the exploratory hole logs are uncorrected. As described in BS EN ISO 22476:2005 and also by different authors, drill hammer, used equipment and other factors might have a considerable impact on the obtained SPT-N values and thus on the comparability of the results.

Therefore, corrected N-values are used for further consideration and interpretation in this report. The Energy Ratios for the specific equipment used on site were 61% (windowless sampler) and 73% (cable percussion) and have been used to calculate standardized N_{60} values summarised in Table 12. Detailed results of the SPT tests and blow counts are included on the borehole logs included in Appendix B.

Table 12: Standard penetration test results

Stratum / Geological Origin	Range of SPT 'N' Values	Number of Tests	Comments	Derived Values Range of ϕ' , cu
Made Ground	8.2 – 38.1	6	Very loose to medium dense and dense Sand and Gravel. Firm to stiff Clay.	$\phi' = <28^\circ$ to 36° cu = 45 kPa
Alluvium	0 – 28.9	18	Soft to firm Clay and Loose to Medium Dense Sand	cu = 0 – 30 kPa $\phi' = <28^\circ - 35^\circ$
Glacial Deposits	12.7 – 18.5	2	Firm to stiff Clay	cu = 50 – 75 kPa
Pennine Lower Coal Measures	>50	4	Very weak Mudstone	-

9.2 Laboratory Testing

Representative soil samples were scheduled for:

- Natural moisture content and plasticity index;
- Particle Size Distribution tests;
- pH value and water-soluble sulphate (SD1 Suite);
- Undrained Shear Strength Triaxial Tests; and
- Point Load Strength Tests.

The results are summarised below and presented in Appendix B.

9.2.1 Natural Moisture Content and Plasticity Index

7 No. samples of natural cohesive material were taken for moisture content and plasticity index determinations. The test results are included in Appendix B and are summarised in Table 13 below. The modified plasticity index can be used as an indicator of volume change potential of the soil and is calculated as the plasticity index of the soil multiplied by the fraction of particles less than 425 μ m.

Table 13: Volume change potential

Stratum / Geological Origin	Range of Plasticity Indices % (Modified)	Volume Change Potential
Alluvium	24 – 26	Medium
Glacial Deposits	16.15 – 25	Low to Medium

One sample tested (CP101 at 2.00m) was classified as non-plastic.

9.2.2 Particle Size Distribution Testing

Particle Size distribution analysis was undertaken on 3 No. samples of Alluvium and underlying Glacial Deposits. The results of laboratory testing are included in Appendix B and summarised in Table 14 below:

Table 14: Summary of Particle Size Distribution Testing

Location ID	Depth (m bgl)	Stratum	Cobbles (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
CP101	3.00	Alluvium	0	3	60		37
	8.00	Glacial Deposits	0	4	3	45	48
CP102	3.00	Alluvium	0	70	26		4

9.2.3 pH Value and Water Soluble Sulphate (SD1 Suite)

The Aggressive Chemical Environment for Concrete classifications for the soil types identified at the site have been determined in accordance with BRE Special Digest 1:2005 (SD1). SD1 requires that sites are first identified as being in one of four categories based on natural ground / 'Brownfield' conditions and pyrite content. The site has been categorised as: Brownfield - Non-pyrite.

The results of laboratory testing are included in Appendix B and summarised in Table 15 below:

Table 15: Summary of SD1 suite analysis

Stratum / Geological Origin	Characteristic Water Soluble Sulphate Value (mg/l SO ₄)	Characteristic pH Value
Made Ground	33	7.6
Alluvium	78	7.0
Glacial Deposits	59	8.2

As the characteristic value of sulphate is less than 3,000mg/l and the characteristic pH is greater than 5.5, the concentrations of magnesium, nitrate and chloride are not considered significant in determining the design sulphate class.

9.2.4 Undrained Triaxial Testing

Shear strength of the natural superficial strata was determined by quick undrained triaxial test on three single 100mm diameter specimens. The results of the tests are presented in Appendix B, and are summarised in Table 16 below:

Table 16: Triaxial test results

Stratum / Geological Origin	Location ID and Depth (m)	Undrained Shear Strength (kPa)	Comments
Glacial Deposits	CP101 at 7.50m	31	Low Strength
	CP101 at 10.50m	89	High Strength
	CP102 at 5.00m	33	Low Strength

9.2.5 Point Load Strength Testing

2 No. Point Load Tests undertaken on suitable rock core samples record IS(50) strengths ranging from 0.05 MPa to 0.08 MPa. These equate to an estimated UCS range of 1.0 MPa to 1.6 MPa (using a correction factor, F, of 20, Rusnak and Mark, 2000). Results are given in Table 17.

Table 17: Pennine Lower Coal Measures Formation – Point Load Tests

Borehole ID	Depth (m bgl)	IS_{50} (MPa)	UCS Equivalent (MPa) (Rusnak & Mark, 2000)
CP101	11.30	0.05	1.0
CP102	8.10	0.08	1.6

10. Preliminary Geotechnical Assessment

10.1 Proposed Development

This assessment has been prepared on the understanding that the site is to be developed for an educational end use. The development proposals include construction of a new six-storey extension to the existing Rochdale Sixth Form College.

If development proposals change, it may be necessary to revise the conclusions and recommendations made in this report and Waterman IE should be contacted to provide further advice.

10.2 Characteristic Values and Design Bearing Resistance

Based upon the site investigation data and a review of the derived values summarised in Section 9, characteristic values can be assigned to each strata. EC7 defines the characteristic value of a soil or rock as a cautious estimate of the value affecting the occurrence of the limit state. The characteristic values to be used in design are highlighted in Table 18 and are considered to be:

Table 18: Characteristic values for geotechnical design

Stratum / Geological Origin	Strength / Density Descriptor	Characteristic Undrained Strength (cu - kPa)	Characteristic Angle of Shearing Resistance (ϕ' - deg)	Characteristic Unconfined Compressive Strength (UCS - MPa)
Made Ground	Very loose to medium dense (Granular) Firm / low to medium strength (Cohesive)	45	$\phi' = <28^\circ - 36^\circ$	-
Alluvium	Loose to medium dense (Granular) Soft to firm / Low to medium strength (Cohesive)	cu = 30 kPa	$\phi' = 30^\circ$	-
Glacial Deposits	Firm to stiff / Low to high strength	cu = 50 kPa	-	-
Pennine Lower Coal Measures	Very weak	-	-	UCS = 1.0 MPa

Given the anticipated high loadings of the proposed structure and the underlying relatively low strength / density Alluvium recorded across the site, shallow foundations are not considered to be suitable for use across the site. Piled foundations are considered to be the most appropriate foundation solution.

10.2.1 Piled Foundations

Due to the relatively low strength / density of the shallow natural soils and the increased loadings the proposed structure is expected to exert, it is considered that piled foundations will be required.

Based on the available site investigation information, end bearing piles would key into the mudstone bedrock between approximately 9m and 12.5m bgl.

The final design of the piles will be the responsibility of the piling contractor. Dependant on whether all existing foundations are removed during demolition, an allowance for probing of pile positions and/or drilling of obstructions may be required.

The influence of the overlying Made Ground and generally low strength / density Alluvium should be ignored in the pile capacity calculations; however, the cohesive Glacial Deposits could provide limited additional skin friction capacity. During detailed pile design the choice of factors of safety should ensure that appropriate safe working loads and settlement tolerances are met.

Preliminary Pile Resistance calculations were undertaken to provide estimations as to the capacities achievable in a variety of pile constructions and diameters, taking into account the skin friction of the overlying cohesive Glacial Deposits. These calculations were undertaken based on the findings of intrusive investigation and laboratory testing undertaken across the site. The following assumptions have been made:

- Continuous Flight Auger (CFA) piles are to be utilised; bored piles calculated for comparison purposes;
- Piles are to be socketed 1m into competent mudstone bedrock;
- Groundwater has been assumed to be 3m bgl;
- Piles are constructed of concrete with a compressive strength of 40 MPa;
- 10mm wall thickness and open base for low displacement driven piles;
- Bentonite is not used in the construction of bored piles.

The following shall only be used as guidance and shall not be used as an indicator of the final capacity and design parameters of piled solutions at the site.

Table 19: Estimated Pile Capacities

Pile Length (m)	Estimated Pile Load by Diameter (kN)		
	D=300mm	D=450mm	D=600mm
High Displacement Driven Piles			
	461	862	1377
Low Displacement Driven Piles			
	263	395	527
Bored Piles			
	470	876	1395

An acceptable percentage of piles should be load tested to at least twice working load. All piles should be integrity tested.

A number of underground obstructions were noted during the investigation; these should be removed prior to construction and the pile design take account of their removal.

On significantly contaminated sites, the Environment Agency may object to the use of piles on the basis that they can introduce pathways for contaminant migration. Such objections can usually be overcome if piles are designed in accordance with the EA's advice "Piling and Penetrative Ground Improvement Methods on Land Affected by contamination: Guidance on Pollution Prevention. NC/99/73.

Consideration should be given to the re-use of pile arisings if bored piles are used. It may be possible to re-use pile arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CL:AIRE guidance.

The effects of noise and vibration (e.g. from piling plant) on neighbouring structures / properties should be addressed as part of the contractors method statement.

10.2.2 Design Class for Concrete

Based on the characteristic values derived from SD1 testing, the Design Sulphate (DS) and Aggressive Chemical Environment for Concrete (ACEC) classifications are considered to be:

- Concrete in contact with Made Ground: DS-1 AC-1;
- Concrete in contact with Alluvium: DS-1 AC-1;
- Concrete in contact with Glacial Deposits: DS-1 AC-1.

10.2.3 Shrinkability / Volume Change Potential

The cohesive horizons of the Alluvium and underlying Glacial Deposits have been shown to have a medium and low to medium volume change potential respectively. Should shallow foundations be proposed on shrinkable soils, they should be deepened where necessary to accommodate the effects of trees and hedgerows. Where foundations are beyond the influence of existing and proposed planting (i.e. 1.5 times the mature tree height), a minimum foundation depth of 0.9m bgl should be adopted.

Foundations within the zone of influence of existing or proposed trees should be deepened as necessary in accordance with recommendations provided in NHBC Chapter 4 – Building Near Trees. If trees are present within influencing distance of proposed foundations, a tree survey should be undertaken to identify appropriate founding depths.

If trees are to be removed and are within influencing distance of the proposed structure, heave protection may be required within the new foundations.

10.2.4 Earthworks / Pavement Design

The proposed development does not include significant earthworks and it is likely that any limited earthworks may require imported materials.

Construction plant should be provided with an adequate working platform in line with the requirements of BRE report, “BR 470: Working Platforms for Tracked Plant”.

The proximity of the existing structure should be considered in the design of any earthworks that are necessary for the proposed development.

The shallow subgrade is likely to exhibit very low CBR values (i.e. generally less than 2.5%). The near surface subgrade is not considered likely to support construction traffic without deteriorating rapidly. Low strength subgrades could be improved using one of the following options:

- The material at the surface could be removed and replaced with suitable material. The thickness removed may typically be between 0.5 and 1.0m and the new Design CBR should be assumed to be equivalent to 2.5%;
- A lime / cement stabilisation process could be utilised to increase the CBR value of the near surface subgrade, enabling proposed pavement areas, temporary access roads and working platforms to be designed based on an improved CBR value (design value in excess of say 2.5%). A specialist contractor should be asked to confirm suitability and the most appropriate method and technique;
- The incorporation of a geogrids/geosynthetic material may assist in reducing capping layer thicknesses. However, it should be noted that excavating back through areas treated with geogrid, e.g. to install drainage or foundations, would result in damage to the geogrids which would then require repairing; and

- A land drainage system may be considered, together with a system of monitoring the improvement achieved.

During construction, the in-situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.

10.2.5 Floor Slabs

It is recommended that suspended floor slabs be adopted due to the anticipated low CBR value of the shallow subgrade and the depth and variability of the Made Ground recorded across the site.

10.2.6 Groundwater / Stability of Excavations

Comments relating to groundwater seepages are included in the logs in Appendix B. Groundwater has been recorded at depths of between 2.2m and 5m bgl across the site.

Based on observations made during fieldwork, when significant shallow obstructions were encountered during the hand pitting for the exploratory holes, even shallow excavations are likely to require shoring to maintain stability.

With regard to shoring and de-watering measures, further advice should be sought from the temporary works designer, however, the following factors should be considered:

- All trenches should be excavated in accordance with CIRIA Report 97 'Trenching Practice'.;
- Trench shoring should be keyed into basal materials beneath the base of the trench. The embedment depth in clay may be significantly deeper than the depth of the excavation being supported; and
- Given the limited quantities of perched groundwater encountered, simple sump pumping may be sufficient to control moderate groundwater seepages in shallow granular materials;
- The impact of shoring and de-watering on the adjacent viaduct should be considered during design.

Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc. Where contamination has been encountered, it may be possible to reuse foundation arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

In line with BS6031, all excavations should be examined daily by a competent person to ensure that they remain safe. Where the sides cannot be sloped back to a safe angle, as approved by a competent and experienced person, their continued stability should not be taken for granted. Vertical or steep faces should be provided with support unless instructed otherwise by a competent person.

11. Conclusions and Risk Evaluation

11.1 Human Health and Controlled Waters

Following the implementation of the ground investigation, the contaminant linkages identified during the Preliminary Environmental Risk Assessment have been re-evaluated and reclassified in relation to the additional information obtained. The results of the reassessment are summarised in Table 12.

Where the recommendations are implemented, the contaminant linkages will be broken, and the Site's overall risk rating will be reduced to **Low**. In addition, the Site is unlikely to be capable of being classified as Contaminated Land under the Environmental Protection Act 1990, thus meeting the requirements of paragraphs 183 to 188 of the National Planning Policy Framework

Table 20: Final Conceptual Model

Potential Sources	Pathways	Receptor	Risk	Justification	Residual Risk
Human Health					
Contamination in Made Ground	Dermal contact, Inhalation & Ingestion	Future Site Users.	Low	Comparison of the soil laboratory data with the residential without plant uptake GACs records no exceedances. Therefore, the materials identified at the site are not considered to represent a risk to future site users. No areas of soft landscaping are proposed.	Low
Asbestos Fibres	Inhalation	Future Site Suers	Low	Asbestos fibres were recorded in one location from WS101 that presents a potential risk to future users of the Site. There are no areas of soft landscaping proposed in the development therefore the risk from the asbestos fibres in the Made Ground to the end-user is considered to be Low. However, should the development proposals be subject to change and soft landscaping is incorporated into the development, a suitable engineered cover system should be implemented at the Site.	Low
Asbestos fibres (Amosite) WS101	Inhalation	.Future Site users	Medium	The asbestos fibres identified in one location poses a risk through fibre and dust inhalation and if present may pose a risk to adjacent third-party property should dust be generated during the proposed earthworks. These risks can be mitigated through the development of a detailed enabling works strategy following guidance and protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (Asbestos in Soil and Made Ground: A guide to understanding risk).	Low
Ground Gas & Vapours					
Made Ground	Accumulation in confined spaces, leading to inhalation.	Future Site users	Low	A number of ground gas sources have been identified, such as Made Ground underlying the Site and landfills present in close proximity of the Site.	Low

				The Site has been assigned a classification of CS1 in accordance with CIRIA C665, which should be confirmed with Rochdale Council.	
TPH Aliphatic EC8-EC10 & EC10-12	Accumulation in confined spaces, leading to inhalation.	Future Site users		Marginally elevated concentrations of TPH within the aliphatic carbon bands were recorded on comparison with the SoBra groundwater values for a residential end-use. However, on the basis of the limited concentrations recorded in the soils and groundwater together with the conservative assessment criteria, the risk is considered to be Low.	Low
Off-site human health receptors	Contamination in Made Ground and shallow soils	Windborne, potentially contaminated construction dust. Runoff from stockpiled soils.	Medium	A Construction Environmental Monitoring Plan (CEMP) should be prepared for the works, including measures to minimise runoff from stockpiled soils, manage groundwater in excavations and suppress the generation of dust. Construction materials brought on-Site as part of works will be appropriately stored to prevent spills and leaks. This should prevent potentially contaminated material reaching off-Site residents.	Low
Controlled Waters					
Contamination in Made Ground, shallow soils, and shallow groundwater.	Migration through granular deposits and via sewer bedding materials to the River Roch	River Roch	Low	The River Roch is a canalised structure in the vicinity of the Site as a result of the re-routing of the watercourse in the 1960s. The presence of hydrocarbon compounds within one sample obtained from the Made Ground is consistent with the former uses at the Site. The limited nature of the groundwater within the Made Ground, together with the canalised surface water structure, indicates a low risk.	Low
Construction materials stored on-Site as part of development works	Spills to ground, and the River Roch.	River Roch	Medium	It is considered that the primary risk to the river is posed by the potential for run-off from the Site, and any contaminated stockpiles that may be present during construction works. Details on how contaminants and run-off will be managed during enabling works will be set out in a Construction Environmental Management Plan (CEMP).	Low
Contamination in Made Ground and shallow soils	Remobilisation of contamination by rainfall infiltration following removal of hardstanding during construction works	Secondary A aquifer in the Alluvium and Pennine Lower Coal Measures	Low	The CEMP should include measures to minimise rainwater infiltration to exposed ground, or the potential for construction spills during the demolition and construction works. The previous ground investigation identified relatively minor metals contamination in the River Roch and the shallow	Low

				groundwater beneath the Site. Groundwater Laboratory results are outstanding and the risk to the underlying Aquifers should be reassessed upon the receipt of laboratory data. Rainwater infiltration via soft landscaping is possible at the completed Development. However, this is likely to be limited as the majority of the Site will be covered by buildings and hardstanding.	
Property					
Contamination in Made Ground, shallow soils, and shallow groundwater	Direct contact with building foundations and buried services leading to chemical attack.	Site structures and services	Low	Barrier pipes will provide sufficient protection for potable water supply pipes in all brownfield conditions; low concentrations of hydrocarbons were recorded at the site and hence it is anticipated that barrier pipes will be required. The requirement for water barrier pipes should be confirmed with the local water provider. Buried concrete should be designed in accordance with the recommendations provided in this report. (DS1, AC1)	Low

11.2 Geotechnical

Foundations

Due to the relatively low strength / density of the shallow natural soils and the increased loadings the proposed structure is expected to exert, it is considered that piled foundations will be required.

Based on the available site investigation information, end bearing piles would key into the mudstone bedrock between approximately 9m and 12.5m bgl.

The final design of the piles will be the responsibility of the piling contractor. Dependant on whether all existing foundations are removed during demolition, an allowance for probing of pile positions and/or drilling of obstructions may be required.

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During construction, the in-situ CBR value must be checked against the Design CBR value, to confirm design requirements are being met.

Floor Slabs

It is recommended that suspended floor slabs be adopted due to the anticipated low CBR value of the shallow subgrade and the depth and variability of the Made Ground recorded across the site.

Groundwater / Stability of Excavations

Based on observations made during fieldwork, when significant shallow obstructions were encountered during the hand pitting for the exploratory holes, even shallow excavations are likely to require shoring to maintain stability.

Consideration should be given to the re-use of arisings from foundation trenches / drainage runs etc. Where contamination has been encountered, it may be possible to reuse foundation arisings subject to risk assessment; however, certainty of use and volume should be confirmed in accordance with the requirements of CLAIRE guidance.

In line with BS6031, all excavations should be examined daily by a competent person to ensure that they remain safe. Where the sides cannot be sloped back to a safe angle, as approved by a competent and experienced person, their continued stability should not be taken for granted. Vertical or steep faces should be provided with support unless instructed otherwise by a competent person.

12. Recommendations

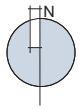
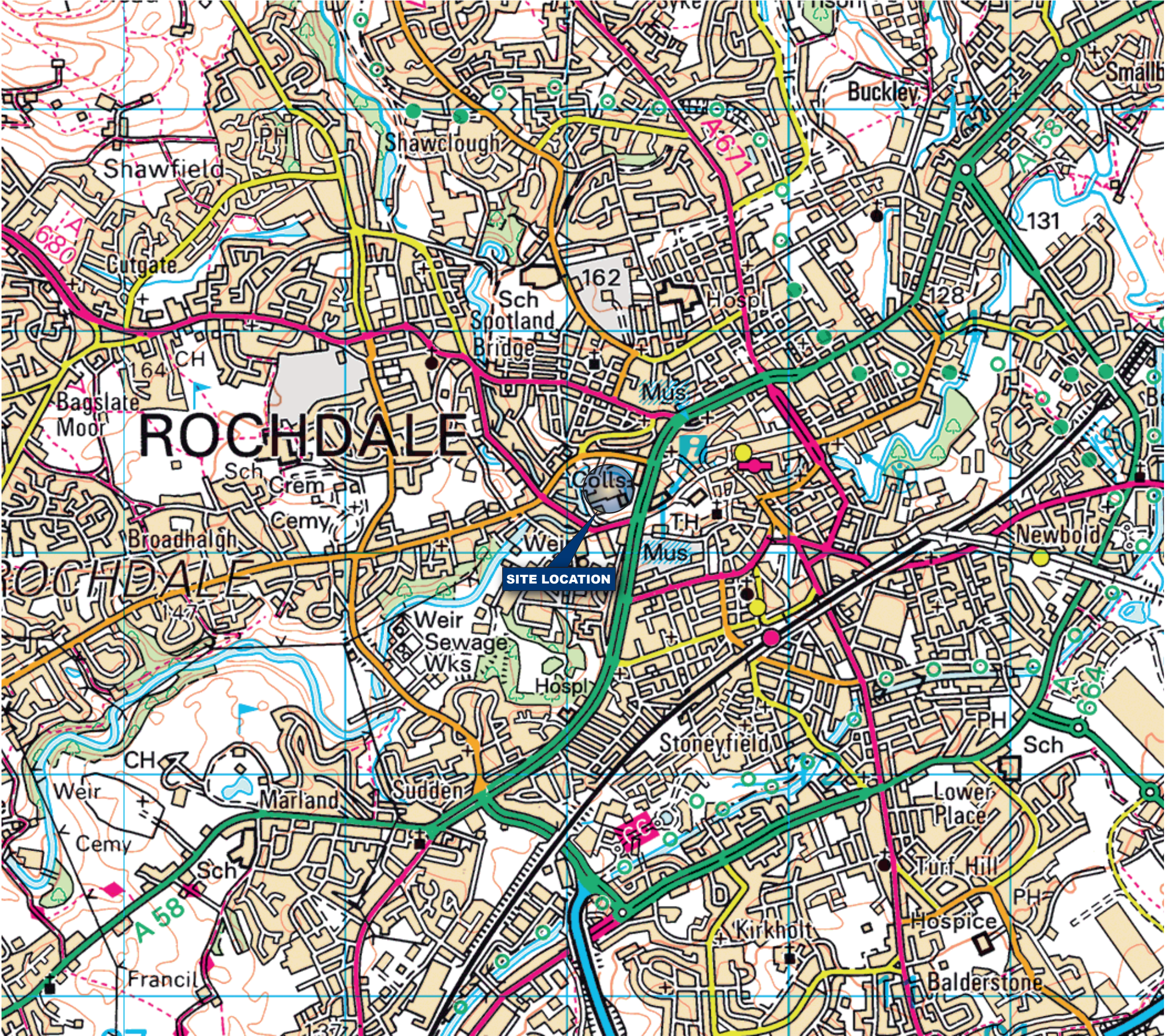
The following actions are recommended to address the potentially unacceptable risks that remain:

- The Site has been designated as Characteristic Situation 1 based on the recorded ground gas concentrations. However, this should be confirmed with Rochdale Council, as it is understood the existing buildings were designated as CS1, but had CS2 ground gas protection measure installed;
- Should soft landscaping be incorporated into the design, the requirements for mitigating risks associated with proposals a suitable engineered cover system will be required in the areas of Made Ground;
- A Materials Management Plan should be produced by contractors to ensure that materials that may be excavated during their works (including pile arisings) may be suitable for re-use on the Site. The re-use of materials should be identified and designated under the CL:AIRE Definition of Waste: Code of Practice (DoWCoP), i.e. the earthworks phase of the development should be planned and managed such that re-use of suitable site-won arisings is maximised and waste is minimised;
- An Asbestos Risk Management and Discovery Plan should be prepared by contractors to include methods and measures for managing asbestos in soils during the earthworks;
- An Environmental Management Plan (EMP) should be prepared including measures for managing waste, control run-off during earthworks, suppressing dust and asbestos fibres etc;
- The conclusions of this report should be subject to review and approval by Rochdale Borough Council;
- Barrier pipes will provide sufficient protection for potable water supply pipes in all brownfield conditions. The requirement for water barrier pipes should be confirmed with the local water provider;
- Buried concrete should be designed in accordance with DS-1, AC-1 classification;
- Topsoil, Subsoil and any Engineered Fill imported for use at the Site should be certified as suitable for use. Samples of imported soils should be taken and scheduled for laboratory testing to verify certification. All supplier and verification chemical results should be collated by a contractor for inclusion in a Completion Report; and,
- Construction and Maintenance workers should undertake risk assessments and prepare method statements before commencing work and should be provided with and make use of appropriate Personal Protective Equipment (PPE). Appropriate hygiene facilities should also be provided on Site and it should be ensured that all future construction personnel have been provided with asbestos awareness training;
- Construction workers should avoid entering excavations. If entry cannot be avoided, a risk assessment should be undertaken with PPE and RPE used where appropriate, and in line with the Confined Space Entry Regulations 1997;
- The overall level of risk associated with hazardous gas at the Site should be kept under review through the design process, particularly in the event that the end use of the site is changed or infrastructure is designed which could introduce pathways for gas (e.g. vibrated stone columns, deep drains, large/deep attenuation tanks, substantial earthworks etc). This may necessitate further monitoring of ground gas and/ or a review of the above recommendations for gas protection.

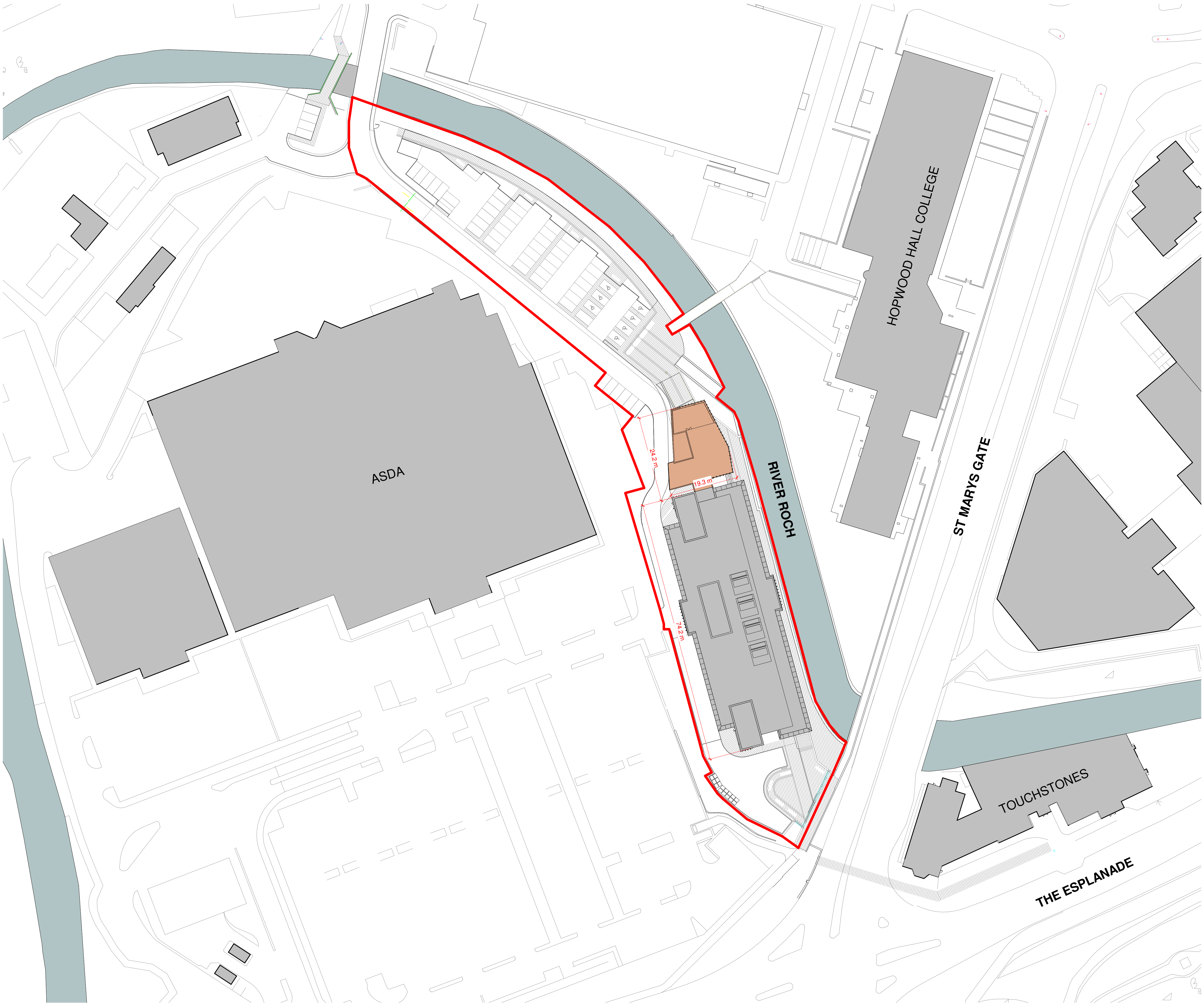
APPENDICES

Appendix A Site Plans

- Site Location Plan (Ref: WIE19085-105-GR-PRA-A1A);
- Red Line Site Boundary;
- Proposed Site Plan (Ref: 3940-A-1002P);
- Exploratory Hole Location Plan (Ref: 19085-100-WIE-ZZ-XX-DR-V-80-0001-P03).



Project Details	WIE19085-105: Rochdale Sixth Form College
Figure Title	Figure A1: Site Location Plan
Figure Ref	WIE19085-105_GR_PRA_A1A
Date	June 2022
File Location	\\s-incs\wiel\projects\wie19085\1005\graphics\pra\issued figures



NOTE:
1. ANY DISCREPANCIES TO BE REPORTED IMMEDIATELY TO THE ARCHITECT.
2. ALL DIMENSIONS TO BE SITE CHECKED & VERIFIED BY THE CONTRACTOR PRIOR TO THE MANUFACTURE OR ORDER OF ANY MATERIALS OR GOODS.

KEY:
— PROPOSAL BOUNDARY



P2	Planning Permission Submission	02.11.22
P1	Issued for comment	28.10.22
Rev	Description	Date

PLANNING

Rochdale Sixth Form College
College Road, Rochdale, OL12 6HY

Proposed Site Plan

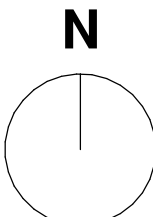
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3940-A-1002P

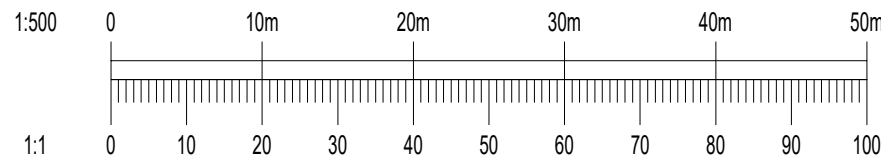
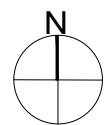
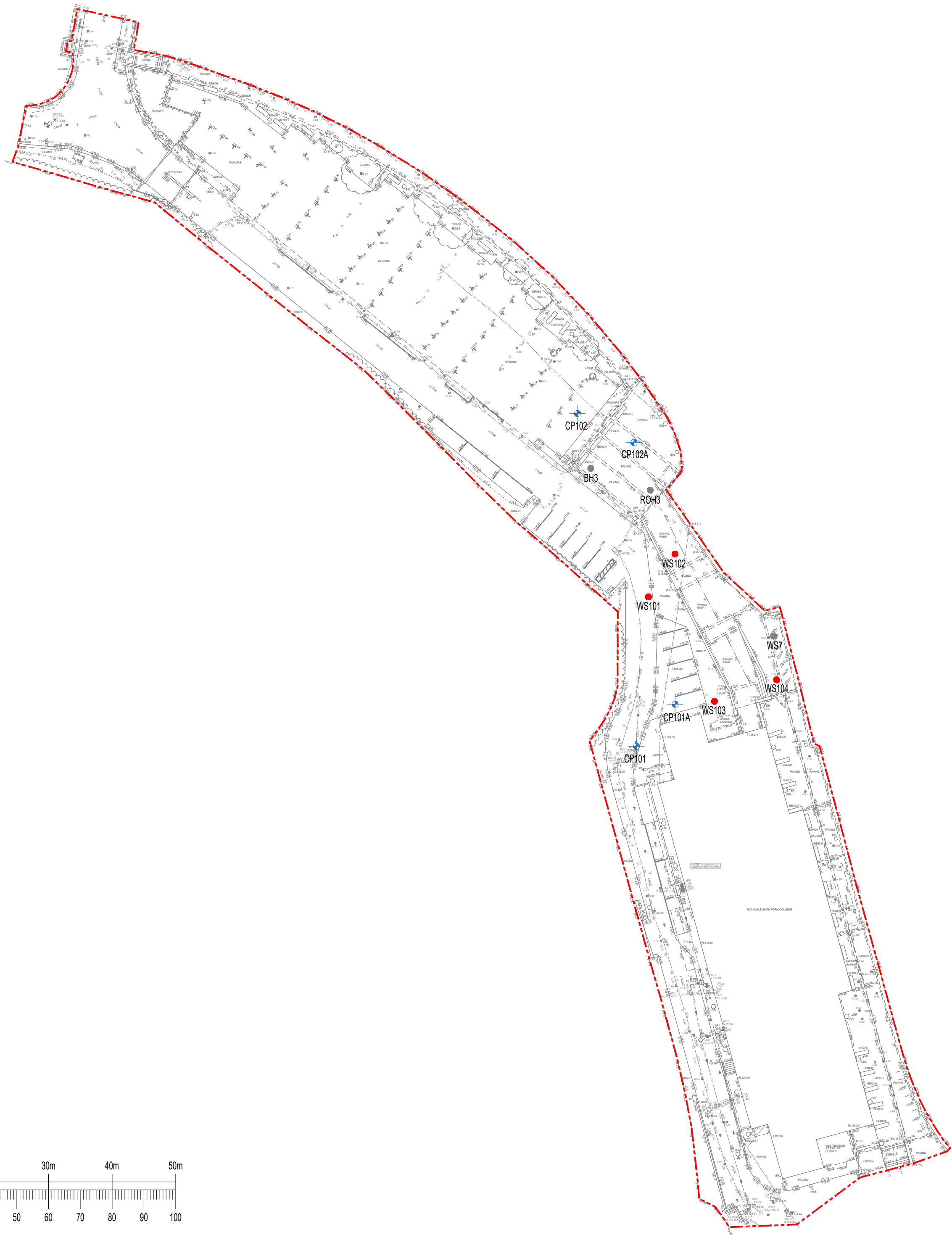
DATE	REVISION	STATUS
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SCALE	PURPOSE OF ISSUE	
As indicated		

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GENERAL NOTES

- SURVEY AREA
- WINDOW SAMPLE LOCATION
- + CABLE PERCUSSION BOREHOLE
- HISTORICAL EXPLORATORY HOLE

P03	24.05.23	SURVEYED EXPLORATORY HOLE LOCATIONS	MC	UA
P02	19.04.23	EXPLORATORY HOLES UPDATED	MC	UA
P01	03.04.23	INFORMATION ISSUE	DC	AM
Rev	Date	Description	By	Chk

Amendments

Project	ROCHDALE COLLEGE			
Title	EXPLORATORY HOLE LOCATION PLAN			
Client	-			



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Suitability	INFORMATION			S2
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Drawn By	DC	Date	APRIL 2023	Scales @ A2 1:500
Project - Originator - Volume - Level - Type - Role - Number				Revision
19085-100-WIE-ZZ-XX-DR-V-80-0001				P03



GROUNDTECH
CONSULTING

Job title: Rochdale Sixth Form Centre

Report type: Factual Report

Prepared for: Waterman I&E

Date: July 2023

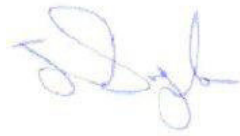
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CLIENT	WATERMAN I&E	
CLIENT CONTACT	ANDREW MOULD	
For and Behalf of Groundtech Consulting		
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TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	PROJECT OBJECTIVES	1
1.2	PROPOSED DEVELOPMENT	1
1.3	LIMITATIONS	1
2.0	SITE SETTING	2
2.1	LOCATION.....	2
2.2	SITE DESCRIPTION	2
3.0	SCOPE OF INVESTIGATION AND RATIONALE	4
3.1	PROJECT OBJECTIVES	4
3.2	SCOPE OF WORKS	4
3.3	SOIL SAMPLING	5
3.4	GEO-ENVIRONMENTAL ANALYSIS	5
3.5	GEOTECHNICAL ANALYSIS	6
3.6	GAS AND GROUNDWATER MONITORING.....	6
3.7	VAPOUR SURVEY - PHOTO IONISATION DETECTOR.....	7
4.0	GROUND MODEL.....	8
4.1	MADE GROUND.....	8
4.2	NATURAL GROUND.....	8
4.3	BEDROCK.....	8
4.4	GROUNDWATER.....	8
4.5	WATCHING BRIEF.....	9
4.6	BOREHOLE PROGRESS / OBSTRUCTIONS.....	9
5.0	RELEVANT INDUSTRY REFERENCES.....	10
	APPENDIX 1 – PLANS	
	APPENDIX 2 – SITE PHOTOGRAPHS	
	APPENDIX 3 - EXPLORATORY HOLE LOGS	
	APPENDIX 4 – GAS MONITORING RESULTS	
	APPENDIX 5 – PID RESULTS	
	APPENDIX 6 - LIMITATIONS	

Plans

<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
GRO-22444-P01	-	Project Location Plan
GRO-22444-P02	-	Exploratory Hole Location Plan

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by Waterman I&E to undertake a Ground Investigation for a site at Rochdale Sixth Form Centre.

A main investigation was undertaken in accordance with BS 5930:2015, BS 10175:2013, BS 8576 and BS 22475.

1.2 Proposed Development

The proposed development is commercial end use comprising the construction of a new six-storey extension to the existing Rochdale Sixth Form College. In addition to the proposed building construction, it is also understood that there would be alterations to external surfaces; however, no new areas of soft landscaping are proposed. A roof garden is to be provided on the sixth floor.

1.3 Limitations

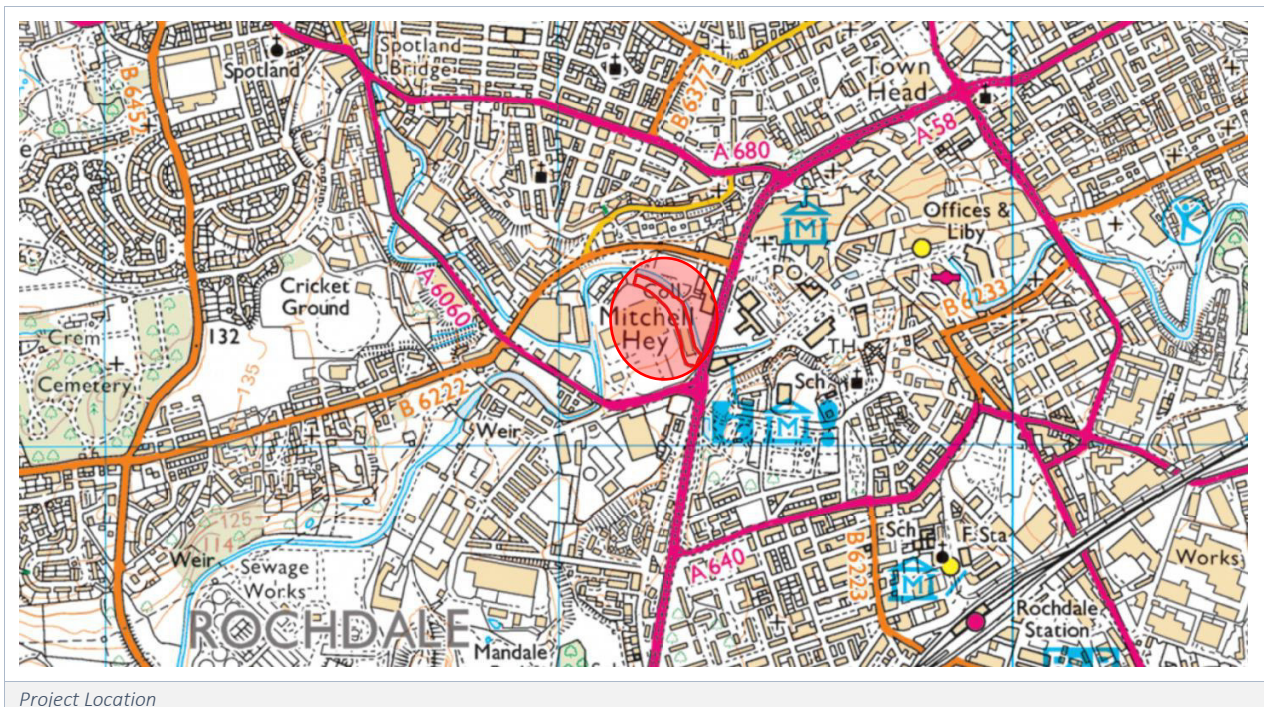
Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report, they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 0.5km south west of Rochdale Town Centre, as shown on the Project Location Plan GRO-22444-P01 and is approximately centred on National Grid Reference 389283 413258.



Access to the site is gained off College Road to the north.

2.2 Site Description

The site is irregular in shape and the topography slopes up to the south east 1.87m towards the existing college building.

Onsite Features

The site is currently occupied by a six-storey college building known as Rochdale Sixth Form Centre.

The building is constructed of a mixture of brick and concrete structures. The area immediately surrounding the building and the car park is all hardsurfaced with tarmac and concrete paving.

There is an area to the east of the site towards the river which is soft landscaped, including grass.

Site Boundaries and Surrounding Features

The site boundary is lined by a metal fence all the way around, with hedges along the western boundary.

The proposed development area is surrounded by the following features/land uses:

- North - River Roch and Hopwood Hall College.
- East - River Roch and the A58 St Mary's Gate.

- South - *Dane Street.*
- West - *ASDA supermarket.*

Site photographs are presented in *Appendix 2*.

3.0 SCOPE OF INVESTIGATION AND RATIONALE

3.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site.
Maintain a watching brief for visual and olfactory evidence of contamination.
Obtain samples using methodology in current guidance for contamination analysis.
Obtain samples using methodology in current guidance for geotechnical analysis.
Determine the presence of obstructions and buried structures.
Record details of buried services encountered.
Install standpipes for gas and groundwater monitoring.

3.2 Scope of Works

The following scope of works was completed between 13th and 15th April 2023:

- *All exploratory hole locations were cleared by a CAT Scanner before the commencement of works.*
- *Coring of the concrete hard surfacing was undertaken at 1 No. location (CP102A).*
- *2 No. Cable Percussive Boreholes (CP101 and CP102) were drilled to depths of 12.75m and 8.7m bgl respectively using a Dando Cable Percussive Rig. A cable percussive borehole was attempted at CP102A however it terminated at 0.8m bgl.*
- *4 No. Windowless Sample Borehole (WS101 to WS104) were drilled to depths of between 3.0m and 5.0m bgl using a Dando Terrier rig.*
- *Photo Ionisation Detector (PID) screening of all environmental samples.*
- *Surveying of all exploratory hole locations to National Grid and meters Above Ordnance Datum (mAOD).*
- *Reinstatement of all locations.*

The exploratory hole locations are presented on Groundtech Plan GRO-22444-P02, and the logs are presented in Appendix 3.

The exploratory hole locations were positioned by Waterman I&E to establish the stratification beneath the site and target areas of concern as set out in the specification. The exploratory holes were logged by a suitably experienced geo-environmental engineer in general accordance with the following current guidance:

- *BS 5930 'Code of Practice for Site Investigations' 2015.*
- *BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil'.*
- *BS EN ISO 14689:2002 'Geotechnical investigation and testing – Identification and classification of rock'.*

3.3 Soil Sampling

During the intrusive investigation, representative samples were taken at regular intervals, changes of strata and where evidence of contamination existed. Laboratory analysis was scheduled on the samples obtained.

The samples taken are summarised in the table below:

Soil Sample	Number
<i>Environmental Sample</i>	35
<i>Disturbed Sample</i>	30
<i>Bulk Sample</i>	6
<i>Undisturbed U100 Sample</i>	4

The samples have been obtained in accordance with current environmental and geotechnical guidance. The sampling plan has been designed to obtain samples from all required strata using the correct methodology.

Disturbed samples of soil for chemical analysis were placed in the correct sampling containers as required by the laboratory in accordance with their MCERTS and UKAS Accreditation. Transportation was arranged in a timely manner and the samples were at the correct temperature.

The sample locations and depths are recorded on the exploratory logs.

3.4 Geo-Environmental Analysis

All testing was scheduled by Waterman I&E.

Contaminants of Concern	Matrix	Number
<i>Suite A – Metals in Soils</i>	<i>Soil</i>	6
<i>Suite B – TPH CWG</i>	<i>Soil</i>	9
<i>Suite C – 16 PAHs & Coronene</i>	<i>Soil</i>	9
<i>Suite D1 – Soil Properties</i>	<i>Soil</i>	9
<i>Suite E1 – Asbestos Screening</i>	<i>Soil</i>	6
<i>Suite F – VOC target list on soil</i>	<i>Soil</i>	2
<i>Suite G – SVOC</i>	<i>Soil</i>	2
<i>Suite H – Cyanide in soil</i>	<i>Soil</i>	3
<i>Suite M – BRE SD1</i>	<i>Soil</i>	11
<i>Suite A – Metals in Soils</i>	<i>Groundwater</i>	3
<i>Suite B – TPH CWG</i>	<i>Groundwater</i>	3
<i>Suite C – 16 PAHs & Coronene</i>	<i>Groundwater</i>	3
<i>Total Hardness</i>	<i>Groundwater</i>	3
<i>Suite F – VOC</i>	<i>Groundwater</i>	2
<i>Suite G4 – SVOC target list & TICs</i>	<i>Groundwater</i>	3
<i>Suite H – Cyanide in water</i>	<i>Groundwater</i>	2
<i>Suite M – Geotechnical suite waters</i>	<i>Groundwater</i>	3
<i>Dissolved Organic Carbon</i>	<i>Groundwater</i>	3

3.5 Geotechnical Analysis

All testing was scheduled by Waterman I&E.

British Standard	Test Method	Number
Part 2	Water Content	7
Part 2	Plasticity Index Analysis	7
Part 7	Undrained Shear Strength in Triaxial Compression	3
BRE SD1	BRE Short Suite (i)	30
Part 2	Particle Size Distribution	5
Part 2	Sedimentation	1
Part 9	Point Load	2
Part 5	One Dimensional Consolidation Test	1

3.6 Gas and Groundwater Monitoring

Gas and groundwater monitoring installations were constructed in the boreholes under the instruction of Waterman I&E. The standpipes consisted of high-density polyethylene (HDPE) pipe - a bentonite seal was placed around the plain pipe and a clean gravel pack was placed around the slotted pipe. A summary of the installation construction is presented in the table below:

Location	Depth (m bgl)	Response Zone (m bgl)	Targeted Strata	Reason
WS102	1.50	0.50 - 1.50	Made Ground: gravelly sand.	Ground gas monitoring
WS103	1.50	0.50 – 1.50	Made Ground: gravelly sand.	Ground gas monitoring
WS104	1.50	0.50 - 1.50	Made Ground: sandy gravel.	Ground gas monitoring
CP101	7.00	4..50 – 7.00	Sand	Groundwater monitoring
CP102	1.00	0.50 – 1.00	Made Ground: clayey gravel.	Ground gas monitoring
	4.50	3.00 – 4.50	Sand	Groundwater monitoring

Permanent gas and flow rate monitoring was carried out using a GFM 436 infrared gas monitor with integral electronic flow analyser. The measurements taken are listed below:

- Oxygen (O₂), carbon dioxide (CO₂) and methane (CH₄) as the percentage volume in air (%v/v).
- Hydrogen sulphide (H₂S) and carbon monoxide (CO) as the percentage volume in air (%v/v).
- Lower Explosive Limit (%LEL) of methane.
- Atmospheric and borehole pressure, including pressure trend.
- Flow measurements (l/hr).
- Weather conditions.

Both peak and steady state conditions were monitored to understand the behaviour of the permanent ground gas, the steady state conditions were recorded by allowing the gas monitor to run for a minimum of 3 minutes.

Six gas monitoring visits have been undertaken between the dates of 28th April 2023 and 14th June 2023. The permanent gas monitoring results are presented in *Appendix 4*.

Groundwater Sampling

Well development was carried out to ensure no cross contamination from the drilling activities remained in the water column in the well. The installations were purged to a minimum three times the volume of the water column in the borehole prior to sampling.

Purging was undertaken at a slower rate than the well development, and the sampling at a slower rate again.

The method of sampling selected was using low flow pumping techniques as set out in the specification.

Where possible, a water meter was used to test the pH, temperature and conductivity before sampling until equilibrium conditions were met, as per BS 10175 guidelines.

Samples were sent to the UKAS Accredited laboratory the same day sampling was carried out in general accordance with BS593010 and BS5667-1111.

One groundwater sampling visit has been undertaken on 28th April 2023.

All groundwater contamination testing was scheduled by Waterman I&E.

3.7 Vapour Survey - Photo Ionisation Detector

Standard sampling protocol and preservation of samples was undertaken as described in the EA guidance on site investigation. The onsite monitoring was carried out in line CIRIA C6658 to aid targeting samples for VOC laboratory analysis.

Soil was collected for onsite testing. A plastic bag was half filled with soil allowing a suitably sized headspace. The bag was sealed and stored for at least 20 minutes before being tested for Total Volatile Organic Compounds (TVOCs) using a Photo Ionisation Detector (PID).

Results of the PID readings are presented on the exploratory hole logs and *Appendix 5*.

4.0 GROUND MODEL

4.1 Made Ground

Made Ground was encountered across the site to depths of between 1.35m and 2.0m bgl.

Surfacing

Paving slabs were encountered to a maximum depth of 0.1m bgl within CP101, CP102, CP102A, WS101, WS103, and WS104 and black tarmac was encountered in WS102 to 0.05m bgl.

Made Ground

Made Ground was encountered to a maximum depth of 2.0m bgl and comprised two main strata:

- *Yellow brown, dark brown and dark grey gravelly sand / sandy gravel was present beneath the surfacing to depths of between 0.2m and 2.0m bgl. The gravel content included sandstone, brick, concrete and coal.*
- *Firm dark brown very gravelly clay with a high cobble content of brick and concrete was encountered in CP101 at a depth between 0.2m to 2.0m bgl.*

4.2 Natural Ground

The natural strata consisted of the following:

- *Very loose, loose and medium dense brown and grey brown variably gravelly clayey Sand was encountered to depths of between 4.5m and 6.8m bgl.*
- *Bands of very soft sandy silty Clay were present in WS102 (1.7m to 3.0m bgl) and WS103 (2.0m to 3.2m bgl).*
- *Firm and stiff grey brown gravelly silty Clay was in CP101 and CP102 to depths of between 8.1m and 11.3m bgl.*

4.3 Bedrock

Weak grey micaceous destructured Mudstone recovered as slightly clayey silty angular to subangular fine to coarse gravel was encountered in CP101 and CP102 from depths of between 8.1m and 11.3m bgl and to the base of the boreholes.

4.4 Groundwater

Groundwater was encountered in the majority of the boreholes during the investigation at depths between 2.2m to 5.0m bgl as summarised in the table below:

Location	Depth (m bgl)	Strata
CP101	5.00	Natural Sand
CP102	3.00	Natural Sand
WS101	2.20	Natural Sand
WS102	3.00	Natural Clay
WS103	2.70	Natural Clay
WS104	2.80	Natural Sand

4.5 Watching Brief

A watching brief was maintained during the Ground Investigation for visual and olfactory evidence of contamination.

No olfactory or visual evidence of contamination was recorded.

4.6 Borehole Progress / Obstructions

Concrete was encountered at 0.4m bgl in CP102A therefore, this borehole was relocated to CP102.

No underground utilities were encountered during the works.

5.0 RELEVANT INDUSTRY REFERENCES

British Standards Institution '*Investigation of Potentially Contaminated sites - code of practice*' BS 10175:2017.

British Standards Institution '*Code of Practice for Site Investigations*' BS 5930:2015

British Standards Institution '*Geotechnical investigation and testing – Identification and classification of soil*' BS EN ISO 14688:2002.

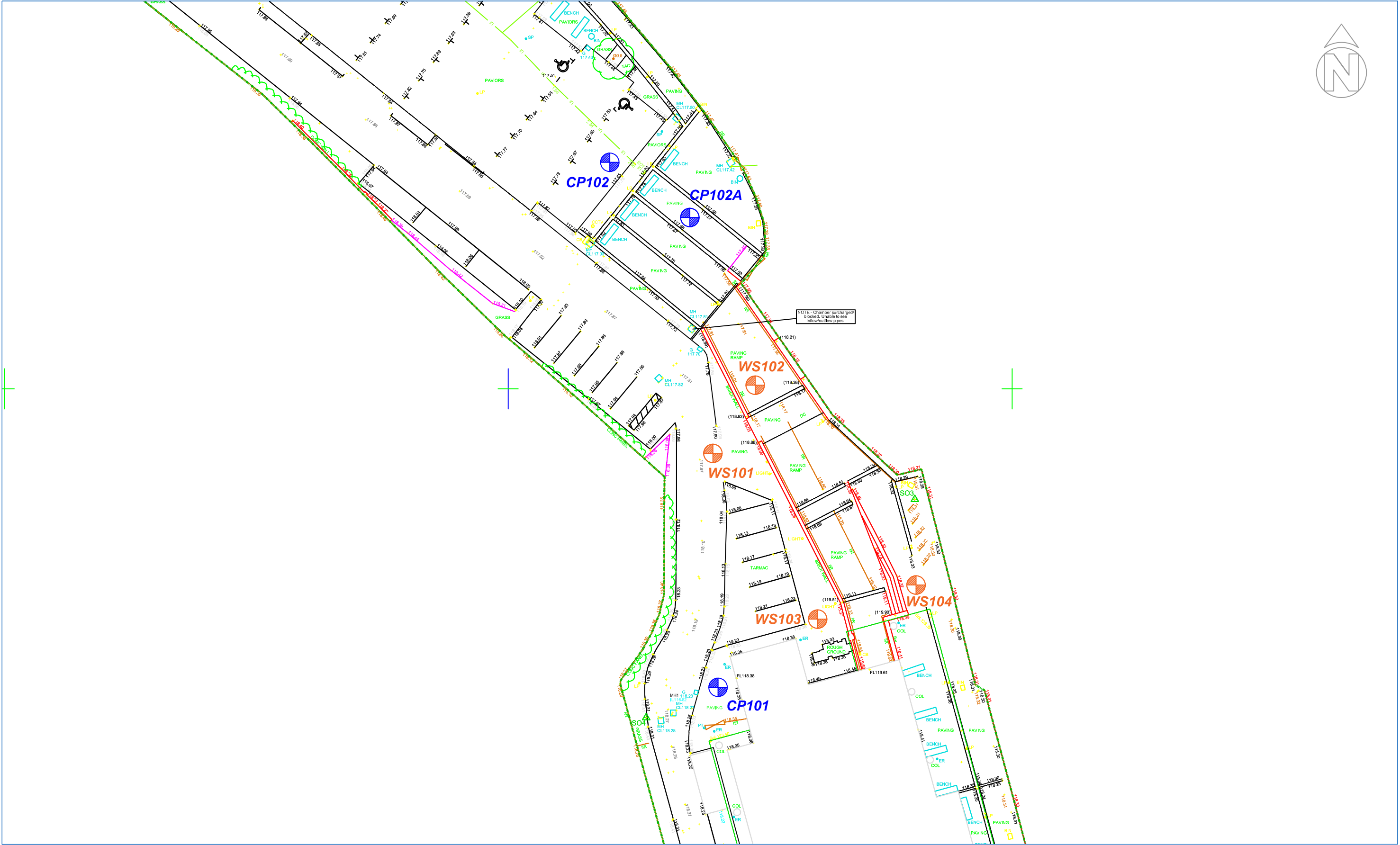
BS EN ISO 14689:2002 '*Geotechnical investigation and testing – Identification and classification of rock*'.

APPENDIX 1 – Plans



GROUNDTECH CONSULTING 	CLIENT	DATE				Status		Notes  SITE LOCATION
	WATERMAN I&E	APRIL 2023				Preliminary		
	PROJECT TITLE	SCALE				Draft		
	ROCHDALE SIXTH FORM COLLEGE	NTS				Issued		
	PLAN TITLE	PLAN NUMBER				For Comment		
	PROJECT LOCATION PLAN	GRO-22444-P01	Rev.	Details	Date	Approved		





GROUNDTECH CONSULTING	CLIENT	DATE			Status		Notes CABLE PERCUSSION BOREHOLE WINDOWLESS SAMPLE BOREHOLE
	WATERMAN I&E	APRIL 2023			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	ROCHDALE SIXTH FORM COLLEGE	NTS			Issued		
	PLAN TITLE	PLAN NUMBER			For Comment		
	EXPLORATORY HOLE LOCATION PLAN	GRO-22444-P02	Rev.	Details	Date	Approved	

APPENDIX 2 – Site Photographs



Photograph 1 – South east aspect of the site.



Photograph 2 – CP102. North aspect of the site.



Photograph 3 – Walkway sloping upwards towards Rochdale Sixth Form Centre.



Photograph 4 – Location of CP101.



Photograph 5 – East of the site.



Photograph 6 – West aspect of the site next to the river and location of WS104.

APPENDIX 3 - Exploratory Hole Logs



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CONSULTING

Borehole Log

Borehole No.

CP101

Sheet 1 of 2

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389268.44 - 413270.09

Hole Type
CP

Location: ROCHDALE

Level: 118.88

Scale
1:50

Client: WATERMAN I&E

Dates: 13/04/2023 - 14/04/2023

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	PID=0	0.05	118.83		MADE GROUND: Light grey paving slab.	1
		0.50	ES	PID=0	0.20	118.68		MADE GROUND: Yellow brown gravelly fine to coarse sand. Gravel is subangular to subrounded fine to medium of mixed lithologies including concrete and brick	
		1.20	D	PID=0				MADE GROUND: Firm dark brown very gravelly clay with a high cobble content of brick and concrete. Gravel is subangular to subrounded medium to coarse of mixed lithologies including brick and concrete.	
		1.20		N=9 (4,1/1,2,3,3)					2
		2.00	D		2.00	116.88		Loose brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subrounded fine to coarse of quartzite.	
		2.00	ES	N=4 (5,3/2,1,0,1) PID=0					
		2.00							
		3.00	B						3
		3.00	D					Becoming very loose from 3.00m bgl.	
		3.00		N=0 (0,0/0,0,0,0)					
		4.00	ES	N=2 (1,0/1,0,1,0) PID=0					4
		4.00							
		5.00	B		4.90	113.98			5
		5.00	D					Medium dense grey brown very gravelly medium to coarse SAND. Gravel is subangular to subrounded fine to coarse of quartzite.	
		5.00		N=25 (4,4/5,7,6,7)					
		6.00	D						6
		6.00	ES						
		6.00		N=25 (4,5/6,6,7,6) PID=0					
					6.80	112.08			7
								Firm brown slightly gravelly silty laminated CLAY. Gravel is subangular to rounded fine to medium of mixed lithologies including quartzite.	
		7.95	U						8
		8.00	D						
		9.00	D						9
		9.00		N=16 (2,2/3,4,4,5)					
					9.40	109.48			10
								Stiff grey gravelly CLAY. Gravel is subrounded to rounded fine to coarse of mixed lithologies including quartzite.	
		10.00	ES						

Continued on next sheet

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 5.0m bgl rising to 1.1m bgl after 20 minutes. 4. Chiseling undertaken for one hour between 12.34m to 12.75m bgl. 5. Monitoring standpipe installed to 7.0m (4.5m plain, 2.5m slotted).





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Borehole Log

Borehole No.

CP101

Sheet 2 of 2

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389268.44 - 413270.09

Hole Type
CP

Location: ROCHDALE

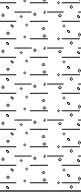
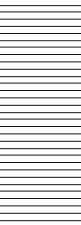
Level: 118.88

Scale
1:50

Client: WATERMAN I&E

Dates: 13/04/2023 - 14/04/2023

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.95	U		11.30	107.58		Weak grey micaceous MUDSTONE destructured recovered as slightly clayey silty angular to subangular fine to coarse gravel.	11
		11.00	D						
		11.30	B						
		12.00	D	N=50 (5,7/50 for 190mm)	12.91	105.97			12
		12.00							
		12.75		N=50 (25 for 75mm/50 for 30mm)					
								End of borehole at 12.92 m	13
									14
									15
									16
									17
									18
									19
									20

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 5.0m bgl rising to 1.1m bgl after 20 minutes. 4. Chiseling undertaken for one hour between 12.34m to 12.75m bgl. 5. Monitoring standpipe installed to 7.0m (4.5m plain, 2.5m slotted).





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Borehole Log

Borehole No.

CP102

Sheet 1 of 1

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389259.15 - 413322.48

Hole Type
CP

Location: ROCHDALE

Level: 117.65

Scale
1:50

Client: WATERMAN I&E

Dates: 14/04/2023 - 15/04/2023

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	PID=0	0.10	117.55		MADE GROUND: Grey block paving.	1
		0.50	ES	PID=0				MADE GROUND: Light grey sandy angular to subangular medium to coarse gravel of limestone. Sand is coarse.	
		0.90	ES		0.80	116.85		MADE GROUND: Dark grey brown clayey angular to subangular fine to coarse gravel of brick.	
		1.20	D						
		1.20	ES						
		1.20		N=31 (5,7/20,5,3,3) PID=0					
		2.00	B		2.00	115.65		Very loose dark grey brown clayey silty fine to medium SAND with pockets of soft grey silty sandy clay.	
		2.00	ES						
		2.00		N=0 (0,0/0,0,0,0) PID=0					
		3.00	B		3.00	114.65		Medium dense dark brown grey very gravelly medium to coarse SAND with low to moderate cobble content of quartzite. Gravel is angular to subangular fine to coarse of mixed lithologies including quartzite.	
		3.00		N=20 (4,4/6,5,5,4)					
		4.00	D						
		4.00	ES					Firm dark brown gravelly silty laminated CLAY. Gravel is angular to subangular fine to coarse of mixed lithologies including mudstone.	
		4.00		N=19 (4,5/4,5,6,4) PID=0	4.50	113.15			
		4.50	D						
		5.45	U					Weak grey micaceous MUDSTONE destructured recovered as slightly clayey silty angular to subangular fine to coarse gravel.	
		5.50	D						
		6.00	D						
		6.00	ES					End of borehole at 8.85 m	
		6.00		N=11 (3,3/2,3,3,3) PID=0					
		7.95	U						
		8.00	D		8.10	109.55			
		8.10	B						
		8.20	D						
		8.20		N=50 (25 for 95mm/50 for 105mm) N=50 (25 for 125mm/50 for 20mm)	8.85	108.80			
		8.70							
		8.70 - 8.85	D						

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 3.0m and 8.1m bgl. 4. Chiseling undertaken for one hour between 8.5m to 8.7m bgl. 5. Dual monitoring standpipes installed to 2m (0.5m plain, 1.5m slotted) and 4.5m (3m plain, 1.5m slotted).





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Borehole Log

Borehole No.

CP102A

Sheet 1 of 1

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389268.03 - 413317.94

Hole Type
CP

Location: ROCHDALE

Level: 117.61

Scale
1:50

Client: WATERMAN I&E

Dates: 14/04/2023 - 14/04/2023

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.05	117.56		MADE GROUND: Light grey block paving slab.	
					0.30	117.31		MADE GROUND: Light grey concrete.	
		0.50	ES					MADE GROUND: Brown sandy subangular to subrounded fine to coarse gravel of brick. Sand is medium to coarse.	
		0.80	ES						
					1.00	116.61		End of borehole at 1.00 m	1
									2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

1. Location cleared of services using a CAT scanner. 2. Concrete cored to 0.3m bgl. 3. Hand dug to 1.0m bgl. 4. Borehole terminated at 1.0m due to concrete obstruction. 5. Backfilled with arisings.





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Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389270.32 - 413293.59

Hole Type
WS

Location: ROCHDALE

Level: 117.94

Scale
1:25

Client: WATERMAN I&E

Dates: 13/04/2023 -

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	117.89		MADE GROUND: Light grey paving block slab.	
		0.20	ES		0.20	117.74		MADE GROUND: Yellow brown slightly gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of brick and sandstone.	
		0.50	ES	PID=0				MADE GROUND: Dark brown very gravelly medium to coarse sand. Gravel is subangular to subrounded medium to coarse of mixed lithologies including brick, concrete and sandstone.	
		0.80	ES		0.80	117.14		MADE GROUND: Dark grey gravelly medium to coarse sand. Gravel is subangular to subrounded fine to coarse of mixed lithologies including coal and brick.	1
		1.20	D	N=13 (2,3/4,4,3,2)					
		1.20							
		1.50	ES	PID=0	1.40	116.54		Loose dark brown clayey fine SAND.	
		2.00	D	N=4 (1,1/1,1,1,1)					2
		2.00							
		2.50	ES	PID=0				Becoming silty from 2.60m bgl.	
		3.00	D	N=12 (2,3/4,2,3,3)	3.00	114.94		End of borehole at 3.00 m	3
		3.00							
									4
									5

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 2.2m bgl. 4. Back filled with arisings.





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Borehole Log

Borehole No.

WS102

Sheet 1 of 2

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389274.51 - 413300.36

Hole Type
WS

Location: ROCHDALE

Level: 118.09

Scale
1:25

Client: WATERMAN I&E

Dates: 13/04/2023 -

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
				PID=0	0.05	118.04		MADE GROUND: Black tarmac.	1	
		0.20	ES	PID=0	0.20	117.89		MADE GROUND: Light grey concrete.		
		0.50	ES	PID=0				MADE GROUND: Dark brown gravelly medium to coarse sand with low cobble content of mixed lithologies including brick. Gravel is subangular to subrounded fine to coarse of mixed lithologies including brick and sandstone.		
		1.00	ES		1.00	117.09		MADE GROUND: Brown clayey fine to coarse sand. (Possibly reworked).		
		1.20	ES	N=0 (0,0/0,0,0,0)						
		1.20		PID=1						
		1.50	D					Very soft brown silty sandy CLAY. Sand is medium to coarse.		
		2.00	D	N=0 (0,0/0,0,0,0)	1.70	116.39				
		2.00								
		3.00	D	N=12 (1,2/3,4,3,2)				Medium dense brown slightly gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of mixed lithologies including quartzite.		
		3.00								
		3.50	ES					No recovery at 4.50m to 5.00m bgl.		
4.00	D	N=19 (2,3/4,4,5,6)	3.80	114.29		Continued on next sheet				
4.00										
			5.00	113.09		Continued on next sheet				

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 3.0m bgl. 4. Monitoring standpipe installed to 1.5m (0.5m plain, 1m slotted).





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS102

Sheet 2 of 2

Project Name: ROCHDALE SIXTH FORM
COLLEGE

Project No.
GRO-22444

Co-ords: 389274.51 - 413300.36

Hole Type
WS

Location: ROCHDALE

Level: 118.09

Scale
1:25

Client: WATERMAN I&E

Dates: 13/04/2023 -

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		5.00		N=50 (11,12/9,11,15,15)				Becoming dense at 5.00m bgl. End of borehole at 5.00 m	
									6
									7
									8
									9
									10

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 3.0m bgl. 4. Monitoring standpipe installed to 1.5m (0.5m plain, 1m slotted).





GROUNDTECH
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Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389280.71 - 413277.15

Hole Type
WS

Location: ROCHDALE

Level: 118.41

Scale
1:25

Client: WATERMAN I&E

Dates: 13/04/2023 -

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	118.36		MADE GROUND: Light grey paving slab.	1
		0.20	ES	PID=0				MADE GROUND: Light grey brown gravelly medium to coarse sand with moderate cobble content of mixed lithologies including brick. Gravel is angular to subangular fine to coarse of mixed lithologies including brick and sandstone.	
		0.50	ES						
		1.00	ES	PID=0	1.00	117.41		MADE GROUND: Dark brown slightly clayey sandy subangular to subrounded fine to coarse gravel of mixed lithologies including brick and sandstone. Sand is fine to coarse.	
		1.20	D	N=14 (4,9/5,4,3,2)					
		1.20			1.35	117.06		Medium dense dark brown slightly clayey fine to coarse SAND.	2
		1.70	ES	PID=1					
		2.00	D	N=0 (0,0/0,0,0,0)	2.00	116.41		Very soft dark brown silty sandy CLAY. Sand is fine to coarse.	3
		2.00							
		3.00	D	N=5 (1,1/1,1,1,2)					
		3.00			3.20	115.21		Loose dark brown gravelly clayey fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies including quartzite and sandstone.	
		3.50	ES	PID=0					
		4.00	D	N=29 (2,3/4,6,9,10)	4.00	114.41		Becoming medium dense at 4.00m bgl. End of borehole at 4.00 m	4
		4.00							5

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 2.7m bgl. 4. Monitoring standpipe installed to 1.5m (0.5m plain, 1m slotted).





GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: ROCHDALE SIXTH FORM COLLEGE

Project No.
GRO-22444

Co-ords: 389290.47 - 413280.55

Hole Type
WS

Location: ROCHDALE

Level: 118.33

Scale
1:25

Client: WATERMAN I&E

Dates: 13/04/2023 -

Logged By
EW

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.05			0.05	118.28		MADE GROUND: Light grey paving slab.	1
		0.20	ES	PID=0	0.20	118.13		MADE GROUND: Yellow slightly gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse of mixed lithologies including sandstone.	
		0.50	ES	PID=0				MADE GROUND: Grey sandy angular to subrounded fine to coarse gravel of mixed lithologies including concrete. Sand is medium to coarse.	
		1.00	ES	PID=0					
		1.20		N=50 (27 for 95mm/50 for 245mm)					
		1.50	ES	PID=0	1.40	116.93		Loose brown orange slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to medium of mixed lithologies including sandstone.	
		2.00	D	N=5 (2,3/2,1,1,1)					
		2.00							
		3.00	D	N=15 (1,2/3,3,4,5)	2.60	115.73		Medium dense grey very clayey fine to coarse SAND.	
		3.00							
		3.50	ES	PID=0					
		4.00		N=50 (11,14/50 for 25mm)	3.70	114.63		Very dense grey brown very gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of mixed lithologies including quartzite.	
		4.00			4.00	114.33		End of borehole at 4.00 m	4
									5

Remarks

1. Location cleared of services using a CAT scanner. 2. Hand dug pit to 1.2m bgl. 3. Groundwater encountered at 2.8m bgl. 4. Monitoring standpipe installed to 1.5m (0.5m plain, 1m slotted).



APPENDIX 4 – Gas Monitoring Results

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		28/04/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Falling	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.5	0.0	0.0	0.0	0.0	0.0					
Finish		20.5	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	20.8	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	1.24
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	20.0	20.0	0.0	0.0	0.0	0.0	0.0001	0.0000	991	-	N	N/A	N/A	2.10
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	16.6	18.2	0.0	0.0	0.0	0.0	0.0003	0.0000	991	-	N	N/A	N/A	2.20
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	11.8	16.7	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	0.83
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.3	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	993	-	N	N/A	N/A	1.49
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.4	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	NGW

Notes: CP102S is the shallow gas well install. CP102D is the deeper gas well install.

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		09/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Sunny			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	20.7	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	2.24
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.1	17.6	20.2	0.0	0.0	0.0	0.0	0.0003	0.0000	991	-	N	N/A	N/A	2.11
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.1	19.3	20.2	0.0	0.0	0.0	0.0	0.0004	0.0000	992	-	N	N/A	N/A	2.16
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	12.0	12.9	0.0	0.0	0.0	0.0	0.0000	0.0000	991	-	N	N/A	N/A	0.78
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.9	20.8	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	1.48
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.2	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	NGW

Notes: CP102S is the shallow gas well install. CP102D is the deeper gas well install.

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		18/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Rising	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.4	0.0	0.0	0.0	0.0	0.0					
Finish		20.4	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.6	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	2.38
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.2	19.0	19.4	0.0	0.0	0.0	0.0	0.0002	0.0000	1009	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.1	19.0	20.1	0.0	0.0	0.0	0.0	0.0004	0.0000	1009	-	N	N/A	N/A	2.26
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	3.3	8.5	0.0	0.0	0.0	0.0	0.0001	0.0000	1010	-	N	N/A	N/A	0.94
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.5	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	1.54
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.2	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	NGW

Notes:

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		26/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Rising	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.5	0.0	0.0	0.0	0.0	0.0					
Finish		20.5	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	20.7	0.0	0.0	0.0	0.0	0.0000	0.0000	1015	-	N	N/A	N/A	2.43
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.4	17.7	17.9	0.0	0.0	0.0	0.0	0.0005	0.0000	1015	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	19.6	20.1	0.0	0.0	0.0	0.0	0.0003	0.0000	1015	-	N	N/A	N/A	2.35
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	3.8	11.4	0.0	0.0	0.0	0.0	0.0001	0.0000	1015	-	N	N/A	N/A	1.22
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	21.0	0.0	0.0	0.0	0.0	0.0000	0.0000	1016	-	N	N/A	N/A	1.54
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	19.8	0.0	0.0	0.0	0.0	0.0000	0.0000	1015	-	N	N/A	N/A	NGW
Notes:																						

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		31/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	21.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	NGW
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.4	17.7	17.9	0.0	0.0	0.0	0.0	0.0005	0.0000	1011	-	N	N/A	N/A	2.37
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	19.6	20.1	0.0	0.0	0.0	0.0	0.0003	0.0000	1011	-	N	N/A	N/A	1.28
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.1	3.2	7.4	0.0	0.0	0.0	0.0	0.0002	0.0000	1011	-	N	N/A	N/A	1.28
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.5	21.4	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	1.31
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.6	20.6	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	NGW
Notes:																						

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		William Sandiford Mitchell				
CLIENT:		WATERMAN I & E				DATE:		14/06/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Clear			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	2.48
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.6	0.5	17.9	17.6	0.0	0.0	0.0	0.0	0.0006	0.0000	1004	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.3	18.6	18.8	0.0	0.0	0.0	0.0	0.0004	0.0000	1004	-	N	N/A	N/A	2.39
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.2	11.0	10.9	0.0	0.0	0.0	0.0	0.0002	0.0000	1005	-	N	N/A	N/A	NGW
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.7	19.9	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	NGW
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.4	19.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	NGW
Notes:																						

APPENDIX 5 – PID Results

GRO-22444
 Rochdale Sixth Form Centre
 Waterman I&E



PID Results Rochdale Sixth Form Centre		
Hole ID	Depth (m)	PID Result
CP101	0.2	0.2
CP101	0.5	0.5
CP101	1	0
CP101	2	0.1
CP101	4	0
CP101	6	0
CP102	0.2	0
CP102	0.5	0.4
CP102	1.2	0
CP102	2	0
CP102	4	0
CP102	6	0
CP102A	0.5	0.2
CP102A	0.8	0
WS101	0.5	0.1
WS101	1.5	0.3
WS101	2.5	0.5
WS102	0.1	0
WS102	0.2	0
WS102	0.5	0
WS102	1.2	1.3
WS102	3.5	0.4
WS103	0.2	0.4
WS103	1	0
WS103	1.7	0.6
WS103	3.5	0.1
WS104	0.2	0.5
WS104	0.5	0.2
WS104	1	0.3
WS104	1.5	0
WS104	3.5	0

APPENDIX 6 - Limitations

Limitations

This report (Report) forms part of the Services and if applicable Additional Services undertaken by Groundtech Consulting Ltd pursuant to a written contract (Agreement) which contains detailed provisions including express limitations of the liability of Groundtech Consulting Ltd.

This Report was prepared using reasonable skill and care as stated in the Agreement for the purpose including intended end use stated by the Client (Purpose) and the liability of Groundtech Consulting Ltd in respect of the form and content of this Report is no greater than its liability under the Agreement. All records, measurements notes, or any other data (Data) obtained by or for the benefit of the Consultant were obtained at a specific point in time and it may not be assumed by the Client or any person relying on this Report that the Data will remain unaffected by the passage of time, the seasons, weather conditions, changes in the water table or the carrying out and completion of works at the Site.

Unless otherwise agreed this Report has been prepared exclusively for the use and reliance of the Client and may not be relied upon, by any other party except as provided for in the Agreement. A third party who relies on this Report, does so at their own and sole risk and Groundtech Consulting Ltd has no liability to such parties.

Groundtech Consulting Ltd that this Report is to be used for the Purpose. The Purpose was instrumental in determining the scope and of the Services provided. If the Purpose should change, the Client may not be able to rely on the Report without the separate agreement of Groundtech Consulting Ltd.

Since the Report was written, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change (see below) and should be investigated if there is any significant delay in acting on the findings of this Report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions in this Report should not be relied upon in the future without written confirmation from Groundtech Consulting Ltd that it is safe to do so.

The observations and conclusions outlined in this Report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting Ltd.

Groundtech Consulting Ltd is not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The Report is based upon Groundtech Consulting Ltd's observations of existing physical conditions at the Site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the Client on the history and usage of the Site. The findings and recommendations contained in this Report are based in part upon information provided by third parties, and Groundtech Consulting Ltd have relied upon such information assuming it to be correct.

Groundtech Consulting Ltd accepts no responsibility for errors or inaccuracies in third party information presented in this Report. Groundtech Consulting Ltd was not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services or Additional Services. Groundtech Consulting Ltd is not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting Ltd and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions may also vary due to the ground's heterogeneous properties and because investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this Report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. If so stipulated in the Agreement, geo-environmental testing was carried out for a limited number of parameters based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

Any groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and groundwater levels may occur at other times of the year which are higher than were recorded during this investigation.

Any site drawings provided in this Report are preliminary and used to present the general relative locations of features on, and surrounding, the Site.



Waterman Infrastructure & Environment Limited
11 Peter Street
Manchester
United Kingdom
M2 5QR



Attention : Andrew Mould
Date : 25th April, 2023
Your reference : WIE19085-108
Our reference : Test Report 23/5972 Batch 1
Location : Rochdale Sixth Form
Date samples received : 18th April, 2023
Status : Final Report
Issue : 1

Fifteen samples were received for analysis on 18th April, 2023 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Simon Gomery BSc

Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	4-6	7-9	13-15	16-18	19-21	28-30	31-33	34-36			Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS101	WS101	WS102	WS102	WS102	WS103	WS103					
Depth	0.50	0.80	2.50	0.20	0.50	3.50	0.20	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023			LOD/LOR	Units	Method No.
Arsenic #	-	36.2	-	-	16.8	-	2.7	-			<0.5	mg/kg	TM30/PM15
Barium #	-	192	-	-	105	-	72	-			<1	mg/kg	TM30/PM15
Beryllium	-	1.1	-	-	1.2	-	<0.5	-			<0.5	mg/kg	TM30/PM15
Cadmium #	-	<0.1	-	-	<0.1	-	<0.1	-			<0.1	mg/kg	TM30/PM15
Chromium #	-	25.5	-	-	38.0	-	17.6	-			<0.5	mg/kg	TM30/PM15
Cobalt #	-	10.4	-	-	10.3	-	6.3	-			<0.5	mg/kg	TM30/PM15
Copper #	-	44	-	-	40	-	7	-			<1	mg/kg	TM30/PM15
Iron	-	26460	-	-	27180	-	16420	-			<20	mg/kg	TM30/PM15
Lead #	-	58	-	-	131	-	22	-			<5	mg/kg	TM30/PM15
Mercury #	-	<0.1	-	-	0.3	-	<0.1	-			<0.1	mg/kg	TM30/PM15
Molybdenum #	-	3.1	-	-	2.4	-	0.2	-			<0.1	mg/kg	TM30/PM15
Nickel #	-	26.7	-	-	24.6	-	12.2	-			<0.7	mg/kg	TM30/PM15
Selenium #	-	<1	-	-	2	-	<1	-			<1	mg/kg	TM30/PM15
Sulphur as S	0.06	-	0.02	0.08	-	-	-	0.05			<0.01	%	TM30/PM15
Total Sulphate as SO4 BRE	0.07	-	0.02	0.03	-	-	-	0.08			<0.01	%	TM50/PM29
Vanadium	-	28	-	-	29	-	10	-			<1	mg/kg	TM30/PM15
Water Soluble Boron #	-	1.1	-	-	0.3	-	0.3	-			<0.1	mg/kg	TM74/PM32
Zinc #	-	64	-	-	66	-	44	-			<5	mg/kg	TM30/PM15
Magnesium	0.0006	-	0.0005	0.0004	-	-	-	0.0002			<0.0001	g/l	TM30/PM20
PAH MS													
Naphthalene #	-	0.17	-	-	0.05	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	<0.03	-	-	<0.03	<0.03	<0.03	-			<0.03	mg/kg	TM4/PM8
Acenaphthene #	-	0.10	-	-	0.07	<0.05	<0.05	-			<0.05	mg/kg	TM4/PM8
Fluorene #	-	0.06	-	-	<0.04	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Phenanthrene #	-	0.70	-	-	0.40	<0.03	<0.03	-			<0.03	mg/kg	TM4/PM8
Anthracene #	-	0.10	-	-	0.06	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	1.29	-	-	0.64	<0.03	<0.03	-			<0.03	mg/kg	TM4/PM8
Pyrene #	-	1.23	-	-	0.59	<0.03	<0.03	-			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	0.64	-	-	0.30	<0.06	<0.06	-			<0.06	mg/kg	TM4/PM8
Chrysene #	-	0.86	-	-	0.46	<0.02	<0.02	-			<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene #	-	1.23	-	-	0.54	<0.07	<0.07	-			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	0.76	-	-	0.29	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	-	0.47	-	-	0.19	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	0.12	-	-	<0.04	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	0.49	-	-	0.19	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
Coronene	-	0.08	-	-	<0.04	<0.04	<0.04	-			<0.04	mg/kg	TM4/PM8
PAH 17 Total	-	8.30	-	-	3.78	<0.64	<0.64	-			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	0.89	-	-	0.39	<0.05	<0.05	-			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	0.34	-	-	0.15	<0.02	<0.02	-			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	112	-	-	111	108	114	-			<0	%	TM4/PM8

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	4-6	7-9	13-15	16-18	19-21	28-30	31-33	34-36			Please see attached notes for all abbreviations and acronyms		
Sample ID	WS101	WS101	WS101	WS102	WS102	WS102	WS103	WS103					
Depth	0.50	0.80	2.50	0.20	0.50	3.50	0.20	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023	13/04/2023					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023	18/04/2023			LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	-	<0.1	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	-	<0.1	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	-	<0.1	-	-	<0.1	0.3	<0.1	-			<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	-	<0.2	-	-	<0.2	<0.2	<0.2	-			<0.2	mg/kg	TMS/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	-	<4	-	-	<4	<4	<4	-			<4	mg/kg	TMS/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	-	<7	-	-	<7	<7	<7	-			<7	mg/kg	TMS/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	-	68	-	-	70	<7	<7	-			<7	mg/kg	TMS/PM8/PM16
>C35-C44 (EH_1D_AL)	-	<7	-	-	11	<7	<7	-			<7	mg/kg	TMS/PM8/PM16
Total aliphatics C5-44 (EH+HS_1D_AL)	-	68	-	-	81	<26	<26	-			<26	mg/kg	TMS/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	-	<0.1	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	-	<0.1	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	-	<0.1	-	-	<0.1	<0.1	<0.1	-			<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	-	<0.2	-	-	<0.2	<0.2	<0.2	-			<0.2	mg/kg	TMS/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	-	<4	-	-	<4	<4	<4	-			<4	mg/kg	TMS/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	-	11	-	-	<7	<7	<7	-			<7	mg/kg	TMS/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	-	175	-	-	178	45	<7	-			<7	mg/kg	TMS/PM8/PM16
>EC35-EC44 (EH_1D_AR)	-	24	-	-	33	19	<7	-			<7	mg/kg	TMS/PM8/PM16
Total aromatics C5-44 (EH+HS_1D_AR)	-	210	-	-	211	64	<26	-			<26	mg/kg	TMS/PM8/PM16
Total aliphatics and aromatics(C5-44) (EH+HS_CU_1D_Total)	-	278	-	-	292	64	<52	-			<52	mg/kg	TMS/PM8/PM16
MTBE #	-	<0.005	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
Benzene #	-	<0.005	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
Toluene #	-	0.011	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
Ethylbenzene #	-	<0.005	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
m/p-Xylene #	-	0.010	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
o-Xylene #	-	<0.005	-	-	<0.005	<0.005	<0.005	-			<0.005	mg/kg	TM36/PM12
Natural Moisture Content	10.6	19.9	25.0	11.9	20.5	29.3	11.2	7.1			<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	<0.6	-	<0.6	1.5	-	-	-	<0.6			<0.6	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE) #	0.030	-	0.027	0.045	-	-	-	0.005			<0.002	g/l	TM38/PM20
Hexavalent Chromium #	-	<0.3	-	-	<0.3	-	<0.3	-			<0.3	mg/kg	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE)	0.0043	-	<0.0025	<0.0025	-	-	-	<0.0025			<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1284	-	<0.0015	0.0253	-	-	-	0.1389			<0.0015	g/l	TM38/PM20
Free Cyanide	-	<0.5	-	-	-	-	<0.5	-			<0.5	mg/kg	TM89/PM45
Total Cyanide #	-	<0.5	-	-	-	-	<0.5	-			<0.5	mg/kg	TM89/PM45
Complex Cyanide	-	<0.5	-	-	-	-	<0.5	-			<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	-	4.88	-	-	4.58	1.14	0.14	-			<0.02	%	TM21/PM24
Organic Matter	-	8.4	-	-	7.9	2.0	0.2	-			<0.2	%	TM21/PM24

Element Materials Technology

Client Name:	Waterman Infrastructure & Environment Limited
Reference:	WIE19085-108
Location:	Rochdale Sixth Form
Contact:	Andrew Mould
EMT Job No:	23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

SVOC Report : Solid

EMT Sample No.	7-9												
Sample ID	WS101												
Depth	0.80												
COC No / misc													
Containers	V J T												
Sample Date	13/04/2023												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	18/04/2023												
Please see attached notes for all abbreviations and acronyms											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<0.01										<0.01	mg/kg	TM16/PM8
2-Methylphenol	<0.01										<0.01	mg/kg	TM16/PM8
2-Nitrophenol	<0.01										<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol #	<0.01										<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	<0.01										<0.01	mg/kg	TM16/PM8
2,4,5-Trichlorophenol	<0.01										<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	<0.01										<0.01	mg/kg	TM16/PM8
4-Chloro-3-methylphenol	<0.01										<0.01	mg/kg	TM16/PM8
4-Methylphenol	<0.01										<0.01	mg/kg	TM16/PM8
4-Nitrophenol	<0.01										<0.01	mg/kg	TM16/PM8
Pentachlorophenol	<0.01										<0.01	mg/kg	TM16/PM8
Phenol #	<0.01										<0.01	mg/kg	TM16/PM8
PAHs													
2-Chloronaphthalene #	<0.01										<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene #	0.10										<0.01	mg/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<0.1										<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	0.1										<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8
Diethyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8
Dimethyl phthalate #	<0.1										<0.1	mg/kg	TM16/PM8
Other SVOCs													
1,2-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene #	<0.01										<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8
2-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	<0.01										<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	<0.01										<0.01	mg/kg	TM16/PM8
3-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether #	<0.01										<0.01	mg/kg	TM16/PM8
4-Chloroaniline	<0.01										<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether	<0.01										<0.01	mg/kg	TM16/PM8
4-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8
Azobenzene	<0.01										<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<0.01										<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether	<0.01										<0.01	mg/kg	TM16/PM8
Carbazole	<0.01										<0.01	mg/kg	TM16/PM8
Dibenzofuran #	0.04										<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene #	<0.01										<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene	<0.01										<0.01	mg/kg	TM16/PM8
Hexachloroethane	<0.01										<0.01	mg/kg	TM16/PM8
Isophorone #	<0.01										<0.01	mg/kg	TM16/PM8
N-nitrosodi-n-propylamine #	<0.01										<0.01	mg/kg	TM16/PM8
Nitrobenzene #	<0.01										<0.01	mg/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	113										<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	118										<0	%	TM16/PM8

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

VOC Report : Solid

EMT Sample No.	7-9												
Sample ID	WS101												
Depth	0.80												
COC No / misc													
Containers	V J T												
Sample Date	13/04/2023												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	18/04/2023												
Please see attached notes for all abbreviations and acronyms											LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<0.002										<0.002	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.002										<0.002	mg/kg	TM15/PM10
Chloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002										<0.002	mg/kg	TM15_A/PM10
Bromomethane	<0.001										<0.001	mg/kg	TM15/PM10
Chloroethane #	<0.002										<0.002	mg/kg	TM15/PM10
Trichlorofluoromethane #	<0.002										<0.002	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<0.006										<0.006	mg/kg	TM15/PM10
Dichloromethane (DCM) #	<0.007										<0.007	mg/kg	TM15/PM10
trans-1-2-Dichloroethene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
cis-1-2-Dichloroethene #	<0.003										<0.003	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004										<0.004	mg/kg	TM15/PM10
Bromochloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
Chloroform #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,1-Trichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
1,1-Dichloropropene #	<0.003										<0.003	mg/kg	TM15/PM10
Carbon tetrachloride #	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dichloroethane #	<0.004										<0.004	mg/kg	TM15/PM10
Benzene #	<0.003										<0.003	mg/kg	TM15/PM10
Trichloroethene (TCE) #	<0.003										<0.003	mg/kg	TM15/PM10
1,2-Dichloropropane #	<0.006										<0.006	mg/kg	TM15/PM10
Dibromomethane #	<0.003										<0.003	mg/kg	TM15/PM10
Bromodichloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004										<0.004	mg/kg	TM15/PM10
Toluene #	0.006										<0.003	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003										<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Tetrachloroethene (PCE) #	<0.003										<0.003	mg/kg	TM15/PM10
1,3-Dichloropropane #	<0.003										<0.003	mg/kg	TM15/PM10
Dibromochloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
1,2-Dibromoethane #	<0.003										<0.003	mg/kg	TM15/PM10
Chlorobenzene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Ethylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
m/p-Xylene #	0.006										<0.005	mg/kg	TM15/PM10
o-Xylene #	<0.003										<0.003	mg/kg	TM15/PM10
Styrene	<0.003										<0.003	mg/kg	TM15_A/PM10
Bromoform	<0.003										<0.003	mg/kg	TM15/PM10
Isopropylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Bromobenzene	<0.002										<0.002	mg/kg	TM15/PM10
1,2,3-Trichloropropane #	<0.004										<0.004	mg/kg	TM15/PM10
Propylbenzene #	<0.004										<0.004	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003										<0.003	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003										<0.003	mg/kg	TM15/PM10
tert-Butylbenzene #	<0.005										<0.005	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<0.006										<0.006	mg/kg	TM15/PM10
sec-Butylbenzene #	<0.004										<0.004	mg/kg	TM15/PM10
4-Isopropyltoluene	<0.004										<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
n-Butylbenzene	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<0.004										<0.004	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007										<0.007	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004										<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027										<0.027	mg/kg	TM15/PM10
1,2,3-Trichlorobenzene	<0.007										<0.007	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	92										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	72										<0	%	TM15/PM10

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/5972	1	WS101	0.80	9	Remigiusz Blichowski	25/04/2023	General Description (Bulk Analysis)	Burned sand
					Remigiusz Blichowski	25/04/2023	Asbestos Fibres	Fibre Bundles
					Remigiusz Blichowski	25/04/2023	Asbestos ACM	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos Type	Amosite
23/5972	1	WS102	0.50	21	Remigiusz Blichowski	25/04/2023	General Description (Bulk Analysis)	Black burned dust and sand
					Remigiusz Blichowski	25/04/2023	Asbestos Fibres	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos ACM	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos Type	NAD
23/5972	1	WS103	0.20	33	Charlotte Taylor	25/04/2023	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	25/04/2023	Asbestos Fibres	NAD
					Charlotte Taylor	25/04/2023	Asbestos ACM	NAD
					Charlotte Taylor	25/04/2023	Asbestos Type	NAD

Client Name: Waterman Infrastructure & Environment Limited

Reference: WIE19085-108

Location: Rochdale Sixth Form

Contact: Andrew Mould

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/5972

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.			AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Waterman Infrastructure & Environment Limited
11 Peter Street
Manchester
United Kingdom
M2 5QR



Attention : Andrew Mould
Date : 25th April, 2023
Your reference : WIE19085-108
Our reference : Test Report 23/5972 Batch 2
Location : Rochdale Sixth Form
Date samples received : 19th April, 2023
Status : Final Report
Issue : 1

Nineteen samples were received for analysis on 19th April, 2023 of which eleven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Simon Gomery BSc
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	46-48	49-51	58-60	61-63	70-72	76-78	85-87	91-93	94-96	97-99	Please see attached notes for all abbreviations and acronyms		
Sample ID	CP101	CP101	CP101	CP101	CP102	CP102	CP102	WS104	WS104	WS104			
Depth	0.20	0.50	4.00	6.00	0.50	1.20	6.00	0.50	1.00	1.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	13/04/2023	13/04/2023	13/04/2023	13/04/2023	14/04/2023	14/04/2023	15/04/2023	15/04/2023	15/04/2023	15/04/2023			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	LOD/LOR	Units	Method No.
Arsenic #	-	6.7	-	-	0.8	-	-	5.8	-	-	<0.5	mg/kg	TM30/PM15
Barium #	-	382	-	-	3	-	-	115	-	-	<1	mg/kg	TM30/PM15
Beryllium	-	0.7	-	-	<0.5	-	-	0.8	-	-	<0.5	mg/kg	TM30/PM15
Cadmium #	-	0.2	-	-	0.2	-	-	<0.1	-	-	<0.1	mg/kg	TM30/PM15
Chromium #	-	68.5	-	-	7.5	-	-	21.5	-	-	<0.5	mg/kg	TM30/PM15
Cobalt #	-	5.9	-	-	<0.5	-	-	8.5	-	-	<0.5	mg/kg	TM30/PM15
Copper #	-	22	-	-	2	-	-	17	-	-	<1	mg/kg	TM30/PM15
Iron	-	16710	-	-	387	-	-	20390	-	-	<20	mg/kg	TM30/PM15
Lead #	-	41	-	-	<5	-	-	19	-	-	<5	mg/kg	TM30/PM15
Mercury #	-	<0.1	-	-	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM30/PM15
Molybdenum #	-	3.3	-	-	0.2	-	-	0.3	-	-	<0.1	mg/kg	TM30/PM15
Nickel #	-	17.1	-	-	<0.7	-	-	20.7	-	-	<0.7	mg/kg	TM30/PM15
Selenium #	-	<1	-	-	<1	-	-	<1	-	-	<1	mg/kg	TM30/PM15
Sulphur as S	<0.01	-	0.02	-	<0.01	0.01	0.03	-	0.02	0.06	<0.01	%	TM30/PM15
Total Sulphate as SO4 BRE	<0.01	-	0.03	-	<0.01	<0.01	0.01	-	0.01	0.07	<0.01	%	TM50/PM29
Vanadium	-	24	-	-	2	-	-	17	-	-	<1	mg/kg	TM30/PM15
Water Soluble Boron #	-	1.3	-	-	0.1	-	-	0.1	-	-	<0.1	mg/kg	TM74/PM32
Zinc #	-	61	-	-	<5	-	-	62	-	-	<5	mg/kg	TM30/PM15
Magnesium	0.0004	-	<0.0001	-	0.0007	0.0007	0.0032	-	0.0012	0.0013	<0.0001	g/l	TM30/PM20
PAH MS													
Naphthalene #	-	0.11	-	<0.04	<0.04	-	-	0.05	-	-	<0.04	mg/kg	TM4/PM8
Acenaphthylene	-	<0.03	-	<0.03	<0.03	-	-	<0.03	-	-	<0.03	mg/kg	TM4/PM8
Acenaphthene #	-	0.06	-	<0.05	<0.05	-	-	<0.05	-	-	<0.05	mg/kg	TM4/PM8
Fluorene #	-	<0.04	-	<0.04	<0.04	-	-	<0.04	-	-	<0.04	mg/kg	TM4/PM8
Phenanthrene #	-	0.41	-	0.11	<0.03	-	-	0.31	-	-	<0.03	mg/kg	TM4/PM8
Anthracene #	-	0.07	-	<0.04	<0.04	-	-	0.07	-	-	<0.04	mg/kg	TM4/PM8
Fluoranthene #	-	0.68	-	0.11	<0.03	-	-	0.42	-	-	<0.03	mg/kg	TM4/PM8
Pyrene #	-	0.64	-	0.10	<0.03	-	-	0.38	-	-	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	-	0.35	-	0.07	<0.06	-	-	0.22	-	-	<0.06	mg/kg	TM4/PM8
Chrysene #	-	0.44	-	0.10	<0.02	-	-	0.31	-	-	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	-	0.60	-	0.11	<0.07	-	-	0.38	-	-	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	-	0.35	-	0.07	<0.04	-	-	0.22	-	-	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	-	0.21	-	<0.04	<0.04	-	-	0.14	-	-	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	-	<0.04	-	<0.04	<0.04	-	-	0.09	-	-	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	-	0.22	-	<0.04	<0.04	-	-	0.15	-	-	<0.04	mg/kg	TM4/PM8
Coronene	-	<0.04	-	<0.04	<0.04	-	-	0.12	-	-	<0.04	mg/kg	TM4/PM8
PAH 17 Total	-	4.14	-	0.67	<0.64	-	-	2.86	-	-	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	-	0.43	-	0.08	<0.05	-	-	0.27	-	-	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	-	0.17	-	0.03	<0.02	-	-	0.11	-	-	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	-	99	-	117	101	-	-	100	-	-	<0	%	TM4/PM8

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	46-48	49-51	58-60	61-63	70-72	76-78	85-87	91-93	94-96	97-99	Please see attached notes for all abbreviations and acronyms		
Sample ID	CP101	CP101	CP101	CP101	CP102	CP102	CP102	WS104	WS104	WS104			
Depth	0.20	0.50	4.00	6.00	0.50	1.20	6.00	0.50	1.00	1.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	13/04/2023	13/04/2023	13/04/2023	13/04/2023	14/04/2023	14/04/2023	15/04/2023	15/04/2023	15/04/2023	15/04/2023			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	19/04/2023	LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	-	<0.2	-	<0.2	<0.2	-	-	<0.2	-	-	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	-	7	-	<4	<4	-	-	<4	-	-	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	-	70	-	<7	<7	-	-	<7	-	-	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	-	142	-	42	<7	-	-	16	-	-	<7	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	-	12	-	<7	<7	-	-	<7	-	-	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-44 (EH+HS_1D_AL)	-	231	-	42	<26	-	-	<26	-	-	<26	mg/kg	TM5/PM8/PM16/PM12/PM10
Aromatics													
>C5-EC7 (HS_1D_AR) #	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	-	<0.1	-	<0.1	<0.1	-	-	<0.1	-	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	-	<0.2	-	<0.2	<0.2	-	-	<0.2	-	-	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	-	<4	-	<4	<4	-	-	<4	-	-	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	-	<7	-	<7	<7	-	-	<7	-	-	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	-	121	-	<7	<7	-	-	97	-	-	<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	-	25	-	12	8	-	-	21	-	-	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-44 (EH+HS_1D_AR)	-	146	-	<26	<26	-	-	118	-	-	<26	mg/kg	TM5/PM8/PM16/PM12/PM10
Total aliphatics and aromatics (C5-44) (EH+HS_CU_1D_Total)	-	377	-	<52	<52	-	-	118	-	-	<52	mg/kg	TM5/PM8/PM16/PM12/PM10
MTBE #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
Benzene #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
Toluene #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
Ethylbenzene #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
m/p-Xylene #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
o-Xylene #	-	<0.005	-	<0.005	<0.005	-	-	<0.005	-	-	<0.005	mg/kg	TM36/PM12
Natural Moisture Content	7.0	17.0	26.8	19.0	2.2	13.3	28.0	9.4	8.8	20.2	<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4	<0.6	-	1.0	-	<0.6	<0.6	<0.6	-	<0.6	<0.6	<0.6	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE) #	0.004	-	0.016	-	0.015	0.007	0.009	-	0.005	0.011	<0.002	g/l	TM38/PM20
Hexavalent Chromium #	-	<0.3	-	-	<0.3	-	-	<0.3	-	-	<0.3	mg/kg	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE)	<0.0025	-	<0.0025	-	<0.0025	<0.0025	<0.0025	-	<0.0025	<0.0025	<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0050	-	0.0509	-	0.0039	0.0066	0.0081	-	0.0038	0.0382	<0.0015	g/l	TM38/PM20
Free Cyanide	-	-	-	<0.5	-	-	-	-	-	-	<0.5	mg/kg	TM89/PM45
Total Cyanide #	-	-	-	<0.5	-	-	-	-	-	-	<0.5	mg/kg	TM89/PM45
Complex Cyanide	-	-	-	<0.5	-	-	-	-	-	-	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	-	1.78	-	0.60	<0.02	-	-	1.38	-	-	<0.02	%	TM21/PM24
Organic Matter	-	3.1	-	1.0	<0.2	-	-	2.4	-	-	<0.2	%	TM21/PM24

Element Materials Technology

Client Name:	Waterman Infrastructure & Environment Limited
Reference:	WIE19085-108
Location:	Rochdale Sixth Form
Contact:	Andrew Mould
EMT Job No:	23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Client Name:	Waterman Infrastructure & Environment Limited
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[illegible]

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	100-102												
Sample ID	WS104												
Depth	3.50												
COC No / misc													
Containers	V J T												
Sample Date	15/04/2023												
Sample Type	Soil												
Batch Number	2												
Date of Receipt	19/04/2023												
Please see attached notes for all abbreviations and acronyms													
TPH CWG											LOD/LOR	Units	Method No.
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1										<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1										<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1										<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	6.1										<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	14										<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	22										<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	29										<7	mg/kg	TM5/PM8/PM16
>C35-C44 (EH_1D_AL)	<7										<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-44 (EH+HS_1D_AL)	71										<26	mg/kg	TM5/PM8/PM16/PM12/PM10
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1										<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2										<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4										<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	20										<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	165										<7	mg/kg	TM5/PM8/PM16
>EC35-EC44 (EH_1D_AR)	104										<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-44 (EH+HS_1D_AR)	289										<26	mg/kg	TM5/PM8/PM16/PM12/PM10
Total aliphatics and aromatics(C5-44) (EH+HS_CU_1D_Total)	360										<52	mg/kg	TM5/PM8/PM16/PM12/PM10
MTBE #													
MTBE #	<0.005										<0.005	mg/kg	TM36/PM12
Benzene #													
Benzene #	<0.005										<0.005	mg/kg	TM36/PM12
Toluene #													
Toluene #	<0.005										<0.005	mg/kg	TM36/PM12
Ethylbenzene #													
Ethylbenzene #	<0.005										<0.005	mg/kg	TM36/PM12
m/p-Xylene #													
m/p-Xylene #	<0.005										<0.005	mg/kg	TM36/PM12
o-Xylene #													
o-Xylene #	<0.005										<0.005	mg/kg	TM36/PM12
Natural Moisture Content													
Natural Moisture Content	24.9										<0.1	%	PM4/PM0
Ammoniacal Nitrogen as NH4													
Ammoniacal Nitrogen as NH4	-										<0.6	mg/kg	TM38/PM20
Chloride (2:1 Ext BRE) #													
Chloride (2:1 Ext BRE) #	-										<0.002	g/l	TM38/PM20
Hexavalent Chromium #													
Hexavalent Chromium #	-										<0.3	mg/kg	TM38/PM20
Nitrate as NO3 (2:1 Ext BRE)													
Nitrate as NO3 (2:1 Ext BRE)	-										<0.0025	g/l	TM38/PM20
Sulphate as SO4 (2:1 Ext) #													
Sulphate as SO4 (2:1 Ext) #	-										<0.0015	g/l	TM38/PM20
Free Cyanide													
Free Cyanide	-										<0.5	mg/kg	TM89/PM45
Total Cyanide #													
Total Cyanide #	-										<0.5	mg/kg	TM89/PM45
Complex Cyanide													
Complex Cyanide	-										<0.5	mg/kg	TM89/PM45
Total Organic Carbon #													
Total Organic Carbon #	1.54										<0.02	%	TM21/PM24
Organic Matter													
Organic Matter	2.7										<0.2	%	TM21/PM24

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

SVOC Report : Solid

EMT Sample No.	61-63										Please see attached notes for all abbreviations and acronyms				
Sample ID	CP101														
Depth	6.00														
COC No / misc															
Containers	V J T														
Sample Date	13/04/2023														
Sample Type	Soil														
Batch Number	2														
Date of Receipt	19/04/2023											LOD/LOR	Units	Method No.	
SVOC MS															
Phenols															
2-Chlorophenol #	<0.01										<0.01	mg/kg	TM16/PM8		
2-Methylphenol	<0.01										<0.01	mg/kg	TM16/PM8		
2-Nitrophenol	<0.01										<0.01	mg/kg	TM16/PM8		
2,4-Dichlorophenol #	<0.01										<0.01	mg/kg	TM16/PM8		
2,4-Dimethylphenol	<0.01										<0.01	mg/kg	TM16/PM8		
2,4,5-Trichlorophenol	<0.01										<0.01	mg/kg	TM16/PM8		
2,4,6-Trichlorophenol	<0.01										<0.01	mg/kg	TM16/PM8		
4-Chloro-3-methylphenol	<0.01										<0.01	mg/kg	TM16/PM8		
4-Methylphenol	<0.01										<0.01	mg/kg	TM16/PM8		
4-Nitrophenol	<0.01										<0.01	mg/kg	TM16/PM8		
Pentachlorophenol	<0.01										<0.01	mg/kg	TM16/PM8		
Phenol #	<0.01										<0.01	mg/kg	TM16/PM8		
PAHs															
2-Chloronaphthalene #	<0.01										<0.01	mg/kg	TM16/PM8		
2-Methylnaphthalene #	<0.01										<0.01	mg/kg	TM16/PM8		
Phthalates															
Bis(2-ethylhexyl) phthalate	<0.1										<0.1	mg/kg	TM16/PM8		
Butylbenzyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8		
Di-n-butyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8		
Di-n-Octyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8		
Diethyl phthalate	<0.1										<0.1	mg/kg	TM16/PM8		
Dimethyl phthalate #	<0.1										<0.1	mg/kg	TM16/PM8		
Other SVOCs															
1,2-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8		
1,2,4-Trichlorobenzene #	<0.01										<0.01	mg/kg	TM16/PM8		
1,3-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8		
1,4-Dichlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8		
2-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8		
2,4-Dinitrotoluene	<0.01										<0.01	mg/kg	TM16/PM8		
2,6-Dinitrotoluene	<0.01										<0.01	mg/kg	TM16/PM8		
3-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8		
4-Bromophenylphenylether #	<0.01										<0.01	mg/kg	TM16/PM8		
4-Chloroaniline	<0.01										<0.01	mg/kg	TM16/PM8		
4-Chlorophenylphenylether	<0.01										<0.01	mg/kg	TM16/PM8		
4-Nitroaniline	<0.01										<0.01	mg/kg	TM16/PM8		
Azobenzene	<0.01										<0.01	mg/kg	TM16/PM8		
Bis(2-chloroethoxy)methane	<0.01										<0.01	mg/kg	TM16/PM8		
Bis(2-chloroethyl)ether	<0.01										<0.01	mg/kg	TM16/PM8		
Carbazole	<0.01										<0.01	mg/kg	TM16/PM8		
Dibenzofuran #	<0.01										<0.01	mg/kg	TM16/PM8		
Hexachlorobenzene	<0.01										<0.01	mg/kg	TM16/PM8		
Hexachlorobutadiene #	<0.01										<0.01	mg/kg	TM16/PM8		
Hexachlorocyclopentadiene	<0.01										<0.01	mg/kg	TM16/PM8		
Hexachloroethane	<0.01										<0.01	mg/kg	TM16/PM8		
Isophorone #	<0.01										<0.01	mg/kg	TM16/PM8		
N-nitrosodi-n-propylamine #	<0.01										<0.01	mg/kg	TM16/PM8		
Nitrobenzene #	<0.01										<0.01	mg/kg	TM16/PM8		
Surrogate Recovery 2-Fluorobiphenyl	111										<0	%	TM16/PM8		
Surrogate Recovery p-Terphenyl-d14	116										<0	%	TM16/PM8		

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085-108
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/5972

VOC Report : Solid

EMT Sample No.	61-63										Please see attached notes for all abbreviations and acronyms		
Sample ID	CP101												
Depth	6.00												
COC No / misc													
Containers	V J T												
Sample Date	13/04/2023												
Sample Type	Soil												
Batch Number	2												
Date of Receipt	19/04/2023												
VOC MS													
Dichlorodifluoromethane	<0.002										<0.002	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.002										<0.002	mg/kg	TM15/PM10
Chloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002										<0.002	mg/kg	TM15_A/PM10
Bromomethane	<0.001										<0.001	mg/kg	TM15/PM10
Chloroethane #	<0.002										<0.002	mg/kg	TM15/PM10
Trichlorofluoromethane #	<0.002										<0.002	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<0.006										<0.006	mg/kg	TM15/PM10
Dichloromethane (DCM) #	<0.007										<0.007	mg/kg	TM15/PM10
trans-1-2-Dichloroethene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
cis-1-2-Dichloroethene #	<0.003										<0.003	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004										<0.004	mg/kg	TM15/PM10
Bromochloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
Chloroform #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,1-Trichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
1,1-Dichloropropene #	<0.003										<0.003	mg/kg	TM15/PM10
Carbon tetrachloride #	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dichloroethane #	<0.004										<0.004	mg/kg	TM15/PM10
Benzene #	<0.003										<0.003	mg/kg	TM15/PM10
Trichloroethene (TCE) #	<0.003										<0.003	mg/kg	TM15/PM10
1,2-Dichloropropane #	<0.006										<0.006	mg/kg	TM15/PM10
Dibromomethane #	<0.003										<0.003	mg/kg	TM15/PM10
Bromodichloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004										<0.004	mg/kg	TM15/PM10
Toluene #	<0.003										<0.003	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003										<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Tetrachloroethene (PCE) #	<0.003										<0.003	mg/kg	TM15/PM10
1,3-Dichloropropane #	<0.003										<0.003	mg/kg	TM15/PM10
Dibromochloromethane #	<0.003										<0.003	mg/kg	TM15/PM10
1,2-Dibromoethane #	<0.003										<0.003	mg/kg	TM15/PM10
Chlorobenzene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,1,2-Tetrachloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Ethylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
m/p-Xylene #	<0.005										<0.005	mg/kg	TM15/PM10
o-Xylene #	<0.003										<0.003	mg/kg	TM15/PM10
Styrene	<0.003										<0.003	mg/kg	TM15_A/PM10
Bromoform	<0.003										<0.003	mg/kg	TM15/PM10
Isopropylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<0.003										<0.003	mg/kg	TM15/PM10
Bromobenzene	<0.002										<0.002	mg/kg	TM15/PM10
1,2,3-Trichloropropane #	<0.004										<0.004	mg/kg	TM15/PM10
Propylbenzene #	<0.004										<0.004	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003										<0.003	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<0.003										<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003										<0.003	mg/kg	TM15/PM10
tert-Butylbenzene #	<0.005										<0.005	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<0.006										<0.006	mg/kg	TM15/PM10
sec-Butylbenzene #	<0.004										<0.004	mg/kg	TM15/PM10
4-Isopropyltoluene	<0.004										<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
n-Butylbenzene	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dichlorobenzene #	<0.004										<0.004	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<0.004										<0.004	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007										<0.007	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004										<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027										<0.027	mg/kg	TM15/PM10
1,2,3-Trichlorobenzene	<0.007										<0.007	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	91										<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	86										<0	%	TM15/PM10

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Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/5972	2	CP101	0.50	51	Remigiusz Blichowski	25/04/2023	General Description (Bulk Analysis)	Pale grey sand and stone
					Remigiusz Blichowski	25/04/2023	Asbestos Fibres	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos ACM	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos Type	NAD
23/5972	2	CP102	0.50	72	Remigiusz Blichowski	25/04/2023	General Description (Bulk Analysis)	Pale rock and dust
					Remigiusz Blichowski	25/04/2023	Asbestos Fibres	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos ACM	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos Type	NAD
23/5972	2	WS104	0.50	93	Remigiusz Blichowski	25/04/2023	General Description (Bulk Analysis)	Pale dust and stone
					Remigiusz Blichowski	25/04/2023	Asbestos Fibres	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos ACM	NAD
					Remigiusz Blichowski	25/04/2023	Asbestos Type	NAD

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[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/5972

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

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	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH ₄ + 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.			AR	Yes

EMT Job No: 23/5972

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.			AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

Waterman Infrastructure & Environment Limited
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4225



Attention : Andrew Mould
Date : 18th May, 2023
Your reference : WIE19085
Our reference : Test Report 23/6732 Batch 1
Location : Rochdale Sixth Form
Date samples received : 28th April, 2023
Status : Final Report
Issue : 1

Three samples were received for analysis on 28th April, 2023 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Simon Gomery BSc

Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/6732

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

EMT Sample No.	1-7	8-14	15-16									
Sample ID	CP101	CP102	WS102									
Depth												
COC No / misc												
Containers	V H N N Z P G	V H N N Z P G	P G									
Sample Date	28/04/2023	28/04/2023	28/04/2023									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	28/04/2023	28/04/2023	28/04/2023									
										LOD/LOR	Units	Method No.
Dissolved Arsenic #	4.3	3.8	1.9							<0.9	ug/l	TM170/PM14
Dissolved Barium #	156.1	242.9	97.7							<1.8	ug/l	TM170/PM14
Dissolved Beryllium #	<0.5	<0.5	<0.5							<0.5	ug/l	TM170/PM14
Dissolved Boron #	51	52	46							<12	ug/l	TM170/PM14
Dissolved Cadmium #	<0.03	<0.03	0.04							<0.03	ug/l	TM170/PM14
Total Dissolved Chromium #	0.3	1.2	0.2							<0.2	ug/l	TM170/PM14
Dissolved Cobalt #	0.9	1.0	2.1							<0.1	ug/l	TM170/PM14
Dissolved Copper #	<1	2	4							<1	ug/l	TM170/PM14
Total Dissolved Iron #	1466.0 ^{AC}	16960.6 ^{AD}	9.5							<4.7	ug/l	TM170/PM14
Dissolved Lead #	<0.4	5.7	<0.4							<0.4	ug/l	TM170/PM14
Dissolved Mercury #	<0.5	<0.5	<0.5							<0.5	ug/l	TM170/PM14
Dissolved Molybdenum #	5.3	5.4	21.8							<0.2	ug/l	TM170/PM14
Dissolved Nickel #	2.7	2.4	9.8							<0.2	ug/l	TM170/PM14
Dissolved Selenium #	1.7	2.9	2.9							<1.2	ug/l	TM170/PM14
Dissolved Vanadium #	1.6	1.4	1.1							<0.6	ug/l	TM170/PM14
Dissolved Zinc #	2.9	11.6	2.3							<1.5	ug/l	TM170/PM14
Dissolved Calcium #	91.6	88.9	63.4							<0.2	mg/l	TM30/PM14
Dissolved Magnesium #	5.9	11.7	6.5							<0.1	mg/l	TM30/PM14
Total Hardness Dissolved (as CaCO3)	254	271	186							<1	mg/l	TM30/PM14
PAH MS												
Naphthalene #	<0.1	<0.1	<0.1							<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	0.005							<0.005	ug/l	TM4/PM30
Acenaphthene #	0.007	0.005	0.015							<0.005	ug/l	TM4/PM30
Fluorene #	<0.005	0.005	<0.005							<0.005	ug/l	TM4/PM30
Phenanthrene #	<0.005	<0.005	0.006							<0.005	ug/l	TM4/PM30
Anthracene #	<0.005	<0.005	0.006							<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	<0.005	0.043							<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	<0.005	0.042							<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	0.016							<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	0.021							<0.005	ug/l	TM4/PM30
Benzo(b)fluoranthene #	<0.008	<0.008	0.026							<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005							<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005 ⁺	<0.005 ⁺	0.005							<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005 ⁺	<0.005 ⁺	<0.005							<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	0.006							<0.005	ug/l	TM4/PM30
PAH 16 Total #	<0.173	<0.173	0.191							<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	0.019							<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008							<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	88	86	90							<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<0.1	<0.1	-							<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	-							<0.5	ug/l	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
Reference: WIE19085
Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/6732

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

EMT Sample No.	1-7	8-14	15-16									
Sample ID	CP101	CP102	WS102									
Depth												
COC No / misc												
Containers	V H N N Z P G	V H N N Z P G	P G									
Sample Date	28/04/2023	28/04/2023	28/04/2023									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	28/04/2023	28/04/2023	28/04/2023									
										LOD/LOR	Units	Method No.
Toluene #	<5	<5	-							<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	-							<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	-							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	-							<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	110	129	-							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	116	129	-							<0	%	TM15/PM10
SVOC TICs	ND	ND _{AB}	ND								None	TM16/PM30
MTBE #	-	-	<5							<5	ug/l	TM36/PM12
Benzene #	-	-	<5							<5	ug/l	TM36/PM12
Toluene #	-	-	<5							<5	ug/l	TM36/PM12
Ethylbenzene #	-	-	<5							<5	ug/l	TM36/PM12
m/p-Xylene #	-	-	<5							<5	ug/l	TM36/PM12
o-Xylene #	-	-	<5							<5	ug/l	TM36/PM12
TPH CWG												
Aliphatics												
>C5-C6 #	<10	<10	<10							<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10							<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	64							<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	54							<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>C35-C44	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-44	<10	<10	118							<10	ug/l	TM5/PM16/PM30
Aromatics												
>C5-EC7 #	<10	<10	<10							<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10							<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10							<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5							<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
>EC35-EC44	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aromatics C5-44	<10	<10	<10							<10	ug/l	TM5/PM16/PM30
Total aliphatics and aromatics(C5-44)	<10	<10	118							<10	ug/l	TM5/PM16/PM30
Sulphate as SO ₄ #	44.3	31.1	69.0							<0.5	mg/l	TM38/PM0
Chloride #	138.4	126.7	371.9							<0.3	mg/l	TM38/PM0
Nitrate as NO ₃ #	<0.2	<0.2	<0.2							<0.2	mg/l	TM38/PM0
Free Cyanide #	<0.01	<0.01	-							<0.01	mg/l	TM89/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

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Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/6732

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

EMT Sample No.	1-7	8-14	15-16
Sample ID	CP101	CP102	WS102
Depth			
COC No / misc			
Containers	V H N N Z P G	V H N N Z P G	P G
Sample Date	28/04/2023	28/04/2023	28/04/2023
Sample Type	Ground Water	Ground Water	Ground Water
Batch Number	1	1	1
Date of Receipt	28/04/2023	28/04/2023	28/04/2023
Please see attached notes for all abbreviations and acronyms			
Total Cyanide #	<0.01	<0.01	-
Ammoniacal Nitrogen as NH4 #	0.90	2.98	1.96
Hexavalent Chromium	<0.006	<0.006	<0.006
Dissolved Organic Carbon #	4	<2	12
pH #	7.75	7.39	7.83

Element Materials Technology

Client Name: Waterman Infrastructure & Environment Limited
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Location: Rochdale Sixth Form
Contact: Andrew Mould
EMT Job No: 23/6732

SVOC Report : Liquid

EMT Sample No.	1-7	8-14	15-16							Please see attached notes for all abbreviations and acronyms		
Sample ID	CP101	CP102	WS102									
Depth												
COC No / misc												
Containers	V H N N Z P G	V H N N Z P G	P G									
Sample Date	28/04/2023	28/04/2023	28/04/2023									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	28/04/2023	28/04/2023	28/04/2023									
SVOC MS												
Phenols												
2-Chlorophenol #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<20 _{AA}	<30 _{AB}	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Phenol	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
PAHs												
2-Chloronaphthalene #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Naphthalene #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Fluorene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<1.0 _{AA}	<1.5 _{AB}	<0.5							<0.5	ug/l	TM16/PM30
Phthalates												
Bis(2-ethylhexyl) phthalate	<10 _{AA}	<15 _{AB}	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<3.0 _{AA}	<4.5 _{AB}	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<2 _{AA}	<3 _{AB}	<1							<1	ug/l	TM16/PM30

Element Materials Technology

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EMT Job No: 23/6732

SVOC Report : Liquid

EMT Sample No.	1-7	8-14	15-16									
Sample ID	CP101	CP102	WS102									
Depth												
COC No / misc												
Containers	V H N N Z P G	V H N N Z P G	P G									
Sample Date	28/04/2023	28/04/2023	28/04/2023									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	28/04/2023	28/04/2023	28/04/2023									
	LOD/LOR	Units	Method No.									
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene #	<2 ⁺ AA	<3 ⁺ AB	<1 ⁺							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Carbazole #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Isophorone #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<1.0 AA	<1.5 AB	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<2 AA	<3 AB	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	90 AA	118 AB	127							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	114 AA	120 AB	137 ^{SV}							<0	%	TM16/PM30

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Contact: Andrew Mould
EMT Job No: 23/6732

VOC Report : Liquid

EMT Sample No.	1-7	8-14										
Sample ID	CP101	CP102										
Depth												
COC No / misc												
Containers	V H N N Z P G	V H N N Z P G										
Sample Date	28/04/2023	28/04/2023										
Sample Type	Ground Water	Ground Water										
Batch Number	1	1										
Date of Receipt	28/04/2023	28/04/2023										
	LOD/LOR	Units	Method No.									
VOC MS												
Dichlorodifluoromethane	<2	<2								<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3								<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1								<1	ug/l	TM15/PM10
Chloroethane #	<3	<3								<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3								<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3								<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3								<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3								<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1								<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2								<2	ug/l	TM15/PM10
Chloroform #	<2	<2								<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2								<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3								<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2								<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2								<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5								<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2								<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3								<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2								<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2								<2	ug/l	TM15/PM10
Toluene #	<5	<5								<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2								<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2								<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2								<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2								<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2								<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2								<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2								<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1								<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2								<2	ug/l	TM15/PM10
o-Xylene #	<1	<1								<1	ug/l	TM15/PM10
Styrene	<2	<2								<2	ug/l	TM15/PM10
Bromoform #	<2	<2								<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3								<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4								<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3								<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3								<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3								<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3								<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3								<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3								<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3								<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3								<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3								<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3								<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3								<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2								<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3								<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3								<3	ug/l	TM15/PM10
Naphthalene	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3								<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	110	129								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	116	129								<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Waterman Infrastructure & Environment Limited

Matrix : Liquid

Reference: WIE19085

Location: Rochdale Sixth Form

Contact: Andrew Mould

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/6732

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x3 Dilution
AC	x5 Dilution
AD	x20 Dilution

HWOL ACRONYMS AND OPERATORS USED

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	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/6732

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				

EMT Job No: 23/6732

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEPA Method 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.	Yes			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			

Client emailed 15-5-23

PSL

Professional Soils Laboratory

TEST AMENDMENT NOTICE

(Please tick boxes as appropriate)

From: **Matt Wooldridge**

To: **Andrew Mould**

Date: **15 / 5 /2023**

Laboratory Ref: **PSL23/ 3384**

Contract Number:

Location: **Lochdale Sixth Form**

☒ BH ☐ TP Sample Number

Depth (m):

Sample Type: ☒ U ☐ B ☐ D ☐ W ☐ P ☐ C

Test/s:

CP102 7.5M U

The above sample cannot be tested for the following reasons:

☒ The Sample has not been received

☐ There is insufficient material for BS1377: 1990 testing

Maximum Grain Size (Minimum 10%):

☐ Fine ☐ Medium ☐ Coarse

Sample Mass (kg):

Required Mass (kg):

.....

.....

☐ The Sample has been previously tested.

☐ The Sample has been misplaced in the Laboratory.

☐ The Sample is unsuitable for testing because:

Please advise action required:

☐ Perform original test on the following alternative Sample:

☐ BH ☐ TP Sample Number: Depth (m):
Sample Type: ☐ U ☐ B ☐ D ☐ W ☐ P ☐ C

☐ Combine original Sample with the following sample:

☐ BH ☐ TP Sample Number: Depth (m):
Sample Type: ☐ U ☐ B ☐ D ☐ W ☐ P ☐ C

☐ Perform the following alternative test/s on the original Sample

☐ Perform non-standard test on material available

☐ Take no further action.

Signed
(Project Engineer)

Date



LABORATORY REPORT



Contract Number: PSL23/3384

Report Date: 23 May 2023

Client's Reference: WIE19085

Client Name: Waterman
PO Box 499
Manchester
M28 4EE

For the attention of: Andrew Mould

Contract Title: Rochdale Sixth Form Centre

Date Received: 10/5/2023

Date Commenced: 10/5/2023

Date Completed: 22/05/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)


M Fennell
(Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
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awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CP101		D	2.00		Brown sandy GRAVEL.
CP101		B	3.00		Brown slightly gravelly very sandy CLAY.
CP101		U	7.50	7.95	Soft brown slightly gravelly slightly sandy CLAY.
CP101		D	8.00		Brown slightly gravelly slightly sandy CLAY.
CP101		D	9.00		Brown slightly gravelly sandy CLAY.
CP101		U	10.50	10.95	Stiff brown very gravelly very sandy CLAY.
CP101		D	11.00		Brown slightly gravelly sandy CLAY.
CP102		B	3.00		Brown very sandy slightly silty GRAVEL.
CP102		D	4.50		Brown slightly gravelly slightly sandy CLAY.
CP102		U	5.00	5.45	Soft brown slightly gravelly slightly sandy CLAY.
CP102		D	6.00		Brown sandy CLAY.
WS102		D	2.00		Brown slightly sandy CLAY.
WS103		D	2.00		Brown sandy very silty CLAY.



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



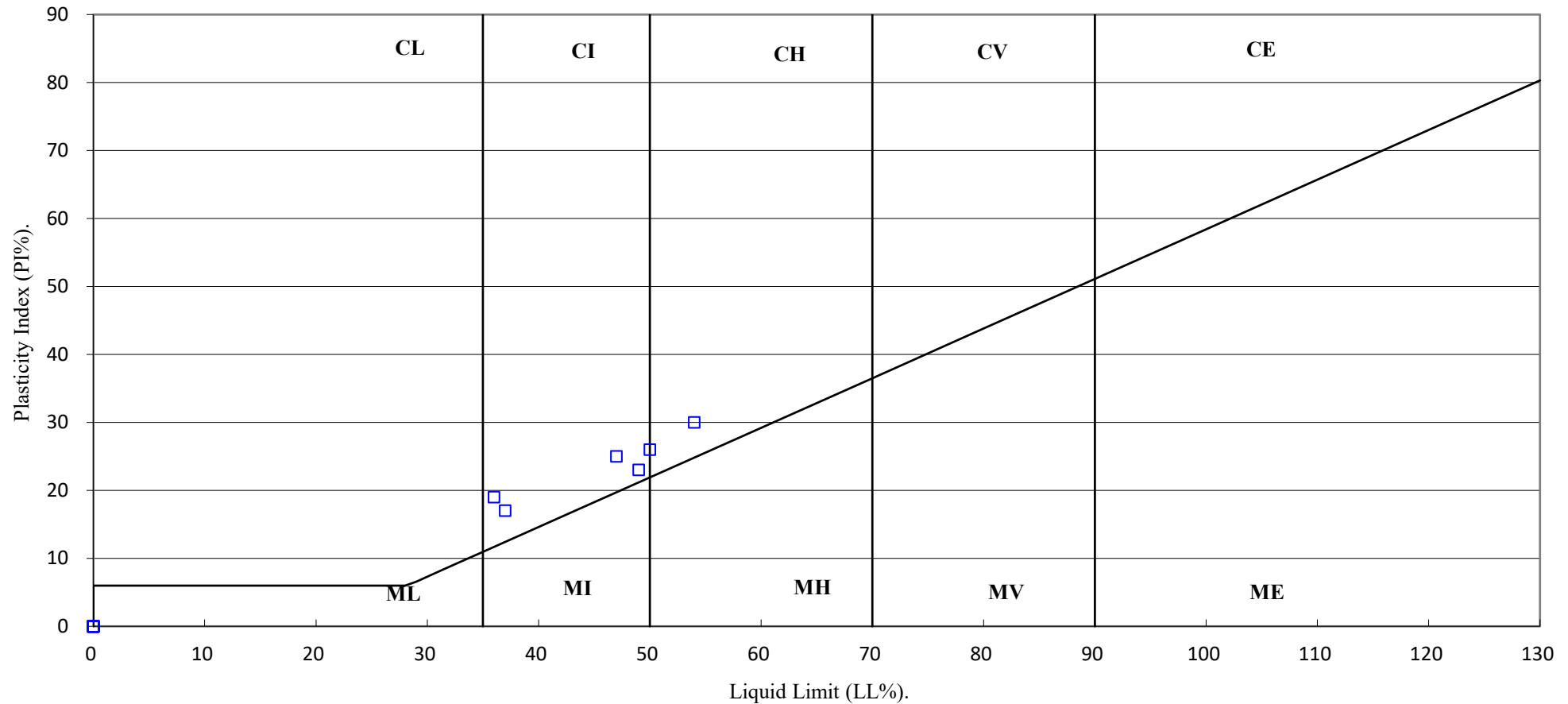
Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:**WIE19085**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

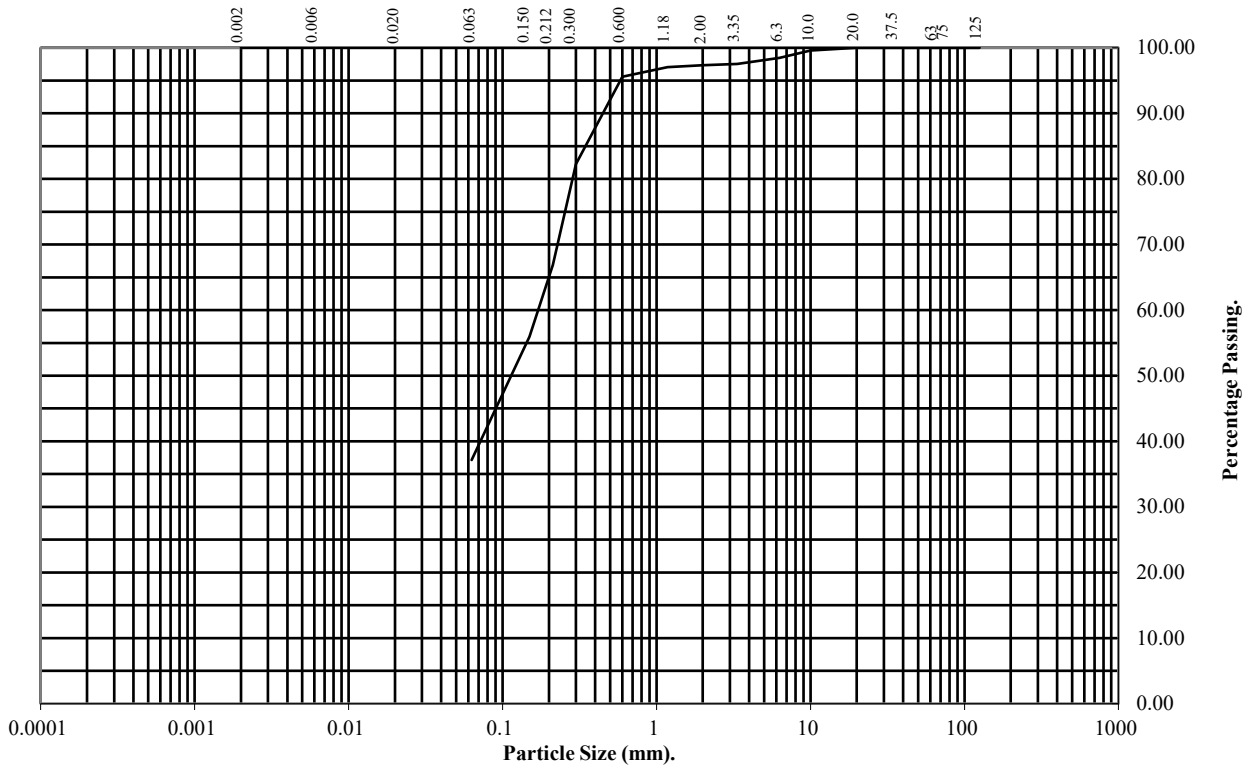
Hole Number: CP101

Top Depth (m): 3.00

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	98
3.35	98
2	97
1.18	97
0.6	96
0.3	82
0.212	67
0.15	56
0.063	37

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	60
Silt/Clay	37

Remarks:

See Summary of Soil Descriptions



Rochdale Sixth Form Centre

Contract No:
PSL23/3384
Client Ref:
WIE19085

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

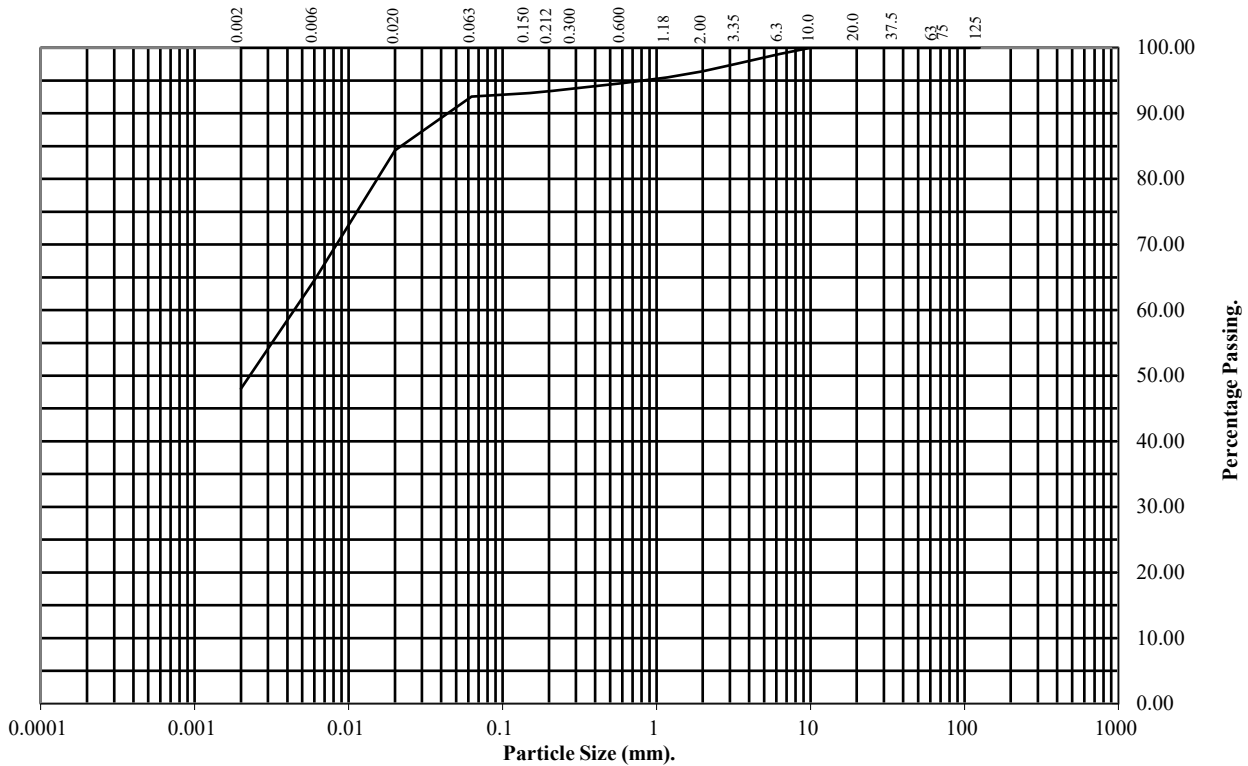
Hole Number: CP101

Top Depth (m): 8.00

Sample Number:

Base Depth(m):

Sample Type: D



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	96
1.18	95
0.6	95
0.3	94
0.212	93
0.15	93
0.063	93

Particle Diameter	Percentage Passing
0.02	84
0.006	65
0.002	48

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	3
Silt	45
Clay	48

Remarks:

See Summary of Soil Descriptions



Rochdale Sixth Form Centre

Contract No:
PSL23/3384
Client Ref:
WIE19085

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

CP102

Top Depth (m):

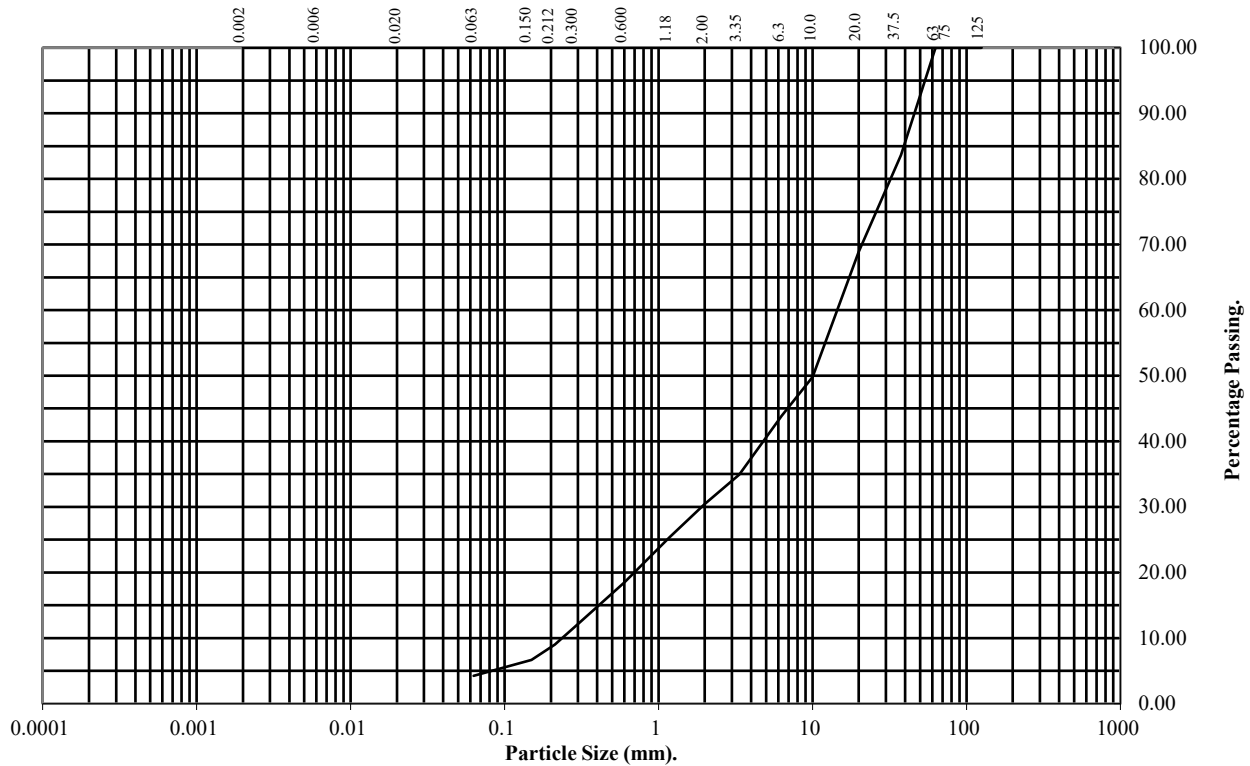
3.00

Sample Number:

Base Depth(m):

Sample Type:

B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	84
20	69
10	50
6.3	44
3.35	35
2	30
1.18	25
0.6	18
0.3	12
0.212	9
0.15	7
0.063	4

Soil Fraction	Total Percentage
Cobbles	0
Gravel	70
Sand	26
Silt/Clay	4

Remarks:

See Summary of Soil Descriptions



Rochdale Sixth Form Centre

Contract No:
PSL23/3384
Client Ref:
WIE19085

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

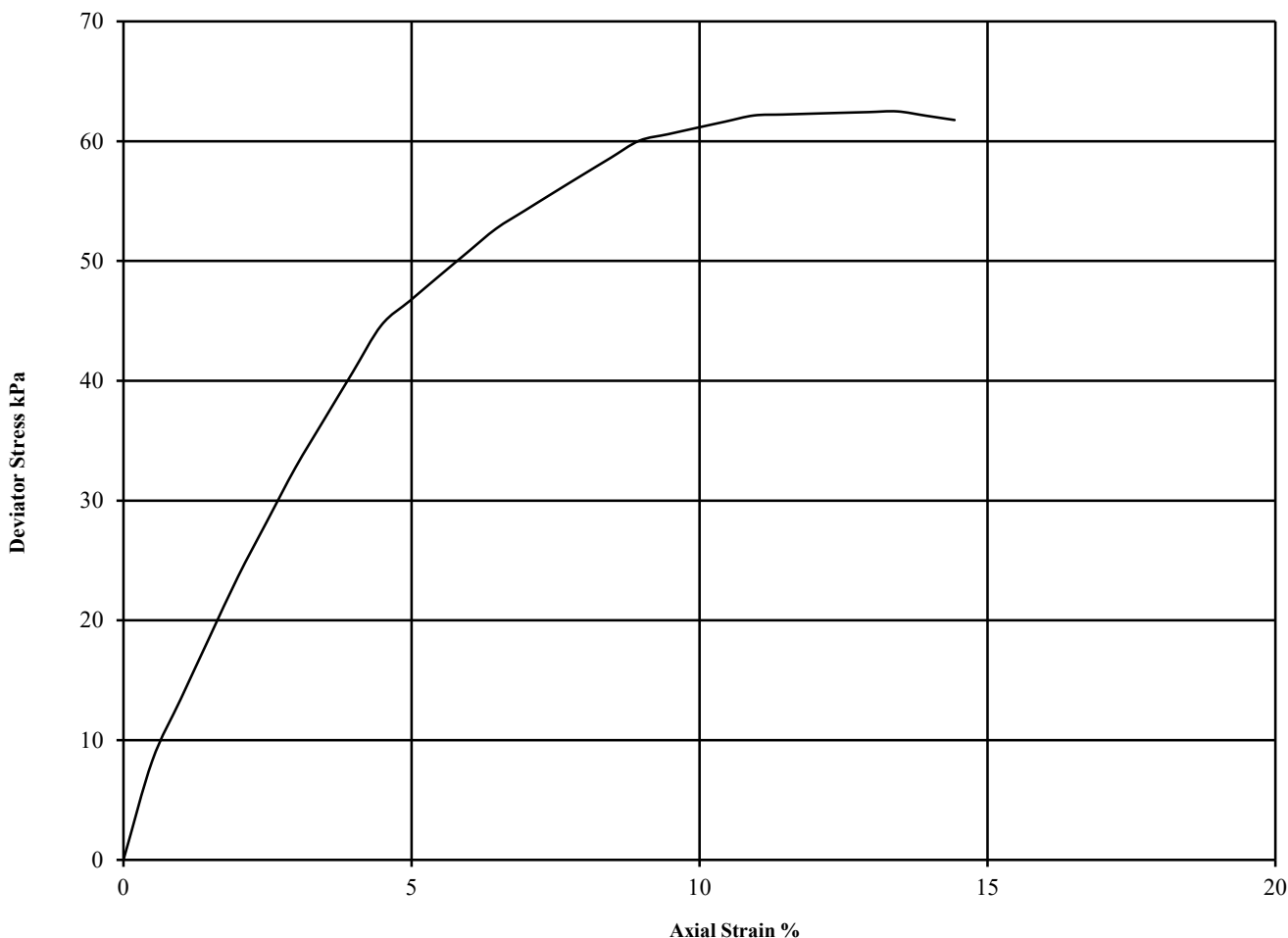
Hole Number: CP101

Top Depth (m): 7.50

Sample Number:

Base Depth (m): 7.95

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	30	1.97	1.51	150	62	31	13.4	Plastic	



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

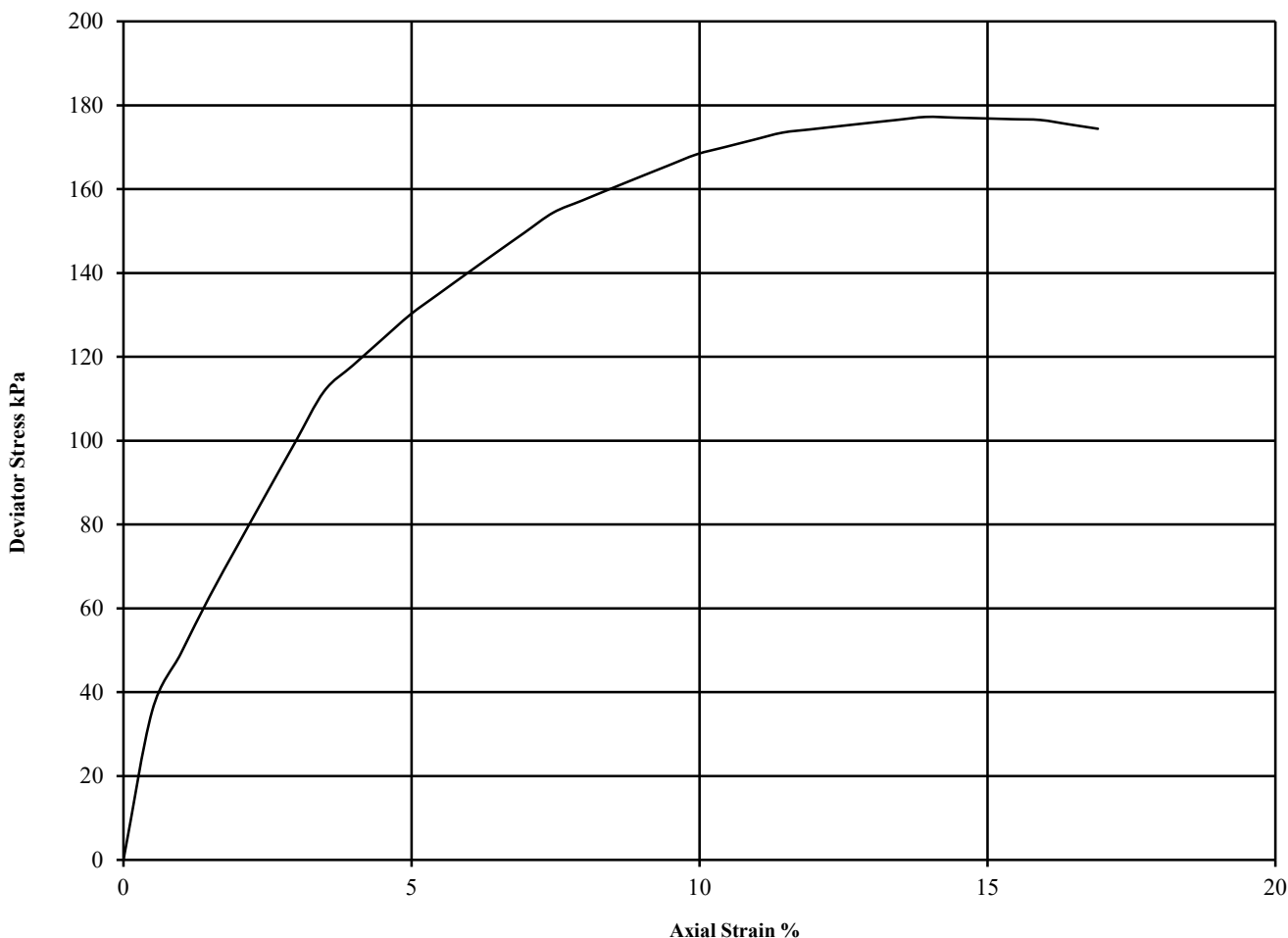
Hole Number: CP101

Top Depth (m): 10.50

Sample Number:

Base Depth (m): 10.95

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	13	2.26	2.00	210	177	89	13.9	Intermediate	



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:

CP102

Top Depth (m):

5.00

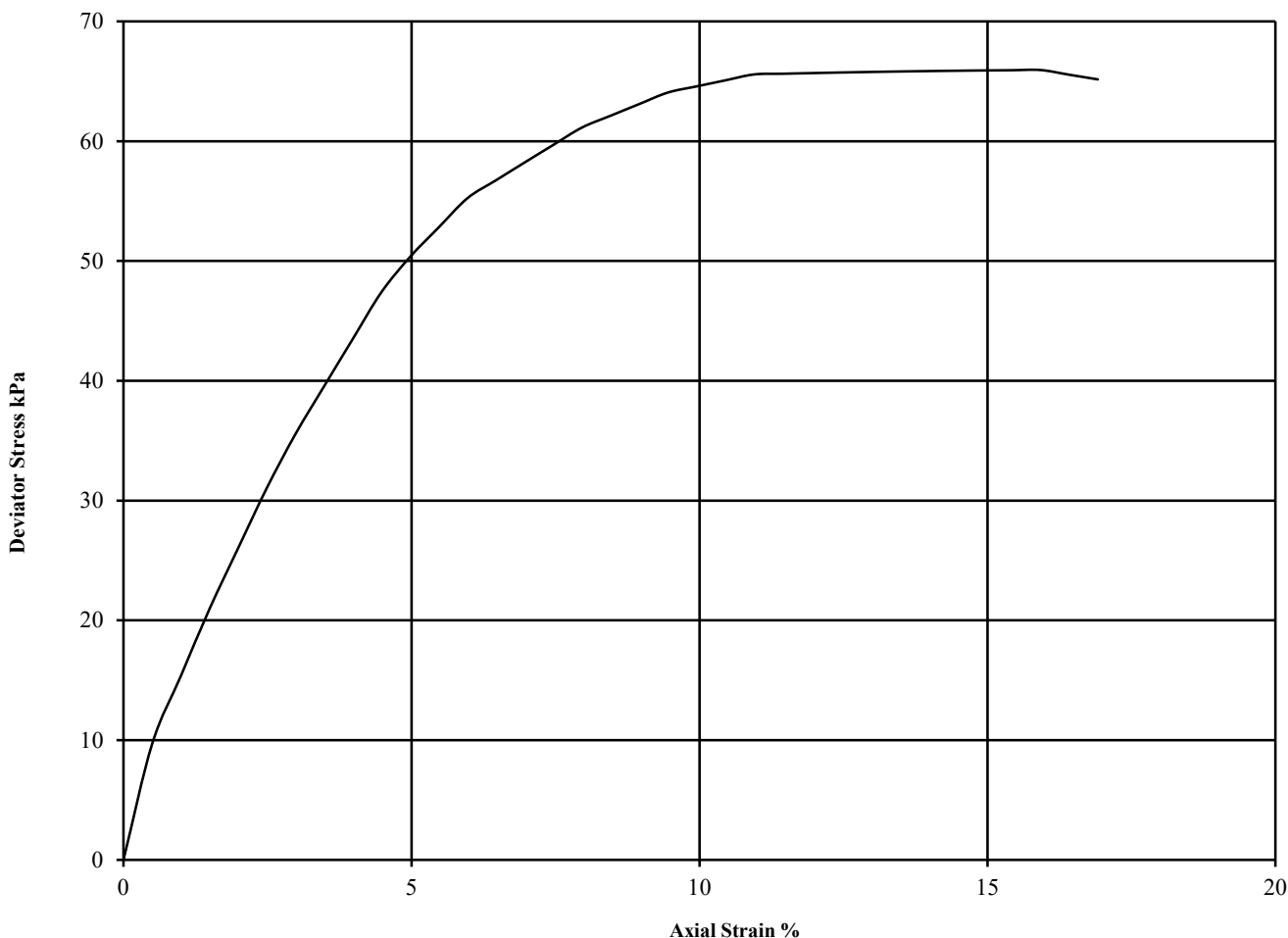
Sample Number:

Base Depth (m):

5.45

Sample Type

U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell	Corr. Max.	Shear	Failure Strain (%)	Mode of Failure	Undisturbed Sample
				Pressure	Deviator	Strength			Sample taken from top of tube
				(kPa)	Stress	Cu			Rate of strain = 2 %/min
				(kPa)	(kPa)	Latex Membrane used 0.2 mm thick,			
				θ_3	$(\theta_1-\theta_3)_f$	$^{1/2}(\theta_1-\theta_3)_f$			Correction applied 0.34
1	27	2.04	1.61	100	66	33	15.9	Plastic	See summary of soil descriptions



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

[illegible]

***Note** All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular



Rochdale Sixth Form Centre

Contract No:

PSL23/3384

Client Ref:

WIE19085



Certificate of Analysis

Certificate Number 23-11515

Issued: 24-May-23

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 23-11515

Client Reference PSL23/3384

Order No (not supplied)

Contract Title WIE19085 - Rochdale Sixth Form Centre

Description 5 Soil samples.

Date Received 16-May-23

Date Started 16-May-23

Date Completed 24-May-23

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis Soil Samples

Our Ref 23-11515

Client Ref PSL23/3384

Contract Title WIE19085 - Rochdale Sixth Form Centre

Lab No	2171811	2171812	2171813	2171814	2171815
Sample ID	CP101	CP102	WS101	WS101	WS104
Depth	3.00	5.50	1.20	3.00	2.00
Other ID					
Sample Type	D	D	D	D	D
Sampling Date	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Metals								
Magnesium Aqueous Extract (2:1)	DETSC 2076*	10	mg/l	< 10	< 10	< 10	< 10	< 10
Inorganics								
pH	DETSC 2008#		pH	10.8	8.2	7.6	7.0	8.4
Chloride Aqueous Extract (2:1)	DETSC 2055	1	mg/l	19	9.2	24	29	14
Nitrate Aqueous Extract as NO3 (2:1)	DETSC 2055	1	mg/l	1.1	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	75	59	33	30	78
Sulphur as S, Total	DETSC 2320	0.01	%	0.02	0.05	0.02	0.02	0.06
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.05	0.05	0.03	0.03	0.07

Information in Support of the Analytical Results

Our Ref 23-11515
 Client Ref PSL23/3384
 Contract WIE19085 - Rochdale Sixth Form Centre

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2171811	CP101 3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
2171812	CP102 5.50 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
2171813	WS101 1.20 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
2171814	WS101 3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
2171815	WS104 2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/- 2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		28/04/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Falling	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.5	0.0	0.0	0.0	0.0	0.0					
Finish		20.5	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	20.8	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	1.24
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	20.0	20.0	0.0	0.0	0.0	0.0	0.0001	0.0000	991	-	N	N/A	N/A	2.10
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	16.6	18.2	0.0	0.0	0.0	0.0	0.0003	0.0000	991	-	N	N/A	N/A	2.20
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	11.8	16.7	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	0.83
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.3	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	993	-	N	N/A	N/A	1.49
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.4	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	992	-	N	N/A	N/A	NGW
Notes: CP102S is the shallow gas well install. CP102D is the deeper gas well install.																						

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		09/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Sunny			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	20.7	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	2.24
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.1	17.6	20.2	0.0	0.0	0.0	0.0	0.0003	0.0000	991	-	N	N/A	N/A	2.11
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.1	19.3	20.2	0.0	0.0	0.0	0.0	0.0004	0.0000	992	-	N	N/A	N/A	2.16
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	12.0	12.9	0.0	0.0	0.0	0.0	0.0000	0.0000	991	-	N	N/A	N/A	0.78
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.9	20.8	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	1.48
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.2	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	990	-	N	N/A	N/A	NGW

Notes: CP102S is the shallow gas well install. CP102D is the deeper gas well install.

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		18/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Rising	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.4	0.0	0.0	0.0	0.0	0.0					
Finish		20.4	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.6	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	2.38
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.2	19.0	19.4	0.0	0.0	0.0	0.0	0.0002	0.0000	1009	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.1	19.0	20.1	0.0	0.0	0.0	0.0	0.0004	0.0000	1009	-	N	N/A	N/A	2.26
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	3.3	8.5	0.0	0.0	0.0	0.0	0.0001	0.0000	1010	-	N	N/A	N/A	0.94
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.5	20.5	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	1.54
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.2	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1009	-	N	N/A	N/A	NGW

Notes:

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		26/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Rising	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.5	0.0	0.0	0.0	0.0	0.0					
Finish		20.5	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	20.7	0.0	0.0	0.0	0.0	0.0000	0.0000	1015	-	N	N/A	N/A	2.43
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.4	17.7	17.9	0.0	0.0	0.0	0.0	0.0005	0.0000	1015	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	19.6	20.1	0.0	0.0	0.0	0.0	0.0003	0.0000	1015	-	N	N/A	N/A	2.35
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.1	0.1	3.8	11.4	0.0	0.0	0.0	0.0	0.0001	0.0000	1015	-	N	N/A	N/A	1.22
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	21.0	0.0	0.0	0.0	0.0	0.0000	0.0000	1016	-	N	N/A	N/A	1.54
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	19.8	0.0	0.0	0.0	0.0	0.0000	0.0000	1015	-	N	N/A	N/A	NGW
Notes:																						

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		Jack Perkins				
CLIENT:		WATERMAN I & E				DATE:		31/05/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Overcast			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.7	21.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	NGW
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.4	17.7	17.9	0.0	0.0	0.0	0.0	0.0005	0.0000	1011	-	N	N/A	N/A	2.37
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.3	0.2	19.6	20.1	0.0	0.0	0.0	0.0	0.0003	0.0000	1011	-	N	N/A	N/A	1.28
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.1	3.2	7.4	0.0	0.0	0.0	0.0	0.0002	0.0000	1011	-	N	N/A	N/A	1.28
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.5	21.4	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	1.31
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.6	20.6	0.0	0.0	0.0	0.0	0.0000	0.0000	1011	-	N	N/A	N/A	NGW
Notes:																						

GROUNDTECH
CONSULTING

SITE NAME:		ROCHDALE SIXTH FORM CENTRE				ENGINEER:		William Sandiford Mitchell				
CLIENT:		WATERMAN I & E				DATE:		14/06/2023				
JOB NO:		GRO-22444										
Pressure Trend:		Steady	Weather:	Clear			Equipment:		GFM 436			
Ambient:		O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)					
Start		20.7	0.0	0.0	0.0	0.0	0.0					
Finish		20.7	0.0	0.0	0.0	0.0	0.0					

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	LNAPL (Y/N)	DNAPL (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady								
CP101	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	20.1	20.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	2.48
CP102S	0.0	0.0	0.00	0.0	0.0	0.0	0.6	0.5	17.9	17.6	0.0	0.0	0.0	0.0	0.0006	0.0000	1004	-	N	N/A	N/A	NGW
CP102D	0.0	0.0	0.00	0.0	0.0	0.0	0.4	0.3	18.6	18.8	0.0	0.0	0.0	0.0	0.0004	0.0000	1004	-	N	N/A	N/A	2.39
WS102	0.0	0.0	0.00	0.0	0.0	0.0	0.2	0.2	11.0	10.9	0.0	0.0	0.0	0.0	0.0002	0.0000	1005	-	N	N/A	N/A	NGW
WS103	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.7	19.9	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	NGW
WS104	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	19.4	19.2	0.0	0.0	0.0	0.0	0.0000	0.0000	1004	-	N	N/A	N/A	NGW
Notes:																						

Appendix E Risk Rating Matrix

Table C.1: Risk rating for contaminated land qualitative risk assessment

Level of Severity	Likelihood		
	Most Likely	Reasonably Foreseeable	Unlikely
Acute harm or severe chronic harm. Direct pollution of sensitive water receptors or serious pollution of other water bodies.	High	High	Low
Harm from long-term exposure. Slight pollution of sensitive receptors or pollution of other water bodies.	Medium	Medium	Low
No significant harm in either short or long term. No pollution of water that is likely to affect sensitive receptors. No more than slight pollution of other water bodies.	Low	Low	Low

Appendix F Generic Assessment Criteria

Human Health Generic Assessment Criteria

Generic Quantitative Risk Assessment Criteria

Table D.1: Residential and Allotment end-uses

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Arsenic	mg/kg	37	37	37	40	40	40	49	49	49	DEFRA C4SLs
Antimony	mg/kg				550	550	550				CL:AIRE 2009
Barium	mg/kg				1300	1300	1300				CL:AIRE 2009
Beryllium	mg/kg	1.7	1.7	1.7	1.7	1.7	1.7	35	35	35	LQM S4ULs 2015
Boron (Water Soluble)	mg/kg	290	290	290	11000	11000	11000	45	45	45	LQM S4ULs 2015
Cadmium	mg/kg	22	22	22	150	150	150	3.9	3.9	3.9	DEFRA C4SLs
Chromium (Total)	mg/kg	910	910	910	910	910	910	18000	18000	18000	LQM S4ULs 2015
Chromium (VI)	mg/kg	21	21	21	21	21	21	170	170	170	DEFRA C4SLs
Copper	mg/kg	2400	2400	2400	7100	7100	7100	520	520	520	LQM S4ULs 2015
Lead	mg/kg	200	200	200	310	310	310	80	80	80	DEFRA C4SLs
Mercury	mg/kg	1.2	1.2	1.2	1.2	1.2	1.2	21	21	21	LQM S4ULs 2015
Molybdenum	mg/kg				670	670	670				CL:AIRE 2009
Nickel	mg/kg	130	130	130	180	180	180	53	53	53	LQM S4ULs 2015
Selenium	mg/kg	250	250	250	430	430	430	88	88	88	LQM S4ULs 2015
Vanadium*	mg/kg	410	410	410	1200	1200	1200	91	91	91	LQM S4ULs 2015
Zinc	mg/kg	3700	3700	3700	40000	40000	40000	620	620	620	LQM S4ULs 2015
Cyanide (Free)	mg/kg	26	26	26				4.1	4.1	4.1	Waterman GAC - CLEA v1.06

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Complex Cyanide	mg/kg	63000	63000	63000				1200	1200	1200	Waterman GAC - CLEA v1.06
Thiocyanate	mg/kg	230	230	230				46	46	46	Waterman GAC - CLEA v1.06
Aliphatic EC5 - EC6	mg/kg	42	78	160	42	78	160	730	1700	3900	LQM S4ULs 2015
Aliphatic EC6 - EC8	mg/kg	100	230	530	100	230	530	2300	5600	13000	LQM S4ULs 2015
Aliphatic EC8-EC10	mg/kg	27	65	150	27	65	150	320	770	1700	LQM S4ULs 2015
Aliphatic EC10-EC12	mg/kg	130	330	760	130	330	770	2200	4400	7300	LQM S4ULs 2015
Aliphatic EC12-EC16	mg/kg	1100	2400	4300	1100	2400	4400	11000	13000	13000	LQM S4ULs 2015
Aliphatic EC16-EC35	mg/kg	65000	92000	110000	65000	92000	110000	260000	270000	270000	LQM S4ULs 2015
Aliphatic EC35-EC44	mg/kg	65000	92000	110000	65000	92000	110000	260000	270000	270000	LQM S4ULs 2015
Aromatic C5-C7	mg/kg	70	140	300	370	690	1400	13	27	57	LQM S4ULs 2015
Aromatic C7-C8	mg/kg	130	290	660	860	1800	3900	22	51	120	LQM S4ULs 2015
Aromatic C8-C10	mg/kg	34	83	190	47	110	270	8.6	21	51	LQM S4ULs 2015
Aromatic C10-C12	mg/kg	74	180	380	250	590	1200	13	31	74	LQM S4ULs 2015
Aromatic C12-C16	mg/kg	140	330	660	1800	2300	2500	23	57	130	LQM S4ULs 2015
Aromatic C16-C21	mg/kg	260	540	930	1900	1900	1900	46	110	260	LQM S4ULs 2015
Aromatic C21-C35	mg/kg	1100	1500	1700	1900	1900	1900	370	820	1600	LQM S4ULs 2015
Aromatic C35-C44	mg/kg	1100	1500	1700	1900	1900	1900	370	820	1600	LQM S4ULs 2015
Benzene	mg/kg	0.087	0.17	0.37	0.38	0.7	1.4	0.017	0.034	0.075	LQM S4ULs 2015
Toluene	mg/kg	130	290	660	880	1900	3900	22	51	120	LQM S4ULs 2015

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Ethyl Benzene	mg/kg	47	110	260	83	190	440	16	39	91	LQM S4ULs 2015
Xylene - o	mg/kg	60	140	330	88	210	480	28	67	160	LQM S4ULs 2015
Xylene - m	mg/kg	59	140	320	82	190	450	31	74	170	LQM S4ULs 2015
Xylene - p	mg/kg	56	130	310	79	180	430	29	69	160	LQM S4ULs 2015
MTBE (Methyl tert-butyl ether)	mg/kg	49	84	160				23	44	90	CL:AIRE 2009
Naphthalene	mg/kg	2.3	5.6	13	2.3	5.6	13	4.1	10	24	LQM S4ULs 2015
Acenaphthylene	mg/kg	170	420	920	2900	4600	6000	28	69	160	LQM S4ULs 2015
Acenaphthene	mg/kg	210	510	1100	3000	4700	6000	34	85	200	LQM S4ULs 2015
Fluorene	mg/kg	170	400	860	2800	3800	4500	27	67	160	LQM S4ULs 2015
Phenanthrene	mg/kg	95	220	440	1300	1500	1500	15	38	90	LQM S4ULs 2015
Anthracene	mg/kg	2400	5400	11000	31000	35000	37000	380	950	2200	LQM S4ULs 2015
Fluoranthene	mg/kg	280	560	890	1500	1600	1600	52	130	290	LQM S4ULs 2015
Pyrene	mg/kg	620	1200	2000	3700	3800	3800	110	270	620	LQM S4ULs 2015
Benzo(a)anthracene	mg/kg	7.2	11	13	11	14	15	2.9	6.5	13	LQM S4ULs 2015
Chrysene	mg/kg	15	22	27	30	31	32	4.1	9.4	19	LQM S4ULs 2015
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	3.9	4	4	0.99	2.1	3.9	LQM S4ULs 2015
Benzo(k)fluoranthene	mg/kg	77	93	100	110	110	110	37	75	130	LQM S4ULs 2015
Benzo(a)pyrene	mg/kg	2.2	2.7	3	3.2	3.2	3.2	0.97	2	3.5	LQM S4ULs 2015
Indeno(1,2,3-cd)pyrene	mg/kg	27	36	41	45	46	46	9.5	21	39	LQM S4ULs 2015

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Di-benzo(a.h.)anthracene	mg/kg	0.24	0.28	0.3	0.31	0.32	0.32	0.14	0.27	0.43	LQM S4ULs 2015
Benzo(g.h.i.) Perylene	mg/kg	320	340	350	360	360	360	290	470	640	LQM S4ULs 2015
Phenol	mg/kg	280	550	1100	750	1300	2300	66	140	280	LQM S4ULs 2015
Pentachlorophenol (PCP)	mg/kg	0.22	0.52	1.2	27	29	31	0.03	0.08	0.19	LQM S4ULs 2015
1,1,2,2 Tetrachloroethane	mg/kg	1.6	3.4	7.5	3.9	8	17	0.41	0.89	2	LQM S4ULs 2015
1,1,1,2 Tetrachloroethane	mg/kg	1.2	2.8	6.4	1.5	3.5	8.2	0.79	1.9	4.4	LQM S4ULs 2015
1,1,1 Trichloroethane	mg/kg	8.8	18	39	9	18	40	48	110	240	LQM S4ULs 2015
Trichloroethene	mg/kg	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	LQM S4ULs 2015
Tetrachloromethane (Carbon Tetrachloride)	mg/kg	0.026	0.056	0.13	0.026	0.056	0.13	0.45	1	2.4	LQM S4ULs 2015
1,2- Dichloroethane	mg/kg	0.0071	0.011	0.019	0.0092	0.013	0.023	0.0046	0.0083	0.016	LQM S4ULs 2015
Chloroethene (Vinyl chloride)	mg/kg	0.00064	0.00087	0.0014	0.00077	0.001	0.0015	0.00055	0.001	0.0018	LQM S4ULs 2015
Trichloroethene	mg/kg	0.016	0.034	0.075	0.017	0.036	0.08	0.041	0.091	0.21	LQM S4ULs 2015
Tetrachloroethene	mg/kg	0.18	0.39	0.9	0.18	0.4	0.92	0.65	1.5	3.6	LQM S4ULs 2015
Trichloromethane (Chloroform)	mg/kg	0.91	1.7	3.4	1.2	2.1	4.2	0.42	0.83	1.7	LQM S4ULs 2015
Sum of PCDDs, PCDFs and dioxins like PCBs	ug/kg			8						8	CLEA SGVs 2009
Isopropylbenzene	mg/kg	11	27	64	12	28	67	32	79	190	CL:AIRE 2009
Propylbenzene	mg/kg	34	82	190	40	97	230	34	83	200	CL:AIRE 2009
Styrene	mg/kg	8.1	19	43	35	78	170	1.6	3.7	8.7	CL:AIRE 2009

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Bromobenzene	mg/kg	0.87	2	4.7	0.91	2.1	4.9	3.2	7.6	18	CL:AIRE 2009
1,1,2 Trichloroethane	mg/kg	0.6	1.2	2.7	0.88	1.8	3.9	0.28	0.61	1.4	CL:AIRE 2009
1,1-Dichloroethane	mg/kg	2.4	3.9	7.4	2.5	4.1	7.7	9.2	17	35	CL:AIRE 2009
1,1-Dichloroethene	mg/kg	0.23	0.4	0.82	0.23	0.41	0.82	2.8	5.6	12	CL:AIRE 2009
1,2,4-Trimethylbenzene	mg/kg	0.35	0.85	2	0.41	0.99	2.3	0.38	0.93	2.2	CL:AIRE 2009
1,2-Dichloropropane	mg/kg	0.024	0.042	0.084	0.024	0.042	0.085	0.62	1.2	2.6	CL:AIRE 2009
2-Chloronaphthalene	mg/kg	3.7	9.2	22	3.8	9.3	22	40	98	230	CL:AIRE 2009
Bromodichloromethane	mg/kg	0.016	0.03	0.061	0.019	0.034	0.07	0.016	0.032	0.068	CL:AIRE 2009
Bromoform	mg/kg	2.8	5.9	13	5.2	11	23	0.95	2.1	4.6	CL:AIRE 2009
Chloroethane	mg/kg	8.3	11	18	8.4	11	18	110	200	380	CL:AIRE 2009
Chloromethane	mg/kg	0.0083	0.0098	0.013	0.0085	0.0099	0.013	0.066	0.13	0.23	CL:AIRE 2009
Cis 1,2 Dichloroethene	mg/kg	0.11	0.19	0.37	0.12	0.2	0.39	0.26	0.5	1	CL:AIRE 2009
Dichloromethane	mg/kg	0.58	0.98	1.7	2.1	2.8	4.5	0.1	0.19	0.34	CL:AIRE 2009
Hexachloroethane	mg/kg	0.2	0.48	1.1	0.22	0.54	1.3	0.27	0.67	1.6	CL:AIRE 2009
Trans 1,2 Dichloroethene	mg/kg	0.19	0.34	0.7	0.19	0.35	0.71	0.93	1.9	4	CL:AIRE 2009
Bis (2-ethylhexyl) phthalate	mg/kg	280	610	1100	2700	2800	2800	47	120	280	CL:AIRE 2009
Butyl benzyl phthalate	mg/kg	1400	3300	7200	42000	44000	44000	220	550	1300	CL:AIRE 2009
Diethyl Phthalate	mg/kg	120	260	570	1800	3500	6300	19	41	94	CL:AIRE 2009
Di-n-butyl phthalate	mg/kg	13	31	67	450	450	450	2	5	12	CL:AIRE 2009
Di-n-octyl phthalate	mg/kg	2300	2800	3100	3400	3400	3400	940	2100	3900	CL:AIRE 2009

Proposed End Use	units	Residential with plant uptake			Residential without plant uptake			Allotment			Source
Soil Organic Matter Content	%	1	2.5	6	1	2.5	6	1	2.5	6	
Biphenyl	mg/kg	66	160	360	220	500	980	14	35	83	CL:AIRE 2009
2,4-Dinitrotoluene	mg/kg	1.5	3.2	7.2	170	170	170	0.22	0.49	1.1	CL:AIRE 2009
2,6-Dinitrotoluene	mg/kg	0.78	1.7	3.9	78	84	87	0.12	0.27	0.61	CL:AIRE 2009
Tributyl tin oxide	mg/kg	0.25	0.59	1.3	1.4	3.1	0.24	0.042	0.1	0.24	CL:AIRE 2009

Controlled Waters Generic Assessment Criteria

Table D.3: Water Quality Standards

Determinand	Concentration (µg/l)		
	Surface Water - EQS Freshwater (DEFRA Directions 2015)	UK Drinking Water Standard (DWS)	WHO Drinking Water Standard
Metals			
Arsenic	50	10	-
Barium	-	-	700
Beryllium	-	-	12
Boron	-	1000	-
Cadmium	0.25*	5	-
Copper	1 (bioavailable)	2000	-
Chromium (total)	4.7	50	-
Chromium (VI)	3.4	-	-
Chromium (III)	4.7	-	-
Iron	1000	200	-
Lead	1.2 (partial bioavailable)	10	-
Manganese	123 (bioavailable)	50	-
Mercury	0.07	1	-
Nickel	4 (bioavailable)	20	-
Selenium	-	10	-
Zinc	10.9+X** (bioavailable X is catchment related)	-	-
Non-Metals			
Cyanide	1	50	-
Chloride	-	250,000	-
Nitrate	-	50,000	-
Sulphate	-	250,000	-
Ammonia (total)	-	500	-
Nitrite	-	500	-
BTEX			
Benzene	10	1	-
Ethyl Benzene	-	-	300
Toluene	74	-	-
Xylene (p+m)	30	-	500
MTBE	-	-	15***
Phenol	7.7	-	-
Petroleum Hydrocarbons			

Aliphatic EC5 - EC6	-	-	15,000
Aliphatic EC6 - EC8	-	-	15,000
Aliphatic EC8-EC10	-	-	300
Aliphatic EC10-EC12	-	-	300
Aliphatic EC12-EC16	-	-	300
Aromatic EC6-EC7 (Benzene)	10	1	
Aromatic EC7-EC8 (Toluene)	74	-	700
Aromatic EC8-EC10	-	-	300****
Aromatic EC10-EC12	-	-	90
Aromatic EC12-EC16	-	-	90
Aromatic EC16-EC21	-	-	90
Aromatic EC21-EC35	-	-	90
Polycyclic Aromatic Hydrocarbons			
Anthracene	0.1	-	1050
Acenaphthene	-	-	210*****
Acenaphthylene	-	-	210*****
Chrysene	-	-	1.085*****
Di-benzo(a,h.)anthracene	-	-	0.01085*****
Phenanthrene	-	-	43.75*****
Benzo(a)pyrene	0.00017	0.01	-
Benzo(b)fluoranthene	0.00017	0.1b	-
Benzo(g,h,i.) Perylene	0.00017	0.1	-
Benzo(k)fluoranthene	0.00017	0.1	-
Fluoranthene	0.0063	-	-
Indeno(1,2,3-cd)pyrene	0.00017	0.1	-
Naphthalene	2	-	70
Fluorene	-	-	140*****
Benzo(a)anthracene	-	-	0.543*****
Pyrene	-	-	105*****
Volatile Organic Compounds			
Vinyl Chloride	-	0.5	-
1,1-dichloroethene	-	-	30
Trans 1,2-Dichloroethene	-	-	0.3
Chloroform	-	100c	-
1,2-Dichloroethane	10	3	-
Trichloroethene (TCE)	-	10	-
Bromodichloromethane	-	100	-
Tetrachloroethene (PCE)	-	10	-
1,3-Dichloropropane	-	100	40
Bromoform	-	100	-

1,4-Dichlorobenzene	-	-	300
1,2-Dichlorobenzene	-	-	1000
1,2-Dibromo-3-chloropropane	-	-	1

* Value for Class 5 water, assumes >200mgCaCO₃/L

** 10.9 + 2.9 (ambient background concentration for Humber catchment)

*** Odour and taste threshold

**** Value for ethylbenzene

***** Waterman-derived criteria based on guidance in WHO document and UK background data

b - Sum of 4 PAHs

c - sum of 4 trichlorohalides – Chloroform, bromoform, dibromoform and bromodichloromethane

Volatile Organic Compounds (VOCs)

The SoBRA Groundwater vapour GAC are detailed in the Tables below.

Table D.4: Petroleum Hydrocarbons

Chemical	CAS	GAC _{gw} vap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
1,2,4-Trimethylbenzene	95-63-6	24	2,200	559,000
Benzene 3	71-43-2	210	20,000	1,780,000
Ethylbenzene 3	100-41-4	10,000	960,000 (sol)	180,000
Isopropylbenzene	98-82-8	850	86,000 (sol)	56,000
Propylbenzene	103-65-1	2,700	240,000 (sol)	54,100
Styrene	100-42-5	8,800	810,000 (sol)	290,000
Toluene 3	108-88-3	230,000	21,000,000 (sol)	590,000
TPH Aliphatic EC5-EC6 3		1,900	190,000 (sol)	35,900
TPH Aliphatic >EC6-EC8 3		1,500	150,000 (sol)	5,370
TPH Aliphatic >EC8-EC10 3		57	5,700 (sol)	427
TPH Aliphatic >EC10-EC12 3		37	3,600 (sol)	34
TPH Aromatic >EC5-EC7 2,3		210,000	20,000,000 (sol)	1,780,000
TPH Aromatic >EC7-EC8 3		220,000	21,000,000 (sol)	590,000
TPH Aromatic >EC8-EC10 3		1,900	190,000 (sol)	64,600
TPH Aromatic >EC10-EC 12 3		6,800	660,000 (sol)	24,500
TPH Aromatic >EC12-EC16 3		39,000	3,700,000 (sol)	5,750
meta-Xylene 3,5	108-38-3	9,500	940,000 (sol)	200,000
ortho-Xylene 3,5	95-47-6	12,000	1,100,000 (sol)	173,000
para-Xylene 3,5	106-42-3	9,900	980,000 (sol)	200,000

Table D.5: Polycyclic Aromatic Hydrocarbons

Chemical	CAS	GAC gw vap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
Acenaphthene	83-32-9	170,000 (sol)	15,000,000 (sol)	4,110
Acenaphthylene	208-96-8	220,000 (sol)	20,000,000 (sol)	7,950
Fluorene	86-73-7	210,000 (sol)	18,000,000 (sol)	1,860
Naphthalene	91-20-3	220	23,000 (sol)	19,000

Table D.6: Pesticides

Chemical	CAS	GACgwvap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
Aldrin	309-00-2	47 (sol)	3,700 (sol)	20
<i>alpha</i> -Endosulfan	959-98-8	7,400 (sol)	590,000 (sol)	530
<i>beta</i> -Endosulfan	33213-65-9	7,500 (sol)	600,000 (sol)	280

Table D.7: Halogenated Organics

Chemical	CAS	GACgwvap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
1,1,1,2-Tetrachloroethane	79-34-5	240	22,000	1,110,000
1,1,1-Trichloroethane	71-55-6	3,000	290,000	1,300,000
1,1,2,2-Tetrachloroethane	79-35-4	1,600	150,000	2,930,000
1,1,2-Trichloroethane	79-00-5	520	49,000	4,491,000
1,1-Dichloroethane	75-34-3	2,700	260,000	3,666,000
1,1-Dichloroethene	75-35-4	160	16,000	3,100,000
1,2,3,4-Tetrachlorobenzene	634-66-2	240	31,000 (sol)	7,800
1,2,3,5-Tetrachlorobenzene	634-90-2	7.0	600	3,500
1,2,3-Trichlorobenzene	87-61-7	35	3,100	21,000
1,2,4,5-Tetrachlorobenzene	95-94-3	8.1	700 (sol)	600
1,2,4-Trichlorobenzene	120-82-1	68	7,200	41,400
1,2-Dichlorobenzene	95-50-1	2,000	220,000 (sol)	133,000
1,2-Dichloroethane	107-06-2	8.9	850	8,680,000
1,2-Dichloropropane	78-87-5	22	2,600	2,050,000
1,3,5-Trichlorobenzene	108-70-3	7.4	660	6,000
1,3-Dichlorobenzene	541-73-1	31	2,800	103,000
1,4-Dichlorobenzene	106-46-7	5,000	460,000 (sol)	51,200
Bromobenzene	108-86-1	220	20,000	388,040
Bromodichloromethane	75-27-4	17	1,600	3,000,000
Bromoform (Tribromomethane)	75-25-2	3,100	400,000	3,000,000
Chlorobenzene	108-90-7	98	15,000	387,000

Chemical	CAS	GACgwvap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
Chloroethane	75-00-3	10,000	1,000,000	5,742,000
Chloroethene (Vinyl Chloride)	75-01-4	0.62	63	2,760,000
Chloromethane	74-87-3	14	1,400	5,350,000
cis-1,2-Dichloroethene	156-59-2	130	13,000	7,550,000
Dichloromethane	75-09-2	3,300	370,000	20,080,000
Hexachlorobenzene	118-74-1	16 (sol)	1,400 (sol)	10
Hexachlorobutadiene	87-68-3	1.7	230	4,800
Hexachloroethane	67-72-1	8.5	740	49,900
Pentachlorobenzene	608-93-5	140	12,000 (sol)	500
Tetrachloroethene	127-18-4	34	4,600	225,000
Tetrachloromethane (Carbon Tetrachloride)	56-23-5	5.3	770	846,000
trans-1,2-Dichloroethene	156-60-5	160	16,000	5,250,000
Trichloroethene	79-01-6	5.7	530	1,370,000
Trichloromethane (Chloroform)	67-66-3	790	85,000	8,950,000

Table D.8: Others (Organic and Inorganic)

Chemical	CAS	GACgwvap (µg/l) 1,2		Aqueous Solubility (µg/l)
		Residential	Commercial	
2-Chloronaphthalene	91-58-7	160	14,000 (sol)	11,700
Biphenyl (Limonene)	92-52-4	15,000 (sol)	1,300,000 (sol)	4,060
Carbon disulphide	75-15-0	56	5,600	2,100,000
Mercury, elemental	7439-97-6	1.1	95 (sol)	56
Methyl tertiary butyl ether (MTBE)	1634-04-4	83,000	7,800,000	48,000,000

Appendix G Limitations and Constraints

The assessment was undertaken in accordance with the scope agreed between Waterman and Waterman Structures Limited, as documented in Waterman's fee letter (WIE19085-100-F-2201121-AM Fee Proposal, dated 1st December 2022), and with Waterman's standard Terms of Appointment.

The benefit of this report is made to Waterman Structures Limited.

The information contained in this report is based on the findings of the Preliminary Environmental Risk Assessment (Report Ref. WIE19085-105-R-1-1-3-PERA) and Coal Mining Risk Assessment (Report Ref. WIE19085-100-R-5.1.3-CMRA), observations made on site, exploratory hole records, laboratory test results, groundwater monitoring and ground gas monitoring.

The ground conditions reported relate only to the point of excavation and do not necessarily guarantee a continuation of the ground conditions throughout the non-inspected area of the site. Whilst such exploratory holes would usually provide a reasonable indication as to the general ground conditions, these cannot be determined with complete certainty.

Waterman has endeavoured to assess all information provided to them during this investigation but makes no guarantees or warranties as to the accuracy or completeness of this information.

The scope of this site investigation includes an assessment of the presence of asbestos containing materials in the ground at the site but not within buildings or structures or below ground structures (basements, buried service ducts and the like).

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

We are Waterman, where every project matters

We deliver progressive, sustainability-driven environmental and engineering consultancy services across every sector. We think differently, and we're harnessing our collective expertise to deliver greener, healthier and well-connected communities, networks and built environments.

Based in strategic locations throughout the UK and Ireland, our team of specialists is at the forefront of tackling the climate emergency and forging a path to a Net Zero built environment.

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