



e3p

Phase II Geoenvironmental Site Assessment
Domett Street, Manchester

Reference: 16-716-R1-2
Date: August 2024



PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Land off Domett Street
Manchester
M9 8DG

Prepared for:
Jigsaw Homes



Report Ref: 16-716-R1-2
Date Issued: August 2024

E3P

Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

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

Registered in England
CRN: 08725262

QUALITY ASSURANCE

Report reference	16-716-R1
------------------	-----------

REV:	DESCRIPTION	AUTHOR	CHECKED	AUTHORISED	DATE
1	First issue	JW	NS	AE	12/10/23
2	Updated with supplementary investigation following site clearance, and addition of completed gas monitoring	JW	JS	AE	05/08/24

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

WRITTEN BY	QUALIFICATIONS	DATE
J. Waugh	BSc(Hons), FGS	29 July 2024

REVIEWED BY	QUALIFICATIONS	DATE
J Sheridan	MeSci, FGS	29 July 2024

AUTHORISED BY	QUALIFICATIONS	DATE
A Edgar	BSc, MSc, PIEMA, MEnvSc, CEnv	05 August 2024

EXECUTIVE SUMMARY

Site Address	Domett Street, Manchester, M9 8DG	
Grid Reference	E 385440, N 402917	
Site Area	~0.06 Ha	
Proposed Development	A proposed development layout has not been provided to E3P. It is understood that the site is to be developed for low-rise residential dwellings.	
Current Site Use	The site is a rectangular shaped parcel of land located to the west of Domett Street and to the south of Old Market Street in Manchester. The site is currently utilised as a storage area for an adjacent construction project. The site involves a trafficked area for deliveries, storage containers and welfare units. Compacted gravel is present across the majority of the site and there is little topographic variance.	
Site History	A review of historical Ordnance Survey maps from 1848 to the present shows the site to comprise terraced residential housing circa 1848. By 1910 the site was redeveloped with two rows of terrace housing present. Pre 1980, the buildings on site are no longer marked presumed demolished, with a grassed surface present from the earliest available aerial images circa 2000 to pre-2023.	
Environmental Setting	Drift Geology	Glaciofluvial Sheet Deposits – SAND and GRAVEL
	Bedrock Geology	Manchester Marls Formation – MUDSTONE
	Faults	None recorded.
	Hydrogeology	Secondary A aquifer (drift) overlying secondary B aquifer (solid). The closest groundwater abstraction is located 432 m west for general cooling. There are no potable abstractions within 1 km.
	Hydrology	A culverted watercourse is located circa 40 m west.
	Flood Risk	Unaffected by flooding from rivers.
Previous Reports	The following previous report has been completed for the site:  Curtins - Phase 1 Preliminary Risk Assessment (Ref: 077873-CUR-00-XX-RP-GE-018, dated 10th May 2021). Prepared for Jigsaw Homes Group Ltd The key findings are summarised in Section 2.1.	
Utility Locations	A full utility survey has not been completed; however, a review of utility plans indicates the following services on site:  Low Voltage and 6–6.6kV cables run along the east of the site. 33kV cables are also present in close proximity to the north and eastern boundaries.  A BT cabinet is present in the north of the site, with a cable running underground towards the centre of the eastern boundary. A BT pole is also present in the northwest corner of the site. Utility connections are also available throughout the surrounding highways.	



Landfill Sites and Ground Gases	A historical landfill site is located circa 130 m north at Land at Pike Fold Lane; however, no further information is available.
Radon	Unaffected – no special precautions required.
Coal Mining/Land Stability	The site is located within a Coal Mining Reporting Area, however, is not located within a Coal Authority deemed High-Risk Development Area. Additionally, there are no mine entries within 1 km of the site or probable/recorded workings in the site boundary or immediate surrounding area. The risk of shallow coal mining is considered to be Low.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within influencing distance of the subject site.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: ✿ 4 x window sample boreholes (September 2023) ✿ 6 x Mechanically excavated trial pits (June 2024)
Ground Conditions	Made Ground – 0.00 m bgl to 1.20 m bgl Made Ground deposits were encountered within all exploratory hole locations to depths of between 0.50 m and 1.20 m bgl. Made Ground deposits generally comprise light grey gravel overlying dark brown clayey very gravelly sand with occasional cobbles. Gravel comprises angular to subangular, fine to coarse sandstone with brick and clinker fragments. Cobbles of sandstone and brick were noted. DRIFT – 0.50 m bgl to >5.45 m bgl Drift deposits were encountered within all exploratory hole locations from 0.50 m to in excess of 5.45 m bgl. The drift deposits generally comprise loose to medium dense occasionally clayey and occasionally silty fine to coarse SAND. Medium-dense to dense gravelly SAND was encountered between depths of 1.60 m and 3.20 m bgl in WS102, WS103 and WS104. SOLID – The solid geology was not encountered during the ground investigation and nearby BGS boreholes do not record the depth to bedrock. GROUNDWATER – Groundwater was not encountered during the ground investigation or during the subsequent monitoring visits.

CONTAMINATED LAND ASSESSMENT

Human Health	The Tier 2 human health risk assessment identified an exceedance of heavy metals and non-volatile PAH compounds in the Made Ground in WS103 at 0.50 m bgl and in TP201 at 0.60 m bgl. All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a suitable cover system in all proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils.
---------------------	--



	Chemical analysis of the natural granular drift deposits in WS102 and WS104 suggests that the soils are likely to be suitable for use as subsoil within the proposed garden areas. There are no suitable sources of topsoil available on the site.
Controlled Waters	The Tier 2 controlled waters risk assessment identified exceedances of the EQS for copper and lead in a leachate sample from WS103. Groundwater was not encountered during site works, which suggests that there is no significant shallow groundwater body. The identified heavy metals are generally of low solubility and mobility, therefore migration towards controlled waters receptors is considered unlikely. The risk to the underlying aquifers is reduced given the absence of any potable groundwater abstraction within 1 km, which suggests the aquifer is not utilised as a strategic water resource. Given the general low soluble nature of the identified contaminants of concern, in addition to the relatively low sensitivity of the site with respect to controlled waters, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ.
Ground Gas	Ground gas monitoring completed suggests that the site can be classified as CS1. No gas protection measures required.
Potable Water Infrastructure	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

GEOTECHNICAL ASSESSMENT

Underground Obstructions	Any below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	The underlying natural sand has been assessed as being loose at circa 1.00 m bgl with a net allowable bearing pressure (ABP) of between 60 – 91 kN/m² The natural sand is medium dense to dense between 2.00 – 5.45 m bgl with an ABP in the range of 122 – 375 kN/m².
Foundation Options	Based on the assessment of the relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying medium dense to dense sands. Due to the presence of Made Ground underlain by loose sands at circa 1.00 m bgl, E3P anticipate that an engineered foundation solution will be required. A programme of remediation and enabling works will be required to remove any buried obstructions. Therefore, upon completion of these enabling works, it is likely that the most cost-effective option for the majority of the site would be to re-engineer the Made Ground using vibro stone columns (VSCs) to support a shallow strip or spread foundation.



Building Floor Slabs	Ground-bearing floor slabs are unlikely to be viable given the anticipated depths of reworked Made Ground > 600 mm.
Heave Precautions	The site is underlain by predominantly granular soils which are not susceptible to volumetric instability. Where soils contain a higher fine content, consideration shall be given to the plasticity of the soils particularly where within tree influence. In the absence of plasticity testing, allowance should be made for medium volume change potential soils.
Soakaway Drainage	The natural granular drift deposits may facilitate soakaways; however permeability of the underlying ground has not yet been assessed. If soakaway drainage is to be considered, full BRE 365 testing must be completed to inform the detailed design.
Sulphate Assessment	The soils generally meet class DS-1, AC-1. Due to a pH value of 5.5, the soils in WS104 at 1.50 m bgl are classified as DS-1, AC-3z.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions.
Cut/Fill	Development levels unknown at this time; however, an element of cut-and-fill works will be required to prepare the development platform.
Civil Engineering Excavations	The E3P Intrusive Ground Investigation has identified the presence of loose sand at circa 1.00 m bgl.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: <i>Waste Classification – Guidance on the classification and assessment of waste</i> .

RECOMMENDATIONS

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

- Plot-specific foundation schedule (upon receipt of the final development levels) with appropriate enabling earthworks strategy.
- Basic remediation statement for cover system.



Table of Contents

EXECUTIVE SUMMARY	1
1. INTRODUCTION	7
1.1. Background	7
1.2. Proposed Development.....	7
1.3. Objectives	7
1.4. Scope of Works.....	8
1.5. Limitations	8
1.6. Confidentiality.....	8
2. GROUND INVESTIGATION.....	9
2.1. Previous Reports	9
2.2. General Overview	10
2.3. Scope of Investigation.....	10
2.4. In-Situ Standard Penetration Testing (SPT).....	11
2.5. Laboratory Analysis.....	11
3. GROUND AND GROUNDWATER CONDITIONS	12
3.1. Summary of Ground Conditions	12
3.2. Made Ground	12
3.3. Drift Deposits	12
3.4. Solid Geology.....	13
3.5. Groundwater	13
3.6. Visual and Olfactory Evidence of Contamination	13
3.7. Soil Consistency	13
3.8. Particle Size Distribution.....	16
3.9. Soil Density/Moisture Content Relationship	16
3.10. pH and Sulphate	16
4. TIER 2 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT	18
4.1. Human Health Risk Assessment.....	18
4.2. Controlled Waters Risk Assessment.....	21
4.2.1. Controlled Water Risk Assessment and Mitigation	25
4.2.2. Discussion of Controlled Waters Risk Assessment	25
4.3. GROUND GAS RISK ASSESSMENT METHODOLOGY	26
4.4. MONITORING METHODOLOGY	27
4.5. SUMMARY OF MONITORING RESULTS	30
4.5.1. GROUNDWATER	30
4.5.2. BAROMETRIC PRESSURE.....	30
4.5.3. GAS FLOW	30
4.5.4. GAS CONCENTRATIONS	30
4.6. CONCLUSION.....	30
4.7. Potable Water Supply	32
4.8. Conceptual Site Model	33
5. GEOTECHNICAL ASSESSMENT	37
5.1. Proposed Development.....	37
5.2. Site Preparation	37
5.3. Foundation Conditions and Assessment of Potential Bearing Capacities	37
5.4. Ground Floor Slabs	39
5.5. Heave Precautions	39
5.6. Highways Construction	39
5.7. Drainage	40
5.8. Concrete Durability	40



5.9.	Excavations	40
5.10.	Construction Activity and Inspection	41
5.11.	Geotechnical Risk Register	42
5.12.	Further Works	43
APPENDIX I LIMITATIONS.....		44
APPENDIX II GLOSSARY		46
APPENDIX III DRAWINGS		49
APPENDIX IV PHOTOGRAPHS		51
APPENDIX V E3P EXPLORATORY HOLE LOGS		55
APPENDIX VI CHEMICAL TESTING RESULTS		56
APPENDIX VII ORIGIN OF TIER 2 GENERIC ASSESSMENT CRITERIA.....		57
APPENDIX VIII GEOTECHNICAL TESTING RESULTS.....		59

DRAWING LIST

16-716-001 - Site Location Plan
16-716-003 - Historical Features Plan
16-716-004 - Site Features Plan
16-716-005 - Exploratory Hole Location Plan
16-716-006 - Depth of Made Ground Plan
16-716-015 - Development Constraints Plan
16-716-010 - Conceptual Site Model
16-716-018 - Contamination Exceedances Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Jigsaw Homes to undertake a detailed Phase II Geoenvironmental Site Assessment for a parcel of land located to the west of Domett Street and to the south of Old Market Street in Manchester.

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

1.2. PROPOSED DEVELOPMENT

A proposed development layout has not been provided to E3P. It is understood that the site is to be developed for low rise residential dwellings.

1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

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



1.4. SCOPE OF WORKS

The scope of work includes the following elements:

- ✦ Detailed review of previous technical reports;
- ✦ Design of suitable intrusive ground investigation;
- ✦ 4 window sample probeholes with environmental monitoring installations;
- ✦ 6 mechanically excavated trial pits;
- ✦ In-situ geotechnical testing;
- ✦ Chemical and geotechnical laboratory analysis;
- ✦ Groundwater monitoring and sampling;
- ✦ Ground gas monitoring;
- ✦ Contamination risk assessment and conceptual site model;
- ✦ Geotechnical assessment and interpretation; and
- ✦ Factual and interpretive reporting.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. CONFIDENTIALITY

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



2. GROUND INVESTIGATION

2.1. PREVIOUS REPORTS

E3P has been provided with the following previous report for the site:

-  **Curtins** - Phase 1 Preliminary Risk Assessment (Ref: 077873-CUR-00-XX-RP-GE-018, dated 10th May 2021). Prepared for Jigsaw Homes Group Ltd

A summary of the pertinent information from this report is provided below:

Site Setting

-  The site is currently occupied by unkept grass surface covers and a path runs diagonally across the site from northwest to southeast. A wooden fence is present surrounding the site.

Site History

-  The earliest historical mapping dated 1848 records terraced residential housing. By 1910 two rows of residential dwellings are shown, one aligned north-south on the eastern boundary and one aligned east-west of the northern boundary.
-  By 1980 the residential buildings were demolished.
-  Infilled reservoirs are located 80 m north and 260 m south. Industries located within 250 m of the site include chemical works, mills, dye works, tannery, match works and chemical research laboratories.

Environmental Setting

-  BGS mapping records Glaciofluvial Sheet Deposits underlain by the Manchester Marls Formation.
-  BGS boreholes within 175 m of the site record Made Ground underlain by granular sand and gravel. Bedrock was not encountered.
-  The site is unaffected by radon.
-  The site is located within a Coal Mining Reporting Area but not within a Development High Risk area. Curtins conclude the risk from coal mining to be low.
-  The superficial drift deposits are designated as a Secondary A aquifer and the bedrock is classified as a Secondary B aquifer. The site is not located within a source protection zone.
-  A tributary of the River Irk is located 72 m west, flowing to the southwest.
-  The site is located within an area assessed as being within at low risk from UXO.



Initial Conceptual Site Model

✚ Curtins conclude the following:

- The risk from Made Ground soils posed to the site's end-users and construction workers is considered to be Moderate / Low due to the anticipated lack of contamination in potential Made Ground soils on site
- The risk presented to groundwater and surface water receptors is considered to be Moderate/Low and Very Low, taking into account the lack of historical industrial land use on site.
- The risk posed to site end-users from ground generating gases arising from organic / putrescible soils on or near the site is considered to be Moderate.

2.2. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to provide general site coverage. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

In initial phase of investigation comprising window sample probeholes was completed on 6th September 2023. During this time, the site was in use as a construction compound with cabins and stored materials.

The site was subsequently cleared/vacated and E3P returned to complete trial pitting on 26th June 2024.

The works are summarised in Table 2.1.

2.3. SCOPE OF INVESTIGATION

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	DATE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions Including the Presence/Nature of Obstructions	September 2023	WS101	Window Sample Probehole	5.45	0.5–1.0
		WS102		5.45	N/A
		WS103		5.45	2.0–3.0
		WS104		5.45	1.5–2.0
	June 2024	TP201	Trial Pits	1.90	N/A
		TP202		1.70	
		TP203		2.00	
		TP204		1.70	
		TP205		1.80	
		TP206		1.70	

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



Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage.

The sampling locations are illustrated in Drawing 16-716-005 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations.

2.4. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V and presented in Table 3.2 and discussed in Section 5.

2.5. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical analysis comprising:

- ✦ Metals.
- ✦ pH, total sulphate, water-soluble sulphate (2:1 extract).
- ✦ Sulphide.
- ✦ Cyanide.
- ✦ Phenols.
- ✦ Total and speciated polycyclic aromatic hydrocarbons (PAHs).
- ✦ Asbestos identification.
- ✦ Speciated and banded total petroleum hydrocarbon (TPH).
- ✦ Total organic carbon (TOC).
- ✦ Leachate analysis.

I2 Analytical undertook the analytical work and the testing results are included in Appendix VI and discussed in Section 4.

Selected samples were submitted to Murray Rix Laboratory where the following geotechnical tests were undertaken:

- ✦ Moisture content.
- ✦ Particle size distribution.
- ✦ 2.5 kg compaction.

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 3.



3. GROUND AND GROUNDWATER CONDITIONS

3.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 3.1.

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)			
	MADE GROUND (MOT)	MADE GROUND	SAND	GRAVELLY SAND
WS101	0.00 – 0.20	0.20 – 1.00	1.00 – 5.45	-
WS102	0.00 – 0.20	0.20 – 0.50	0.50 – 1.60 2.60 – 5.45	1.60 – 2.60
WS103	0.00 – 0.20	0.20 – 1.00	1.00 – 2.00 3.00 – 5.45	2.00 – 3.00
WS104	0.00 – 0.20	0.20 – 1.10	1.10 – 2.00 3.20 – 5.45	2.00 – 3.20
TP201	-	0.00 – 1.10	1.10 – 1.90	-
TP202	-	0.00 – 1.20	1.20 – 1.70	-
TP203	-	0.00 – 1.20	1.20 – 2.00	-
TP204	-	0.00 – 1.20	1.20 – 1.70	-
TP205	-	0.00 – 1.20	1.20 – 1.80	-
TP206	-	0.00 – 1.20	1.20 – 1.70	-

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths of between 0.50 m and 1.20 m bgl.

Made Ground deposits generally comprise light grey gravel overlying dark brown clayey very gravelly sand with occasional cobbles. Gravel comprises angular to subangular, fine to coarse sandstone with brick and clinker fragments. Cobbles of sandstone and brick were noted.

A Depth of Made Ground Plan is presented as Drawing 16-716-006 in Appendix III.

3.3. DRIFT DEPOSITS

Drift deposits were encountered within all exploratory hole locations from 0.50 m (WS102) to in excess of 5.45 m bgl. The drift deposits generally comprise loose to medium dense occasionally clayey and occasionally silty fine to coarse SAND.

Medium dense to dense gravelly SAND was encountered between depths of 1.60 m and 3.20 m bgl in WS102, WS103 and WS104.



3.4. SOLID GEOLOGY

The solid bedrock geology was not encountered during the ground investigation. BGS boreholes in the vicinity of the site do not record the depth to bedrock.

3.5. GROUNDWATER

Groundwater strikes were not encountered during the ground investigation.

Monitoring was undertaken using an electronic dip meter to record the depth to groundwater. These results are summarised in Table 4.6.

3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

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

3.7. SOIL CONSISTENCY

Results of the standard penetration tests, including the relative densities derived from SPTs are included in Table 3.2.



TABLE 3.2 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING PRESSURE (kN/m ²)*
WS101	1.00	Very clayey SAND.	6	6.05	Loose	N/A	N/A	N/A	60.49
WS101	2.00	SAND	31	28.32	Medium Dense	N/A	N/A	N/A	283.20
WS101	3.00	Clayey SAND.	14	12.18	Medium Dense	N/A	N/A	N/A	121.75
WS101	4.00	SAND.	19	16.05	Medium Dense	N/A	N/A	N/A	160.52
WS101	5.00	SAND.	19	15.76	Medium Dense	N/A	N/A	N/A	157.63
WS102	1.00	SAND.	9	9.07	Loose	N/A	N/A	N/A	90.73
WS102	2.00	SAND and GRAVEL.	25	22.84	Medium Dense	N/A	N/A	N/A	228.38
WS102	3.00	Slightly clayey SAND.	8	6.96	Loose	N/A	N/A	N/A	69.57
WS102	4.00	Silty SAND.	22	18.59	Medium Dense	N/A	N/A	N/A	185.87
WS102	5.00	Silty SAND.	29	24.06	Medium Dense	N/A	N/A	N/A	240.59
WS103	1.00	SAND.	7	7.06	Loose	N/A	N/A	N/A	70.57



Domett Street, Manchester

Phase II Geoenvironmental Site Assessment

August 2024

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE (N ₁) ₆₀	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m ²)	ALLOWABLE BEARING PRESSURE (kN/m ²)*
WS103	2.00	SAND and GRAVEL.	41	37.46	Dense	N/A	N/A	N/A	374.55
WS103	3.00	Silty SAND.	14	12.18	Medium Dense	N/A	N/A	N/A	121.75
WS103	4.00	Silty SAND.	20	16.90	Medium Dense	N/A	N/A	N/A	168.97
WS103	5.00	Silty SAND.	18	14.93	Medium Dense	N/A	N/A	N/A	149.33
WS104	1.00	SAND.	8	8.07	Loose	N/A	N/A	N/A	80.65
WS104	2.00	SAND and GRAVEL.	30	27.41	Medium Dense	N/A	N/A	N/A	274.06
WS104	3.00	Silty SAND.	22	19.13	Medium Dense	N/A	N/A	N/A	191.32
WS104	4.00	Silty SAND.	28	23.66	Medium Dense	N/A	N/A	N/A	236.56
WS104	5.00	Silty SAND.	27	22.40	Medium Dense	N/A	N/A	N/A	224.00

Notes

* The Allowable Bearing Pressure (ABP) should be considered indicative.

The interpretation of in situ mass undrained shear strength (c_u) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).

Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.



3.8. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on a selected sample of granular material via wet sieve to obtain information on the soil fractions. The results are included in Table 3.3. The full results can be found in Appendix VIII.

TABLE 3.3 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
WS104	1.10 (Natural)	0	41	42	17
TP202	0.50 (Made Ground)	0	30	43	27
TP203	2.00 (Natural)	0	27	59	14
TP204	1.00 (Made Ground)	0	13	33	54
TP206	1.50 (Natural)	0	5	42	53

3.9. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density/moisture content relationship analysis has been conducted on soils using compaction tests utilising a 2.5 kg rammer. The results of the tests have been summarised in Table 3.4. The full test results can be found in Appendix VIII.

TABLE 3.4 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m ³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
WS103	Orange, brown silty SAND	1.00	2.5 kg	11.1	13	0	1.67	4

The proctor compaction tests have indicated that the material in WS103 has a lower initial moisture content than the optimum moisture content.

3.10. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 3.5), show that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with BRE *Special Digest 1* (2005).

Due to a pH value of 5.5, the soils in WS104 at 1.50 m bgl are classified as DS-1, AC-3z.



TABLE 3.5 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
WS101	0.90	0.071	7.7	DS-1, AC-1
WS102	0.90	0.052	7.6	DS-1, AC-1
WS103	0.50	0.016	8.2	DS-1, AC-1
WS104	1.50	0.045	5.5	DS-1, AC-3z
TP201	0.60	0.034	8.6	DS-1, AC-1
TP203	0.90	0.026	8.5	DS-1, AC-1
TP205	1.10	<0.010	8.4	DS-1, AC-1
TP206	1.20	<0.010	8.7	DS-1, AC-1



4. TIER 2 QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 2 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

4.1. HUMAN HEALTH RISK ASSESSMENT

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

Where Tier 2 screening values are not provided by LQM, other screening values have been used and these are referenced in Table 4.1.

The results of this comparison have been summarised in Table 4.1.



TABLE 4.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	37	8	110	TP201 0.60 m	1	Further Action
Cadmium	mg/kg	11	8	9.4	-	1	No Further Action
Chromium (VI)	mg/kg	6.1	8	<0.50	-	1	No Further Action
Lead**	mg/kg	200	8	270	TP201 0.60 m	1	Further Action
Mercury	mg/kg	1.2	8	0.82	-	2	No Further Action
Nickel	mg/kg	180	8	55	-	1	No Further Action
Selenium	mg/kg	250	8	1.60	-	1	No Further Action
Copper	mg/kg	2400	8	150	-	1	No Further Action
Zinc	mg/kg	3700	8	260	-	1	No Further Action
Cyanide - Total	mg/kg	791	8	<1.0	-	1	No Further Action
Phenols - Total.	mg/kg	210	8	<1.0	-	1	No Further Action
Asbestos	Fibres	NFD	7	NFD	-	4	No Further Action
Naphthalene	mg/kg	2.3	8	1.8	-	3	No Further Action
Acenaphthylene	mg/kg	170	8	0.21	-	2	No Further Action
Acenaphthene	mg/kg	210	8	2.1	-	1	No Further Action
Fluorene	mg/kg	170	8	1.3	-	1	No Further Action
Phenanthrene	mg/kg	95	8	3.7	-	2	No Further Action
Anthracene	mg/kg	2400	8	0.98	-	2	No Further Action
Fluoranthene	mg/kg	280	8	6.6	-	2	No Further Action
Pyrene	mg/kg	620	8	6.1	-	2	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	8	3.4	-	2	No Further Action
Chrysene	mg/kg	15	8	3.4	-	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	2.6	8	4.1	WS103 0.50 m	2	Further Action
Benzo(k)Fluoranthene	mg/kg	77	8	2.2	-	2	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	8	3.6	WS103 0.50 m	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	27	8	2.1	-	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	8	0.55	WS103 0.50 m	2	Further Action
Benzo(ghi)Perylene	mg/kg	320	8	2.7	-	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	8	<0.1	-	3	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	8	<0.1	-	3	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	8	<0.1	-	3	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	74	8	<2.0	-	3	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	140	8	8.1	-	3	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	260	8	42	-	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	1100	8	570	-	1	No Further Action



Notes

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

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

* The Tier 2 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 2 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 2 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

**CL:AIRE C4SL

Referring to Table 4.1, the result of this direct comparison indicates that the data exceeds the screening criteria for a residential end-use for the following contaminants:

- ✳ Arsenic
- ✳ Lead
- ✳ Benzo(b)Fluoranthene;
- ✳ Benzo(a)pyrene; and
- ✳ Dibenzo(a,h)Anthracene.

Asbestos was not encountered in any of the samples tested.

In relation to these exceedances, the following can be determined:

- ✳ The main exposure pathways based on the Tier 2 exceedances are:
 - Dermal contact and ingestion;
- ✳ The exceedances for all determinands are associated with shallow Made Ground deposits in WS103 at 0.50 m bgl and TP201 at 0.60 m bgl.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils. The risk to chronic human health associated with the elevated concentrations of heavy metals and non-volatile PAH compounds can be mitigated through the installation of a suitable cover system in all proposed private gardens, landscaping and public open space to remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.

Chemical analysis of the natural granular drift deposits in WS102 and WS104 suggests that the soils are likely to be suitable for use as subsoil within the proposed garden areas. There are no suitable sources of topsoil available on the site.



4.2. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 4.2.

TABLE 4.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Heavy metal and PAH contamination may be present as a result of the Made Ground associated with historical construction and demolition activities.		Low
Pathway		
Vertical Migration Due to the majority of the site being underlain by granular glaciofluvial deposits, vertical migration of contaminants is likely to occur as a result of the high permeability of the drift deposits.		High
Lateral migration Lateral migration of contaminants is considered possible due to the presence of granular glaciofluvial deposits across the site.		Medium
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary A aquifer	Medium
Aquifer Classification in Bedrock	Secondary B aquifer	Medium
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected.	Low
Distance to the Closest Groundwater Abstraction Point	The closest groundwater abstraction is located 432 m west for general cooling. There are no potable abstractions within 1 km.	Medium
Is the Site Located Within 50 m of a Surface Watercourse?	A culverted watercourse is located circa 40 m west.	Low
The ICSM developed within the context of the site setting has identified viable pollutant pathways, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying aquifers and the lateral migration to the watercourse located to the west of the site.		

To ensure a robust appraisal of the identified risk to controlled waters, E3P has identified the sources of potential contamination that represent a risk to controlled waters from the initial CSM, we have then assessed the availability of ground investigation data in the form of analysis of the solid phase (soil) and dissolved phase within the perched groundwater or aquifer. The results of this assessment are presented in Table 4.3.



TABLE 4.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
C5-C10 > 5 mg/kg	All concentrations are below the laboratory LOD.	None
C10-C12 > 10 mg/kg	All concentrations are below the laboratory LOD.	None
C12-C16 > 50 mg/kg	All concentrations are below or slightly exceeding the laboratory LOD.	None
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	All concentrations are less than 2.0 mg/kg.	None
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected in WS103 at 0.50 m bgl with a concentration of 44.7 mg/kg.	Further Discussion
Heavy metals > 500 mg/kg	Concentrations of heavy metals of approximately >800 mg/kg have been identified within shallow Made Ground deposits at TP201. Concentrations of all other samples are less than 500 mg/kg.	Further Discussion

The Tier 2 assessment has included a comparison of leachate analysis from samples of the Made Ground to environmental quality standards (EQS) in the first instance and in the absence of these to the drinking water standards (DWS). The monitoring wells were noted to be dry during monitoring, therefore groundwater samples could not be obtained.

These are presented in Table 4.4.



TABLE 4.4 COMPARISON OF LEACHATE ANALYSIS WITH TIER 2 SCREENING LEVELS

DETERMINAND	UNIT	EQS ^{1,2}	DWS _{3,4}	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA					
Arsenic	µg/l	50	10	1	5.9	-	No Further Action
Cadmium	µg/l	0.08-0.25	5	1	< 0.08	-	No Further Action
Chromium (VI)	µg/l	3.4	–	1	< 5.0	-	No Further Action
Chromium (III)	µg/l	4.7	50	1	1.1	-	No Further Action
Copper	µg/l	1	2000	1	23	WS103 (EQS)	Further Action
Total Cyanide	µg/l	1	50	1	< 1.0	-	No Further Action
Lead	µg/l	1.2	10	1	3.4	WS103 (EQS)	Further Action
Mercury	µg/l	–	1.0	1	< 0.5	-	No Further Action
Nickel	µg/l	4	20	1	1.5	-	No Further Action
Selenium	µg/l	–	10	1	< 4.0	-	No Further Action
Zinc	µg/l	10.9	–	1	9.6	-	No Further Action
pH	6–9			1	7.9	-	No Further Action
Polycyclic Aromatic Hydrocarbons							
Naphthalene	µg/l	2	10*	1	<0.01	-	No Further Action
Anthracene	µg/l	0.1	10*	1	<0.01	-	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	1	<0.01	-	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	1	<0.01	-	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	1	<0.01	-	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	1	<0.01	-	No Further Action
Fluoranthene	µg/l	0.0063	10*	1	<0.01	-	No Further Action



DETERMINAND	UNIT	EQS ^{1,2}	DWS _{3,4}	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA					
Benzo(ghi)perylene	µg/l	1.7–4	10*	1	<0.01		No Further Action
Aromatic Hydrocarbon							
TPH C5-C7 (benzene)	µg/l	10	1	1	< 1.0		No Further Action
TPH C7-C8 (toluene)	µg/l	74	700	1	< 1.0		No Further Action
TPH C8-C10 (xylene)	µg/l	30	300	1	< 1.0		No Further Action
TPH C10-C12 (naphthalene)	µg/l	2	90	1	< 10		No Further Action
TPH C12-C16	µg/l	–	90	1	< 10		No Further Action
TPH C16-C35	µg/l	–	90	1	< 10		No Further Action
Aliphatic Hydrocarbon							
TPH C5-C6	µg/l	–	1000 ⁵	1	< 1.0		No Further Action
TPH C6-C8	µg/l	–	1000 ⁵	1	< 1.0		No Further Action
TPH C8-C10	µg/l	–	300	1	< 1.0		No Further Action
TPH C10-C12	µg/l	–	300	1	< 10		No Further Action
TPH C12-C16	µg/l	–	300	1	< 10		No Further Action
TPH C16-C21	µg/l	–	300**	1	< 10		No Further Action
TPH C21-C35	µg/l	–	300**	1	< 10		No Further Action



Notes (Table 4.4)

Solubility <0.01µg/l

AA – Annual Average

* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water

** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.

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

4.2.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

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

 Copper

 Lead

Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation.

The assessment is considered to be conservative, given the closest surface watercourse is culverted, and therefore is not likely to be in hydraulic continuity with the site.

4.2.2. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

The site is underlain by granular drift deposits which may facilitate migration to the underlying secondary B aquifer in the bedrock.

PAH contamination has been identified in the Made Ground in WS103 at 0.50 m bgl, however, no elevated concentrations of PAH compounds have been identified in the dissolved phase in leachate analysis.

Groundwater was not encountered during site works, which suggests that there is no significant shallow groundwater body.

The identified heavy metals are generally of low solubility and mobility, therefore migration towards controlled waters receptors is considered unlikely.

The risk to the underlying aquifers is reduced given the absence of any potable groundwater abstraction within 1 km, which suggests the aquifer is not utilised as a strategic water resource.

Given the general low soluble nature of the identified contaminants of concern, in addition to the relatively low sensitivity of the site with respect to controlled waters, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ.



4.3. GROUND GAS RISK ASSESSMENT METHODOLOGY

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

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

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

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

The following equation should be utilised:

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

Where:

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

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

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

The final derived GSV can then be used to characterise the site as summarised in Table 4.5.



TABLE 4.5 SITE CHARACTERISATION BY GSV (BS8485:2015)

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

Notes

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

4.4. MONITORING METHODOLOGY

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using a calibrated infrared gas analyser (GFM435) with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 500 seconds at each location, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

The results of the ground gas monitoring are presented in Table 4.6.

In addition to the raw data, the results for each individual standpipe have been assessed with reference to guidance provided in BS8485:2015+A1:2019. Based on the initial peak measured flow rates and hazardous gas concentrations, individual hazardous gas flow rates (Q_{hg}) have been derived for each monitoring point, from which an individual Characteristic Situation (CS) can ultimately be determined.



TABLE 4.6 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)	
WS101	Granular Made Ground	21/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	984	Rising	0.1	0.1	0.50 - 1.00	0.78	Dry	
		03/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1008	Steady	0.1	0.1		0.80	Dry	
		30/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	0.2	984	Steady	0.1	0.1		0.78	Dry	
		17/11/2023	0.1	0.1	0.0001	0.7	0.7	0.0007	19.9	1009	Rising	0.1	0.1		0.78	Dry	
		07/12/2023	0.1	0.1	0.0001	1	1	0.0010	18	992	Steady	0.1	0.1		0.75	Dry	
		04/01/2024	0.1	0.1	0.0001	1.5	1.3	0.0015	18.9	991	Falling	0.1	0.1		0.75	Dry	
		22/01/2024	0.1	0.1	0.0001	1.2	0.9	0.0012	19.5	994	Rising	0.1	0.1		0.75	Dry	
		21/02/2024	0.1	0.1	0.0001	2.8	2.8	0.0028	13.8	985	Falling	0.1	0.1		0.74	Dry	
		15/03/2024	0.1	0.1	0.0001	2.4	2.4	0.0024	14	995	Rising	0.1	0.1		0.74	Dry	
WS103	Natural Granular Drift	21/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	983	Rising	0.1	0.1	2.00 - 3.00	2.85	Dry	
		03/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1007	Steady	0.1	0.1		2.85	Dry	
		30/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	1.2	1007	Steady	0.1	0.1		2.85	Dry	
		17/11/2023													N/A		
		07/12/2023															
		04/01/2024	0.1	0.1	0.0001	4.5	4.5	0.0045	16	1007	Falling	0.1	0.1		2.8	Dry	
		22/01/2024	0.1	0.1	0.0001	4	3.9	0.0040	16.8	1007	Rising	0.1	0.1		2.85	Dry	
		21/02/2024													N/A		
		15/03/2024	0.1	0.1	0.0001	4.3	4.3	0.0043	16.5	1007	Rising	0.1	0.1				2.88
WS104	Natural Granular Drift	21/09/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	983	Rising	0.1	0.1	1.50 - 2.00	1.94	Dry	
		03/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.8	1007	Steady	0.1	0.1		1.92	Dry	
		30/10/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	4.5	983	Steady	0.1	0.1		1.92	Dry	



WELL	STRATA	DATE	CH ₄ PEAK (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ Q _{hg} (l/hr)	CO ₂ PEAK (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ Q _{hg} (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	PEAK FLOW (l/hr)	STEADY FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
		17/11/2023	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1010	Rising	0.1	0.1		1.92	Dry
		07/12/2023	0.1	0.1	0.0001	2.1	2	0.0021	18.7	992	Steady	0.1	0.1		1.92	Dry
		04/01/2024	0.1	0.1	0.0001	1.9	1.5	0.0019	18.7	992	Falling	0.1	0.1		1.9	Dry
		22/01/2024	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	996	Rising	0.1	0.1		1.95	Dry
		21/02/2024	0.1	0.1	0.0001	3.6	3.6	0.0036	16.8	985	Falling	0.1	0.1		Bung Trapped	
		15/03/2024	Well Not Located (Likely Destroyed)												N/A	

Notes

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



4.5. SUMMARY OF MONITORING RESULTS

4.5.1. GROUNDWATER

During all monitoring visits to date, all monitoring wells have been recorded as dry. The groundwater level of the site is likely to be below the maximum extent of the monitoring well depths.

4.5.2. BAROMETRIC PRESSURE

Visits 1, 7 and 9 were undertaken during periods of low/rising pressure, with pressure recorded to be 983–992 mbar.

Visits 2, 3 and 5 were undertaken during periods of steady pressure recorded to be 983–1007 mbar.

Visit 4 was undertaken during a period of high/rising pressure, with pressure recorded to be 983–992 mbar.

Visits 6 and 8 were undertaken during periods of falling pressure, with pressure recorded to be 985–992 mbar.

4.5.3. GAS FLOW

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

4.5.4. GAS CONCENTRATIONS

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

Carbon dioxide concentrations were recorded at concentrations ranging from 0.1% v/v to 4.5% v/v (WS103).

4.6. CONCLUSION

The determined Characteristic Situation for each standpipe for each visit is presented in Table 4.7. This indicates that based on the peak flow rates the majority of the monitoring visits are classified as Characteristic Situation (CS)1 – Very Low Gas Risk.

TABLE 4.7 GAS RISK PROFILE AND LOCATION

WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH ₄ (%V/V)	MAX CH ₄ Q _{hg} (l/hr)	MAX CO ₂ (%V/V)	MAX CO ₂ Q _{hg} (l/hr)	CHARACTERISTIC SITUATION
WS101	21/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	03/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	17/11/2023	Dry	0.1	0.1	0.0001	0.7	0.0007	CS1



WELL	DATE	DEPTH TO WATER (m bgl)	MAX FLOW (l/hr)	MAX CH ₄ (%V/V)	MAX CH ₄ Q _{hg} (l/hr)	MAX CO ₂ (%V/V)	MAX CO ₂ Q _{hg} (l/hr)	CHARACTERISTIC SITUATION
	07/12/2023	Dry	0.1	0.1	0.0001	1.0	0.0010	CS1
	04/01/2024	Dry	0.1	0.1	0.0001	1.3	0.0015	CS1
	22/01/2024	Dry	0.1	0.1	0.0001	0.9	0.0012	CS1
	21/02/2024	Dry	0.1	0.1	0.0001	2.8	0.0028	CS1
	15/03/2024	Dry	0.1	0.1	0.0001	2.4	0.0024	CS1
WS103	21/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	03/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	04/01/2024	Dry	0.1	0.1	0.0001	4.5	0.0045	CS1
	22/01/2024	Dry	0.1	0.1	0.0001	3.9	0.0040	CS1
	15/03/2024	Dry	0.1	0.1	0.0001	4.3	0.0043	CS1
WS104	21/09/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	03/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	30/10/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	17/11/2023	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	07/12/2023	Dry	0.1	0.1	0.0001	2.0	0.0021	CS1
	04/01/2024	Dry	0.1	0.1	0.0001	1.5	0.0019	CS1
	22/01/2024	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
	21/02/2024	Bung Trapped	0.1	0.1	0.0001	3.6	0.0036	CS1

E3P has assessed the previous variables and come to the following conclusions:

- ✿ Ground gas monitoring suggests that the site can be classified as CS1, and it is considered that gas protection measures will not be required.
- ✿ No elevated concentrations of methane or carbon dioxide have been recorded.
- ✿ Made Ground has been encountered at a maximum depth of 1.10 m bgl. No significant putrescible materials were identified which could be considered a potential gassing source.
- ✿ Drift deposits comprise SAND and GRAVEL from 0.50 m bgl to depths in excess of 5.45 m bgl.
- ✿ The site is not located within an area affected by radon.

With due consideration to the Conceptual Site Model and the absence of any persistent gas source and gas generation potential, it is considered by E3P that the site can be classified as CS1, and therefore no gas protection measures are required.



4.7. POTABLE WATER SUPPLY

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

TABLE 4.8 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at <u>Current</u> pipeline depth (mg/kg)
Total VOC	0.5	N/A
Total BTEX And MTBE	0.1	N/A
Total SVOCs (Excluding PAH and those substances marked with an *)	2	N/A
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.0
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	<4.0
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	35
Phenols (From SVOC Analysis)*	2	N/A
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	N/A
Ethers*	0.5	N/A
Nitrobenzene*	0.5	N/A
Ketones*	0.5	N/A
Aldehydes*	0.5	N/A
Amines	Fail	N/A
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	WS103 0.50 m bgl (EC16-EC40 Aliphatic and Aromatic Hydrocarbons = 1072 mg/kg)	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No hydrocarbon impact has been identified at depth. Groundwater levels are generally significantly deeper than pipeline depth.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	Currently unknown.	
Will soils be imported to site as part of any future earth works	Currently unknown. The importation of materials may affect the WIR Risk Assessment which should be updated after completion.	

Notes

Pipe line depth normally between 0.75m–1.35m

Based on the assessment of current site conditions it is likely that PE pipe will be suitable for the proposed development. This will need to be confirmed with a UKWIR risk assessment post remediation.



4.8. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 4.9 has been prepared for the site.

TABLE 4.9 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non-volatile PAH (Made Ground)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	Moderate	LOW
Assessment: Heavy metals (Arsenic and Lead) were identified in the Made Ground in TP201 at 0.60 m bgl. PAHs (benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene) were identified in the Made Ground in WS103 at 0.50 m bgl.						
Recommendation: Cover system to garden and landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Low Likelihood	Low	N/A
Assessment: Asbestos has not been identified.						
Recommendation: Construction works completed with PPE and provision of welfare.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile Contaminants such as hydrocarbons (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Unlikely	Low	N/A
Assessment: No volatile contamination has been recorded and no significant sources have been identified.						
Recommendation: No further assessment is required.						
PL4	Methane, carbon dioxide (Made Ground)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Low	LOW
Assessment: Made Ground has been identified as a potential source of hazardous ground gas. However, monitoring has concluded that the site can be classified as CS1.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Secondary A drift Aquifer, Secondary B bedrock Aquifer). Culverted watercourse	Low Likelihood	Low	N/A
Assessment: No significant source of mobile contamination has been identified and soil and leachate analysis does not suggest a risk to controlled waters.						
Recommendation: No further assessment is required.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/Low	LOW
Assessment: The soils at the site generally meet class DS-1, and AC-1. Due to a pH value of 5.5, the soils in WS104 at 1.50 m bgl are classified as DS-1, AC-3z.						
Recommendation: Concrete should be designed in accordance with the chemical testing results.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL7	Organic contaminants such as hydrocarbons (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Low Likelihood	Low	LOW
Assessment: No elevated concentrations have been identified at the proposed pipeline depth (0.75 m – 1.35 m). Recommendation: Based on the assessment of current site conditions, it is likely that PE pipe will be suitable for the proposed development. This will need to be confirmed with a UKWIR risk assessment post-remediation.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Low Likelihood	Low	LOW
Assessment: Contamination has been encountered within shallow Made Ground which may be taken up by flora in soft landscaping. Recommendation: Installation of a clean cover system within any areas of soft landscaping to prevent plant uptake of contaminants.						

Notes:

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



5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

At the time of this report, no proposed site plans were available to E3P. It is understood that the site is to be developed for residential dwellings.

5.2. SITE PREPARATION

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW)*. This should include the following:

- ✦ Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- ✦ Removal of all hardstanding.
- ✦ Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- ✦ Buried structures and old foundations should be excavated from below the proposed development footprint with the resulting void backfilled.

5.3. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 5.1.

TABLE 5.1 SUMMARY OF ABP

GRANULAR SOILS			
Description	Depth (Range m bgl)	Relative Density	Allowable Bearing Pressure (kN/m ²)
Clayey SAND	1.00 – 1.45	Loose	60 – 91
Gravelly SAND	2.00 – 2.45	Medium Dense – Dense	228 – 375
Silty/Clayey SAND	2.00 – 5.45	Medium Dense	122 – 283



Based on the assessment of the relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying medium dense to dense sands.

Due to the presence of Made Ground underlain by loose sands at circa 1.00 m bgl, E3P anticipate that an engineered foundation solution will be required.

A programme of remediation and enabling works will be required to remove any buried obstructions.

Therefore, upon completion of these enabling works, it is likely that the most cost-effective option for the majority of the site would be to re-engineer the Made Ground using vibro stone columns (VSCs) to support a shallow strip or spread foundation. To determine if VSC is viable at the subject site, E3P has completed a Ground Improvement Design Risk Matrix that is summarised in Table 5.2.

TABLE 5.2 GROUND IMPROVEMENT DESIGN RISK MATRIX

RISK ITEM	COMMENT	PASS/FAIL
Soft clays with an undrained shear strength less than 30 kN/m ²	No clays soils have been identified on site from ground level to 5.45 m bgl.	PASS
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200 mm, either as a single layer or the sum of the thicknesses of individual layers throughout the length of the stone column	No peat or organic layers have been identified from ground level to 5.45m bgl.	PASS
Voided filled ground, e.g. old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	Made Ground is identified to a maximum depth of 1.20 m bgl with brick cobbles.	PASS – on completion of enabling works
Loose or non-engineered fill not previously subject to rising or fluctuating water levels saturation	None identified.	PASS
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified.	PASS
Fill, containing degradable material where organic material forms more than 15% of fill by volume	None identified.	PASS
Clays with a plasticity index greater than 40%	None identified.	PASS
Highly sensitive soils liable to collapse or remoulding	None identified.	PASS
Cohesive soils with trees in influencing distance	None identified.	PASS
Overall Risk Rating and Suitability for Vibratory Ground Improvement		PASS



A summary of anticipated foundations is presented in Table 5.3.

TABLE 5.3 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	2.35	N/A	MD SAND	N	Trench Fill / Engineered	DS-1 AC-1
WS102	>2.50	N/A	N/A	N	Engineered	DS-1 AC-1
WS103	2.35	N/A	D SAND	N	Trench Fill / Engineered	DS-1 AC-1
WS104	2.35	N/A	MD SAND	N	Trench Fill / Engineered	DS-1, AC-3z

5.4. GROUND FLOOR SLABS

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

In this instance, it is considered that for the majority of substructures, the underlying stratum would have in excess of 600 mm of infill and, as such, a suspended floor slab will be required.

Where a cast in-situ suspended slab is utilised with no subfloor void, appropriate compressible material (heave precautions) will be required in the construction of the substructure.

5.5. HEAVE PRECAUTIONS

Heave precautions are not likely to be required given the site is underlain by granular soils which are not susceptible to volumetric instability.

Where soils contain a higher fine particle content, consideration shall be given to the plasticity of the soils particularly where within tree influence. In the absence of plasticity testing, allowances should be made for medium volume change potential soils.

5.6. HIGHWAYS CONSTRUCTION

A programme of remediation and enabling works will be required to remediate the proposed road subgrade in accordance with the requirements of the Manual of Contract Documents for Highway Works Volume 1 Specification for Highway Works (Series 600-Earthworks) for a method compaction.

It is considered that the material can be re-engineered using method compaction to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.



5.7. DRAINAGE

The presence of substantial depths of Made Ground across some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

The natural granular drift deposits may facilitate soakaways; however permeability of the underlying ground has not yet been assessed.

If soakaway drainage is to be considered, full BRE 365 testing must be completed to inform the detailed design.

5.8. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE *Special Digest 1* (2005).

5.9. EXCAVATIONS

Site observations indicated that excavations should be feasible in the near surface with normal plant. However, due to the granularity of the natural strata and a likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

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

TABLE 5.4 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	No	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure.
Shallow Bedrock	No	Shallow bedrock has not been identified.



5.10. CONSTRUCTION ACTIVITY AND INSPECTION

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

- ✳ Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and sub-formations to foundations and pavement construction.
- ✳ Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.
- ✳ It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed upon with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to the provision of space for settling tanks or an attenuation pond.
- ✳ Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✳ The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).



5.11. GEOTECHNICAL RISK REGISTER

POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils		All	100	Elevated heavy metals and PAH have been encountered. Cover system recommended for garden/landscaped areas.
Obstructions		N/A	0	Obstructions have not been encountered. Significant obstructions not anticipated.
Artificially levelled and filled platforms		N/A	N/A	
Trench collapse		All	100	Made Ground and granular drift present beneath may be prone to collapse.
Volume change potential clay		N/A	N/A	The site is underlain by granular soils. Should cohesive soils be encountered, an assessment of the volume change potential will be required, and therefore heave precautions may be required at the site. In the absence of plasticity testing, a conservative allowance should be made for medium volume change potential soils.
Running sands		N/A	N/A	Data searches indicate low risk.
Concrete design		WS104	TBC	Due to a pH value of 5.5, the soils in WS104 at 1.50 m bgl are classified as DS-1, AC-3z.
Low-permeability ground		N/A	N/A	The natural granular drift deposits may facilitate soakaways; however permeability of the underlying ground has not yet been assessed. If soakaway drainage is to be considered, full BRE 365 testing must be completed to inform the detailed design.
Services/sensitive structures		All	30	A review of online services has identified a number of services within or in close proximity of the site boundary Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal foundation solutions		All	TBC	An engineered foundation solution is likely to be required due to the presence of Made Ground underlain by loose sands at circa 1.00 m bgl.



5.12. FURTHER WORKS

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

-  Plot-specific foundation schedule (upon receipt of the final development levels) with appropriate enabling earthworks strategy.
-  Basic remediation statement for cover system.

END OF REPORT



APPENDIX I

LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

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



Domett Street

Phase II Geoenvironmental Site Assessment
August 2024

MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection



APPENDIX III

DRAWINGS

DRAWING 16-716-001 – SITE LOCATION PLAN





Historical Features

Former Buildings

Notes:				
P1	REVB	19.10.2023	OW	NS
P1	REVA	17.10.2023	OW	JS
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job Title:

Domett Street, Manchester

Job No:

16-716

Drawing No:

003

Date:

19.10.2023

Scale:

1:1000 @ A3



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

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



Site Features MOT Gravel Surfaces Storage Areas Containers 6 KV LV Electric BT						Jigsaw Homes	16-716	18.09.2023	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk	
							Drawing No:	Scale:		
						004	1:1000 @ A3			
						Domett Street, Manchester	Drawing Title: Site Features Plan (During First Phase of Investigation)			The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.
P1	REVA	18.09.2023	OW	LW						
Phase	Issue	Date	Drawn	Checked						



Location Symbols

WS101

Approximate Window Sample Probehole Location

WS103(MW)

Approximate Window Sample Probehole Location with Install

TP201

Approximate Trial Pit Location

Notes:

P1	REVB	27.06.2024	OW	JW
P1	REVA	13.09.2023	OW	LW
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job No:

16-716

Drawing No:

005

Date:

27.06.2024

Scale:

NTS @ A3

Job Title:

Domett Street, Manchester

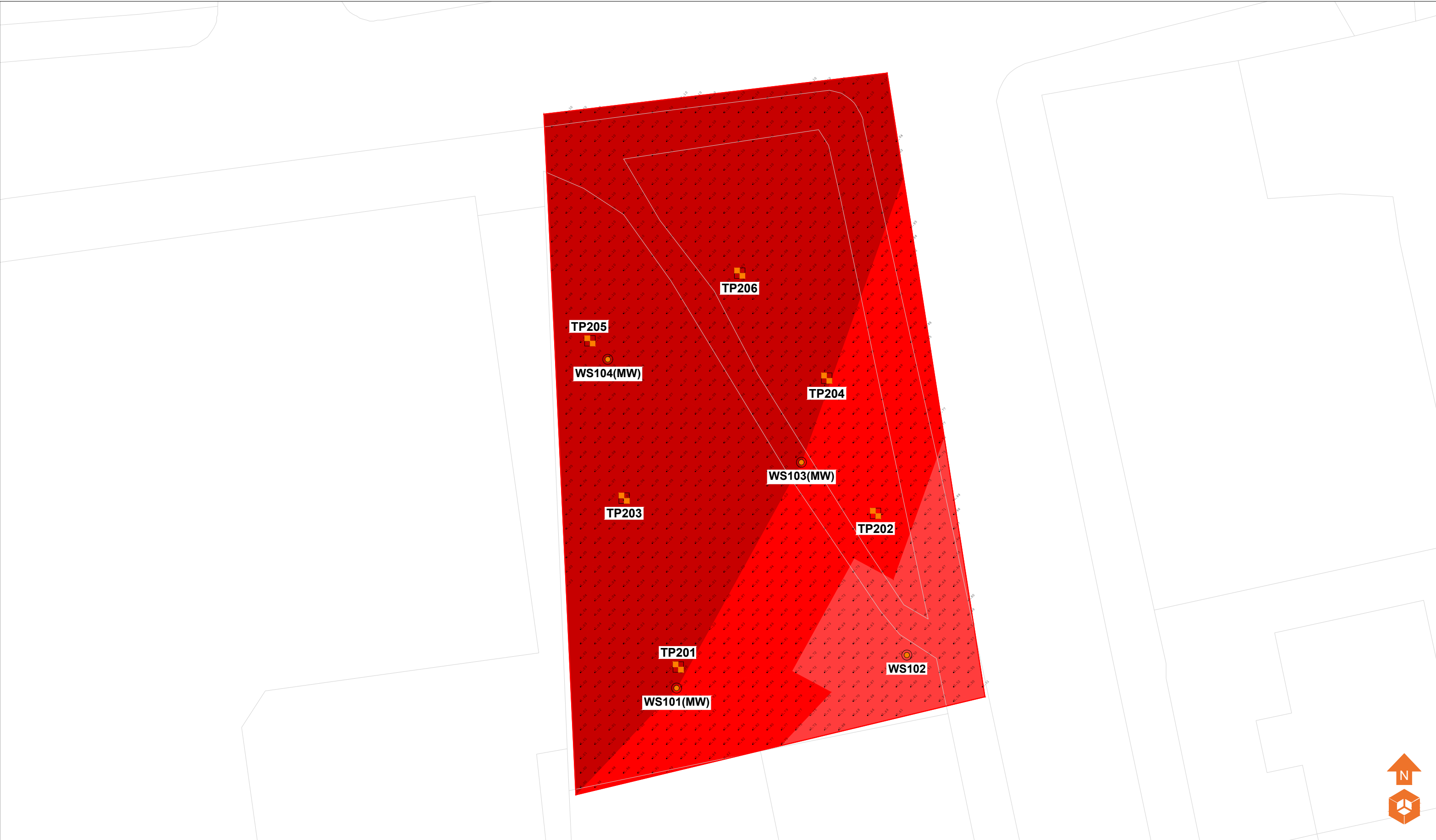
Drawing Title:

Exploratory Hole Location Plan

e3p

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

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



Location Symbols

Approximate Window Sample Probehole Location

Approximate Window Sample Probehole Location with Install

Made Ground Depth (m)

Depth of Made Ground 0.00 - 0.49m

Depth of Made Ground 0.50 - 0.74m

Depth of Made Ground 0.75m

Notes:

P1	REVB	01.08.2024	OW	JW
P1	REVA	18.09.2023	OW	LW
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job No:

16-716

Drawing No:

006

Date:

01.08.2024

Scale:

NTS @ A3

Job Title:

Domett Street, Manchester

Drawing Title:

Depth of Made Ground Plan

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

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

N

S

Made Ground

Glaciofluvial Sheet Deposits - Sand and Gravel

Manchester Marls Formation - Mudstone

7

1

7

1

Geology Key

Made Ground

Glaciofluvial Sheet Deposits

Manchester Marls Formation

Sources

① Non Volatile PAHs, (Made Ground)

⑦ Phytotoxic Contaminants (Made Ground)

Pathways

Dermal Contact / Ingestion

Plant Uptake

Receptors

① Future End Users

⑦ Flora

Notes:

P1	REVC	01.08.2024	OW	JC
P1	REVB	19.10.2023	OW	NS
P1	REVA	17.10.2023	OW	JS
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Domett Street, Manchester

Job No:

16-716

Drawing No:

010

Date:

01.08.2024

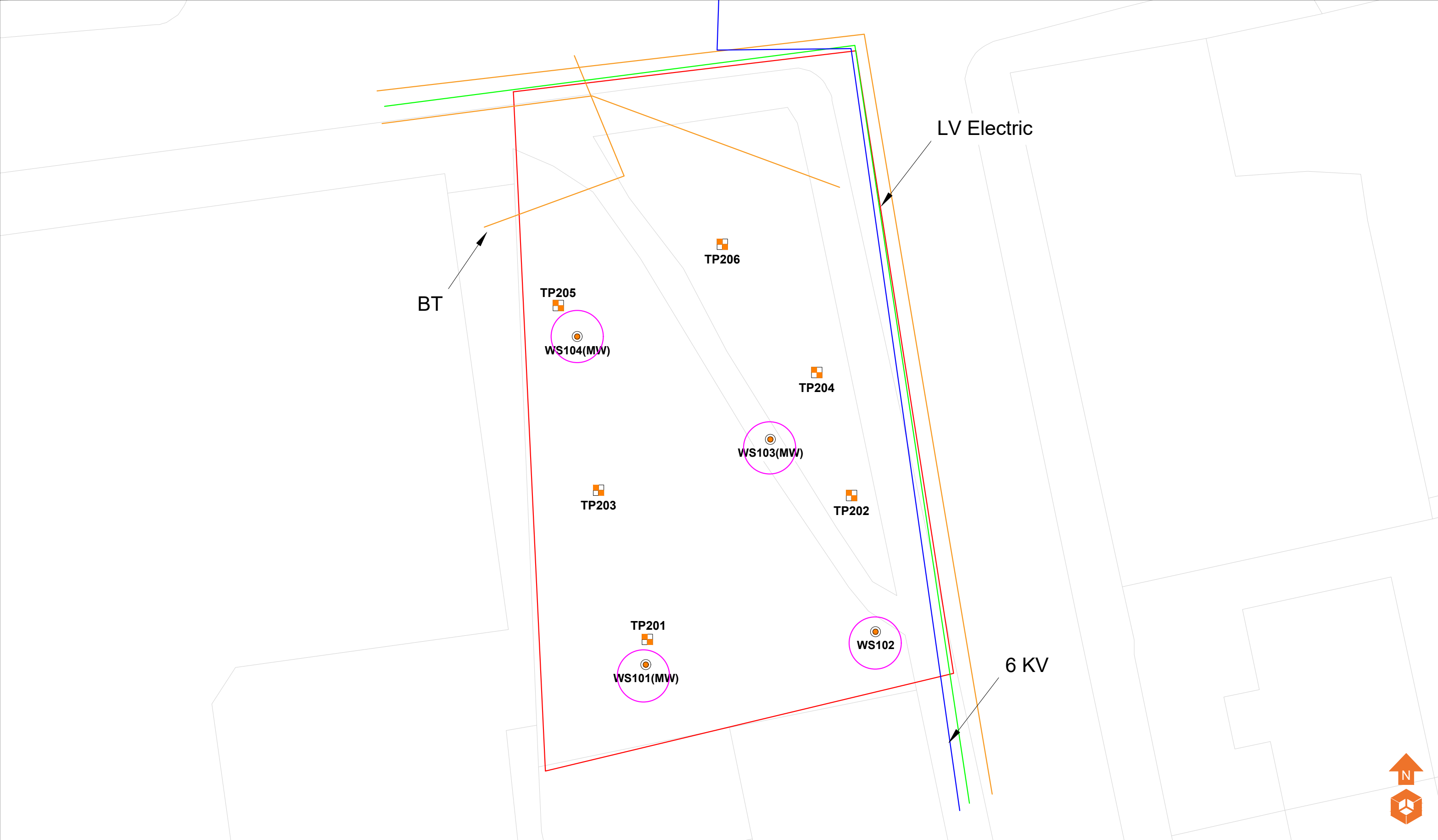
Scale:

NTS

e3p

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

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



Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install

Development Constraints

- 6 KV
- LV Electric
- BT
- Loose Sands

Notes:				
P1	REVB	05.08.2024	JS	JS
P1	REVA	17.10.2023	OW	JS
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job Title:

Domett Street, Manchester

Job No:

16-716

Drawing No:

015

Date:

17.10.2023

Scale:

1:1000 @ A3

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

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



Location Symbols

Approximate Window Sample Probehole Location

Approximate Window Sample Probehole Location with Install

Human Health Exceedances

Non-Volatile PAH

Heavy Metals

Notes:

P1	REVC	01.08.2024	OW	JS
P1	REVB	17.10.2023	OW	JS
P1	REVA	06.10.2023	EB	JW
Phase	Issue	Date	Drawn	Checked

Client:

Jigsaw Homes

Job Title:

Domett Street, Manchester

Job No:

16-716

Drawing No:

018

Job Title:

Contamination Issues Plan

Date:

01.08.2024

Scale:

NTS@ A3

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

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

APPENDIX IV PHOTOGRAPHS

PLATE 1 STORAGE OF CONSTRUCTION MATERIALS



PLATE 2 WS101 ARISINGS



PLATE 3 WS102 ARISINGS



PLATE 4 WS104 MONITORING WELL LOCATION



PLATE 5 TP201 PIT AND ARISINGS



PLATE 6 TP204 PIT AND ARISINGS



APPENDIX V

E3P EXPLORATORY HOLE

LOGS

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Domett Street

Project No.
16716

Co-ords: 385439.00 - 402906.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Jigsaw Homes

Dates: 06/09/2023 -

Logged By
J.Waugh

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.20			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular of limestone (MOT).	
		0.90	ES + L D ES	N=6 (1,1/1,1,2,2)	1.00			MADE GROUND: Dark brown clayey very gravelly fine to coarse sand with occasional cobbles. Gravel is fine to coarse angular to sub-angular of sandstone with brick and clinker fragments. Cobbles are angular of sandstone and brick.	1
		1.00			1.30			Loose brown very clayey fine to coarse SAND.	
		1.00 - 1.45						Loose orangish brown fine to coarse SAND. (Medium dense at 2.00m bgl).	
		1.20							
		2.00		N=31 (5,5/6,9,6,10)					2
		2.50	ES						
		3.00		N=14 (4,4/4,4,3,3)	2.80			Medium dense brown clayey fine to coarse SAND.	3
					3.70				
		4.00		N=19 (3,3/4,5,4,6)				Medium dense orangish brown fine to coarse SAND.	4
		5.00		N=19 (2,3/3,4,5,7)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Window sample borehole completed at 5.45m bgl.
2. Groundwater not encountered.
3. Monitoring standpipe installed to 1.00m bgl. (Response Zone: 0.50m - 1.00m bgl)

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Domett Street

Project No.
16716

Co-ords: 385449.00 - 402907.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Jigsaw Homes

Dates: 06/09/2023 -

Logged By
J.Waugh

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES + L		0.20			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular of limestone (MOT).	1
					0.50			MADE GROUND: Dark brown clayey very gravelly fine to coarse sand with occasional cobbles. Gravel is fine to coarse angular to sub-angular of sandstone with brick and clinker fragments. Cobbles are angular of sandstone and brick.	
		0.90	ES	N=9 (1,2/2,2,2,3)	1.10			Brown very clayey fine to coarse SAND.	
		1.00						Loose orangish brown fine to coarse SAND.	
		1.50	ES		1.60			Medium dense brown to light grey gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded of sandstone and limestone.	
		2.00		N=25 (4,5/5,6,7,7)					
		2.50	ES		2.60			Loose brown slightly clayey very silty fine to coarse SAND.	
		2.70	D						
		3.00		N=8 (2,2/2,2,2,2)	3.40			Medium dense greyish brown mottled brown silty fine to coarse SAND.	
		4.00		N=22 (5,5/5,5,6,6)					4
		5.00		N=29 (5,6/7,7,7,8)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Window sample borehole completed at 5.45m bgl.
2. Groundwater not encountered.

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Domett Street

Project No.
16716

Co-ords: 385444.00 - 402916.00

Hole Type
WS

Location: Manchester

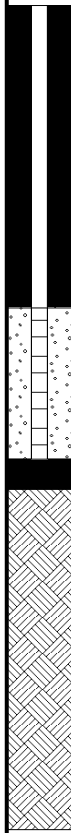
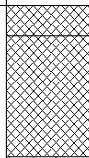
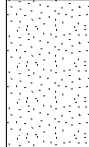
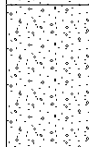
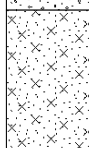
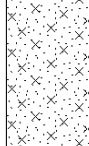
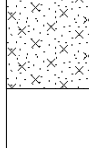
Level:

Scale
1:50

Client: Jigsaw Homes

Dates: 06/09/2023 -

Logged By
J.Waugh

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20 - 1.00	B	N=7 (1,1/1,1,2,3)	0.20			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular of limestone (MOT). MADE GROUND: Dark brown clayey very gravelly fine to coarse sand with occasional cobbles. Gravel is fine to coarse angular to sub-angular of sandstone with brick and clinker fragments. Cobbles are angular of sandstone and brick. Loose orangish brown fine to coarse SAND.	1
		0.50	ES + L						
		1.00	B		1.00				
		1.00 - 2.00	B						
		1.50	ES	N=41 (7,7/8,11,11,11)				Dense brown to light grey gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded of sandstone and limestone.	2
		2.00	B		2.00				
		2.00 - 3.00	B						
		2.50	ES						
		3.00	B	N=14 (3,4/4,4,3,3)	3.00			Medium dense brown mottled greyish brown silty fine to coarse SAND.	3
		3.00 - 5.00	B						
		3.50	ES						
		4.00							
				N=20 (4,5/5,5,5,5)					4
		5.00		N=18 (3,3/3,4,5,6)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Window sample borehole completed at 5.45m bgl.
2. Groundwater not encountered.
3. Monitoring standpipe installed to 3.00m bgl. (Response Zone: 2.00m - 3.00m bgl)

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Domett Street

Project No.
16716

Co-ords: 385436.00 - 402921.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Jigsaw Homes

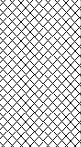
Dates: 06/09/2023 -

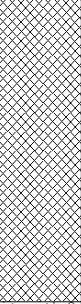
Logged By
J.Waugh

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20			MADE GROUND: Light grey gravel. Gravel is fine to coarse angular of limestone (MOT).	1
		0.50	ES + L					MADE GROUND: Dark brown clayey very gravelly fine to coarse sand with occasional cobbles. Gravel is fine to coarse angular to sub-angular of sandstone with brick and clinker fragments. Cobbles are angular of sandstone and brick.	
		1.00		N=8 (1,1/1,2,2,3)	1.10			Loose orangish brown fine to coarse SAND.	2
		1.10 - 2.00	B						
		1.50	ES		2.00			Medium dense brown to light grey gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded of sandstone and limestone.	3
		2.00		N=30 (5,5/5,8,8,9)					
		2.00 - 3.00	B		3.20				4
		2.50	ES						
		3.00		N=22 (4,4/5,5,5,7)					5
		3.40 - 5.00	B ES					Medium dense brown mottled greyish brown silty fine to coarse SAND.	
		3.50							6
		4.00		N=28 (4,4/5,6,7,10)					
		5.00		N=27 (6,4/6,6,7,8)	5.45				7
									
									8
									
									9
									
									10
									
									11
									
									12
									
									13
									
									14
									
									15
									
									16
									

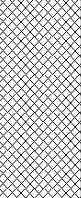
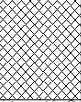
Remarks

1. Window sample borehole completed at 5.45m bgl.
2. Groundwater not encountered.
3. Monitoring standpipe installed to 2.00m bgl. (Response Zone: 1.50m - 2.00m bgl)

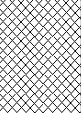
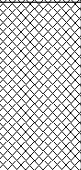
				Trial Pit Log			TrialPit No TP201 Sheet 1 of 1	
Project Name: Domett Street				Project No. 16716		Co-ords: 385438.00 - 402907.00 Level:		Date 26/06/2024
Location: Manchester						Dimensions (m): 2.00 0.70		Scale 1:30
Client: Jigsaw Homes						Depth 1.90		Logged J.Waugh
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.60	ES		0.60 0.70			MADE GROUND: Dark brown clayey silty very gravelly sand with rootlets and frequent cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick, concrete and metal fragments. Cobbles are angular brick and concrete.	
							MADE GROUND: Black sandy gravel. Gravel is fine to coarse angular to subrounded of ash, brick and clinker fragments.	
	1.20	ES		1.10			MADE GROUND: Greyish brown silty sandy gravel with frequent cobbles. Gravel is fine to coarse angular to subangular of sandstone with brick and concrete fragments.	
	1.50	B		1.90			Light orangish brown slightly gravelly silty fine to coarse SAND. Gravel is fine to medium angular to subrounded of sandstone.	
							End of Pit at 1.90m	
Remarks: 1. Complete. 2. Approximate W3W Location: ///bump.claims.goes Stability: STABLE								
								

				Trial Pit Log			TrialPit No TP202 Sheet 1 of 1		
Project Name: Domett Street				Project No. 16716		Co-ords: 385447.00 - 402914.00 Level:		Date 26/06/2024	
Location: Manchester						Dimensions (m): 0.70 2.00		Scale 1:30	
Client: Jigsaw Homes						Depth 1.70		Logged J.Waugh	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50	B		1.20			MADE GROUND: Dark brown clayey silty very gravelly sand with rootlets and frequent cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick, concrete and metal fragments. Cobbles are angular brick and concrete.		
	0.80	ES					Light orangish brown slightly gravelly silty fine to coarse SAND. Gravel is fine to medium angular to subrounded of sandstone.		
				1.70			End of Pit at 1.70m		
									4
Remarks: 1. Complete. 2. Approximate W3W Location: ///glory.fleet.bolt									
Stability: STABLE									



				Trial Pit Log			TrialPit No TP204 Sheet 1 of 1		
Project Name: Domett Street				Project No. 16716		Co-ords: 385445.00 - 402922.00 Level:		Date 26/06/2024	
Location: Manchester						Dimensions (m): 0.70 2.00		Scale 1:30	
Client: Jigsaw Homes						Depth 1.70		Logged J.Waugh	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.90 1.00	ES B		0.80 1.20 1.70			MADE GROUND: Dark brown clayey silty very gravelly sand with rootlets and frequent cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick, concrete and metal fragments. Cobbles are angular brick and concrete.		
							MADE GROUND: Dark brown silty gravelly very clayey sand with occasional cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick fragments. Cobbles are angular brick and concrete.		
							Light orangish brown slightly gravelly silty fine to coarse SAND. Gravel is fine to medium angular to subrounded of sandstone.		
							End of Pit at 1.70m		
Remarks: 1. Complete. 2. Approximate W3W Location: ///crash.wishes.full									
Stability: STABLE									



				Trial Pit Log			TrialPit No TP205 Sheet 1 of 1		
Project Name: Domett Street				Project No. 16716		Co-ords: 385436.00 - 402923.00 Level:		Date 26/06/2024	
Location: Manchester						Dimensions (m): 0.70 2.00		Scale 1:30	
Client: Jigsaw Homes						Depth 1.80		Logged J.Waugh	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	1.10 1.20	ES B		0.50 1.20 1.80		  	MADE GROUND: Dark brown clayey silty very gravelly sand with rootlets and frequent cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick, concrete and metal fragments. Cobbles are angular brick and concrete.		
							MADE GROUND: Dark brown silty gravelly very clayey sand with occasional cobbles. Gravel is fine to coarse angular to subrounded of sandstone with brick fragments. Cobbles are angular brick and concrete.		
							Light orangish brown slightly gravelly silty fine to coarse SAND. Gravel is fine to medium angular to subrounded of sandstone.		
							End of Pit at 1.80m		
1 2 3 4									
Remarks: 1. Complete. 2. Approximate W3W Location: ///looked.asset.reds									
Stability: STABLE									

APPENDIX VI

CHEMICAL TESTING

RESULTS



Jessica Sheridan

e3p
Taylor Road
Urmston
Manchester
M41 7JQ

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

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 23-55272

Project / Site name:	Domett Street	Samples received on:	07/09/2023
Your job number:	16-716	Samples instructed on/ Analysis started on:	07/09/2023
Your order number:	006075	Analysis completed by:	13/09/2023
Report Issue Number:	1	Report issued on:	13/09/2023
Samples Analysed:	1 leachate sample - 4 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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

Analytical Report Number: 23-55272

Project / Site name: Domett Street

Your Order No: 006075

Lab Sample Number				2804514	2804515	2804516	2804517
Sample Reference				WS101	WS102	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.90	0.90	0.50	1.50
Date Sampled				06/09/2023	06/09/2023	06/09/2023	06/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	16	14	9.7	6.4
Total mass of sample received	kg	0.001	NONE	0.7	0.2	0.8	0.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	MLO	MLO	MLO	MLO

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6	8.2	5.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	610	410	450	440
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.071	0.052	0.016	0.045
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	140	100	31	89
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	71.1	52.2	15.7	44.7
Sulphide	mg/kg	1	MCERTS	15	< 1.0	9.8	1
Total Sulphur	mg/kg	50	MCERTS	640	170	740	250
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.3	1	3.7	0.6

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.22	0.06	1.8	0.11
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.21	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.06	< 0.05	2.1	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.05	< 0.05	1.3	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.55	< 0.05	3.7	0.07
Anthracene	mg/kg	0.05	MCERTS	0.1	< 0.05	0.98	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.1	0.05	6.6	0.05
Pyrene	mg/kg	0.05	MCERTS	1	0.06	6.1	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.54	< 0.05	3.4	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.55	< 0.05	3.4	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.65	< 0.05	4.1	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.2	< 0.05	2.2	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.49	< 0.05	3.6	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.3	< 0.05	2.1	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.08	< 0.05	0.55	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.32	< 0.05	2.7	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.22	< 0.80	44.7	< 0.80
-----------------------------	-------	-----	-----------	------	--------	------	--------

Analytical Report Number: 23-55272

Project / Site name: Domett Street

Your Order No: 006075

Lab Sample Number				2804514	2804515	2804516	2804517
Sample Reference				WS101	WS102	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.90	0.90	0.50	1.50
Date Sampled				06/09/2023	06/09/2023	06/09/2023	06/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	28	6.5	9.2	7.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	9.4	< 0.2	0.8	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	14	15	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	97	15	41	21
Lead (aqua regia extractable)	mg/kg	1	MCERTS	200	17	170	11
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	11	27	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	260	30	150	45

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	8.1	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	< 10	42	< 10
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	35	14	570	< 10
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	460	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	50	16	1100	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected



4041



Analytical Report Number: 23-55272

Project / Site name: Domett Street

Your Order No: 006075

Lab Sample Number				2804518
Sample Reference				WS103
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				06/09/2023
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.9
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	2.5
----------------------------	------	---	-----------	-----

Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
-------------------	------	-----	------	-------

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	5.9
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.1
Copper (dissolved)	µg/l	0.7	ISO 17025	23
Lead (dissolved)	µg/l	1	ISO 17025	3.4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	9.6

Monoaromatics & Oxygenates

Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10



4041



Analytical Report Number: 23-55272

Project / Site name: Domett Street

Your Order No: 006075

Lab Sample Number				2804518
Sample Reference				WS103
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				06/09/2023
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status	

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_1D_TOTAL_MS	µg/l	10	NONE	< 10
--	------	----	------	------

TPH-CWG - Aliphatic ## >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic ## >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic ## >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_MS	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_MS	µg/l	10	NONE	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_MS	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_MS	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-55272

Project / Site name: Domett Street

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2804514	WS101	None Supplied	0.9	Brown sandy loam with gravel and brick.
2804515	WS102	None Supplied	0.9	Brown clay and sand with gravel.
2804516	WS103	None Supplied	0.5	Brown sandy loam with gravel and vegetation.
2804517	WS104	None Supplied	1.5	Brown sandy loam with vegetation.

Analytical Report Number : 23-55272

Project / Site name: Domett Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate (automated)	Determination of pH in leachate by electrometric measurement.	In house method.	L099B	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

Analytical Report Number : 23-55272

Project / Site name: Domett Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

Analytical Report Number : 23-55272

Project / Site name: Domett Street

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.



Final Report

Report No.: 24-20590-1

Initial Date of Issue: 04-Jul-2024

Re-Issue Details:

Client E3P

Client Address: Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

Contact(s):



Project 16-716 Domett Street

Quotation No.: Q23-31421

Date Received: 28-Jun-2024

Order No.: 008612

Date Instructed: 28-Jun-2024

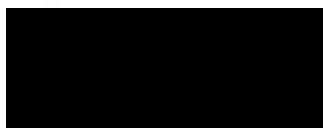
No. of Samples: 4

Turnaround (Wkdays): 5

Results Due: 04-Jul-2024

Date Approved: 04-Jul-2024

Approved By:



Details: David Smith, Technical Director

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

Results - Soil

Project: 16-716 Domett Street

Client: E3P		Chemtest Job No.:		24-20590	24-20590	24-20590	24-20590
Quotation No.: Q23-31421		Chemtest Sample ID.:		1827736	1827737	1827738	1827739
Order No.: 008612		Client Sample Ref.:		TP201	TP203	TP205	TP206
		Client Sample ID.:		TP201	TP203	TP205	TP206
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.60	0.90	1.10	1.20
		Date Sampled:		26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024
		Time Sampled:		12:00	12:00	12:00	12:00
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	HWOL Code	Accred.	SOP	Units	LOD		
ACM Type		U	2192		N/A	-	-
Asbestos Identification		U	2192		N/A	No Asbestos Detected	No Asbestos Detected
Moisture		N	2030	%	0.020	16	11
Soil Colour		N	2040		N/A	Brown	Brown
Other Material		N	2040		N/A	Stones and Roots	Stones
Soil Texture		N	2040		N/A	Loam	Sand
pH at 20C		M	2010		4.0	8.6	8.7
Sulphate (2:1 Water Soluble) as SO4		M	2120	g/l	0.010	0.034	< 0.010
Total Sulphur		U	2175	%	0.010	0.25	< 0.010
Cyanide (Total)		M	2300	mg/kg	0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)		N	2325	mg/kg	0.50	7.0	7.4
Sulphate (Total)		U	2430	%	0.010	0.17	< 0.010
Arsenic		M	2455	mg/kg	0.5	110	3.9
Cadmium		M	2455	mg/kg	0.10	0.11	< 0.10
Chromium		M	2455	mg/kg	0.5	21	8.7
Copper		M	2455	mg/kg	0.50	150	6.1
Mercury		M	2455	mg/kg	0.05	0.58	< 0.05
Nickel		M	2455	mg/kg	0.50	55	8.8
Lead		M	2455	mg/kg	0.50	270	6.2
Selenium		M	2455	mg/kg	0.25	1.6	< 0.25
Zinc		M	2455	mg/kg	0.50	200	26
Chromium (Hexavalent)		N	2490	mg/kg	0.50	< 0.50	< 0.50
Organic Matter		M	2625	%	0.40	29	6.0
Total Organic Carbon		M	2625	%	0.20	17	3.5
TPH >C6-C8	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C8-C10	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C10-C12	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C12-C16	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C16-C21	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C21-C25	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C25-C35	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
TPH >C35-C40	EH_1D_Total	N	2670	mg/kg	1.0	< 1.0	< 1.0
Total TPH >C6-C40	EH_1D_Total	M	2670	mg/kg	10	< 10	< 10
Naphthalene		M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene		N	2800	mg/kg	0.10	< 0.10	< 0.10

Results - Soil

Project: 16-716 Domett Street

Client: E3P		Chemtest Job No.:		24-20590	24-20590	24-20590	24-20590
Quotation No.: Q23-31421		Chemtest Sample ID.:		1827736	1827737	1827738	1827739
Order No.: 008612		Client Sample Ref.:		TP201	TP203	TP205	TP206
		Client Sample ID.:		TP201	TP203	TP205	TP206
		Sample Type:		SOIL	SOIL	SOIL	SOIL
		Top Depth (m):		0.60	0.90	1.10	1.20
		Date Sampled:		26-Jun-2024	26-Jun-2024	26-Jun-2024	26-Jun-2024
		Time Sampled:		12:00	12:00	12:00	12:00
		Asbestos Lab:		NEW-ASB	NEW-ASB	NEW-ASB	
Determinand	HWOL Code	Accred.	SOP	Units	LOD		
Acenaphthene		M	2800	mg/kg	0.10	< 0.10	< 0.10
Fluorene		M	2800	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene		M	2800	mg/kg	0.10	0.73	0.28
Anthracene		M	2800	mg/kg	0.10	0.13	< 0.10
Fluoranthene		M	2800	mg/kg	0.10	1.2	0.57
Pyrene		M	2800	mg/kg	0.10	1.0	0.50
Benzo[a]anthracene		M	2800	mg/kg	0.10	0.55	< 0.10
Chrysene		M	2800	mg/kg	0.10	0.55	< 0.10
Benzo[b]fluoranthene		M	2800	mg/kg	0.10	0.81	< 0.10
Benzo[k]fluoranthene		M	2800	mg/kg	0.10	0.29	< 0.10
Benzo[a]pyrene		M	2800	mg/kg	0.10	0.68	< 0.10
Indeno(1,2,3-c,d)Pyrene		M	2800	mg/kg	0.10	0.50	< 0.10
Dibenz(a,h)Anthracene		N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		M	2800	mg/kg	0.10	0.47	< 0.10
Total Of 16 PAH's		N	2800	mg/kg	2.0	6.9	< 2.0
Total Phenols		M	2920	mg/kg	0.10	< 0.10	< 0.10

Test Methods

SOP	Title	Parameters included	Method summary	Water Accred.
2010	pH Value of Soils	pH at 20°C	pH Meter	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <30°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N-dimethyl-p-phenylenediamine.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2455	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazine.	
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID	
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS	
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.	

Report Information

Key

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

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

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

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

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

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

All results are expressed on a dry weight basis.

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

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

All Asbestos testing is performed at the indicated laboratory .

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

Sample Deviation Codes

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage.

Water Sample Category Key for Accreditation

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

Report Information

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

Clean Up Codes

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

HWOL Acronym System

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

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

APPENDIX VII

ORIGIN OF TIER 2 GENERIC ASSESSMENT CRITERIA

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene ⁽ⁱⁱⁱ⁾	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C₅-C₆ (aliphatic)	
TPH C₆-C₈ (aliphatic)	
TPH C₈-C₁₀ (aliphatic)	
TPH C₁₀-C₁₂ (aliphatic)	
TPH C₁₂-C₁₆ (aromatic)	
TPH C₁₆-C₂₁ (aromatic)	
TPH C₂₁-C₃₅ (aromatic)	



APPENDIX VIII

GEOTECHNICAL TESTING

RESULTS

TEST REPORT

Client e3p

Address Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

Contract Domett Street,
Manchester

Job Number MRN 4588/111

Date of Issue 03 October 2023

Page 1 of 3

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



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

Also at: London: 020 8523 1999

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

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

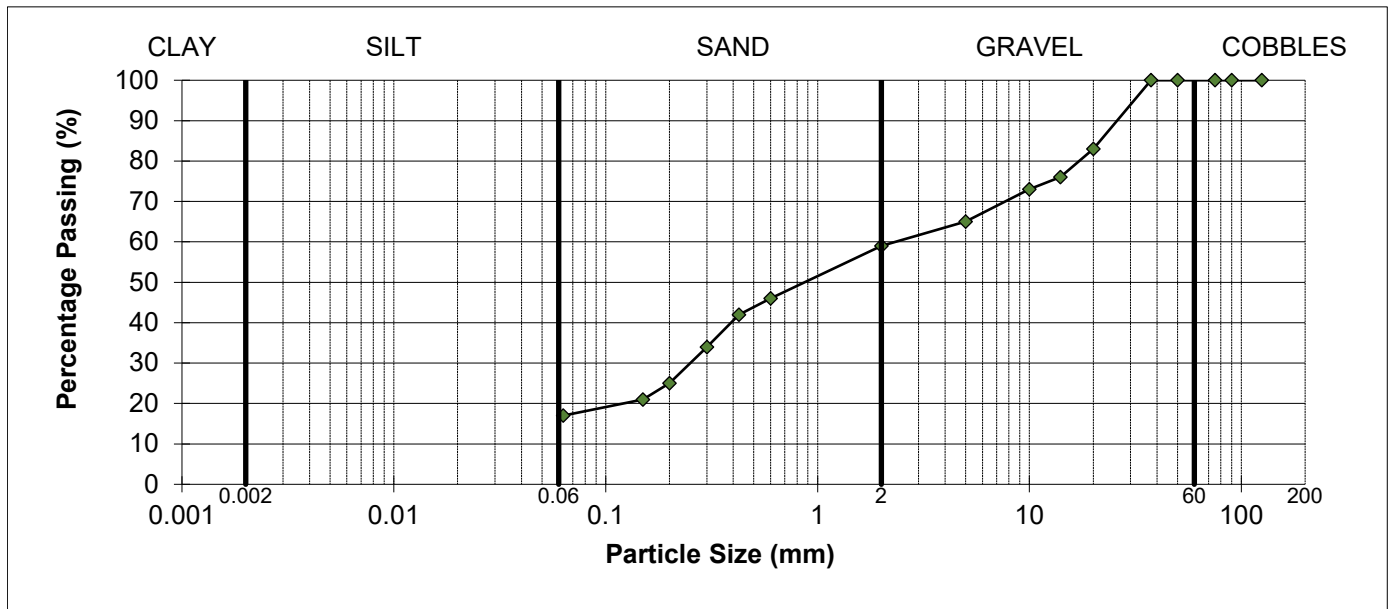
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	e3p
SITE	Domett Street, Manchester
JOB NUMBER	MRN 4588/111

SAMPLE LABEL	WS104 B 1.10	DATE SAMPLED	08-Sep-23
LAB SAMPLE No	131074	DATE RECEIVED	08-Sep-23
DATE TESTED	12-Sep-23	SAMPLED BY	Client

MATERIAL	Orange brown silty SAND & GRAVEL
ADVISED SOURCE	Not advised

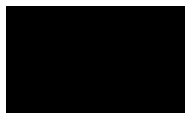
Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		5	65	
90	100		2	59	
75	100		0.6	46	
50	100		0.425	42	
37.5	100		0.3	34	
20	83		0.2	25	
14	76		0.15	21	
10	73		0.063	17	



REMARKS

As received water content = 9.3%

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

03-Oct-23

MURRAY RIX

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



TEST CERTIFICATE

DRY DENSITY/WATER CONTENT RELATIONSHIP 2.5kg RAMMER

BS 1377-2:2022 Cl.11

PARTICLE DENSITY METHOD BS 1377-2:2022 Cl.9.2

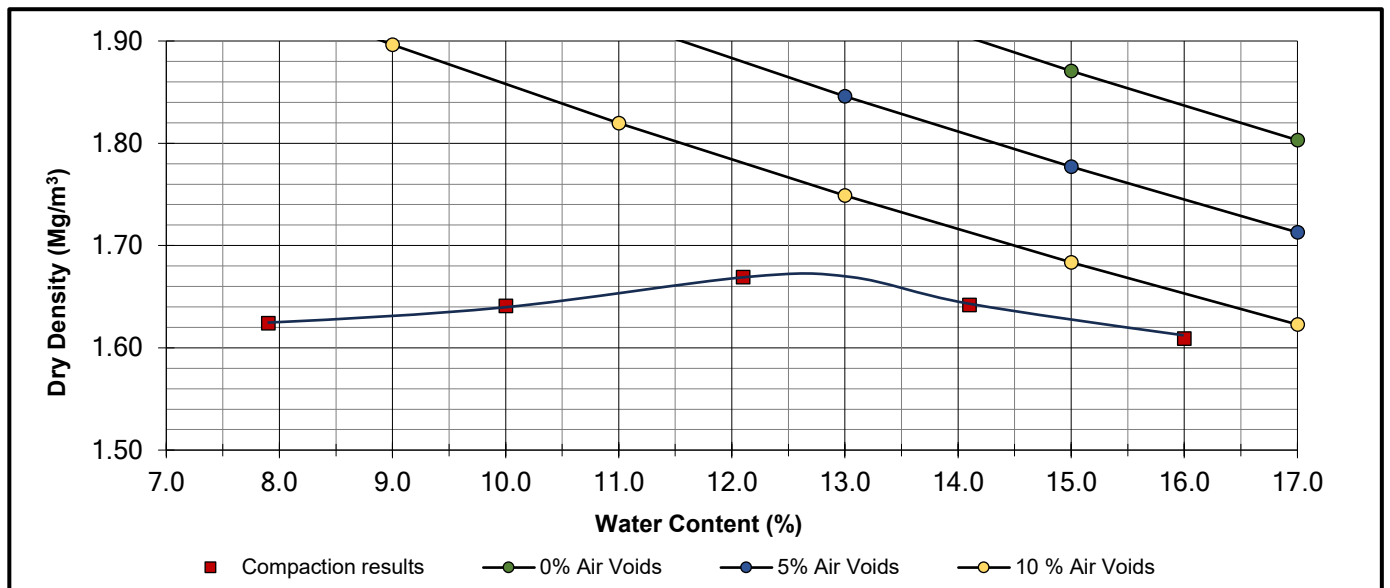
CLIENT	e3p
SITE	Domett Street, Manchester
JOB NUMBER	MRN 4588/111

SAMPLE LABEL	WS103 B 1.00	DATE SAMPLED	08-Sep-23
SAMPLE NUMBER	131073	DATE RECEIVED	08-Sep-23
DATE TESTED	12-Sep-23	SAMPLED BY	Client

MATERIAL	Orange brown silty SAND
ADVISED SOURCE	Not advised
PRE TREATMENT	Air Dried / Separate Batches

RETAINED 37.5mm	0 %	GRADING ZONE	Zone 2
RETAINED 20mm	4 %	PARTICLE DENSITY	2.60 Mg/m ³ (Assumed)

POINT NUMBER	WATER CONTENT (%)	DRY DENSITY (Mg/m ³)
1	7.9	1.624
2	10.0	1.641
3	12.1	1.669
4	14.1	1.642
5	16.0	1.609



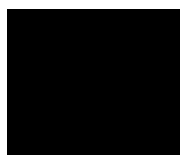
OPTIMUM WATER CONTENT	13	(%)
MAXIMUM DRY DENSITY	1.67	(Mg/m ³)

REMARKS

As received water content = 11.1%

NAME O.P. Davies BA (Hons)
(Laboratory Manager)

SIGNED



DATE 03-Oct-23

TEST REPORT

Client e3p

Address Taylor Road
Trafford Park
Urmston
Manchester
M41 7JQ

Contract 16-716 -
Domett Street

Job Number MRN 24005/146

Date of Issue 29 July 2024

Page 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

- 1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.
- 2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.
- 3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.
- 4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.
- 5 The results included within the report are representative of the samples submitted for analysis.
- 6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.



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

Also at: London: 020 8523 1999

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

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

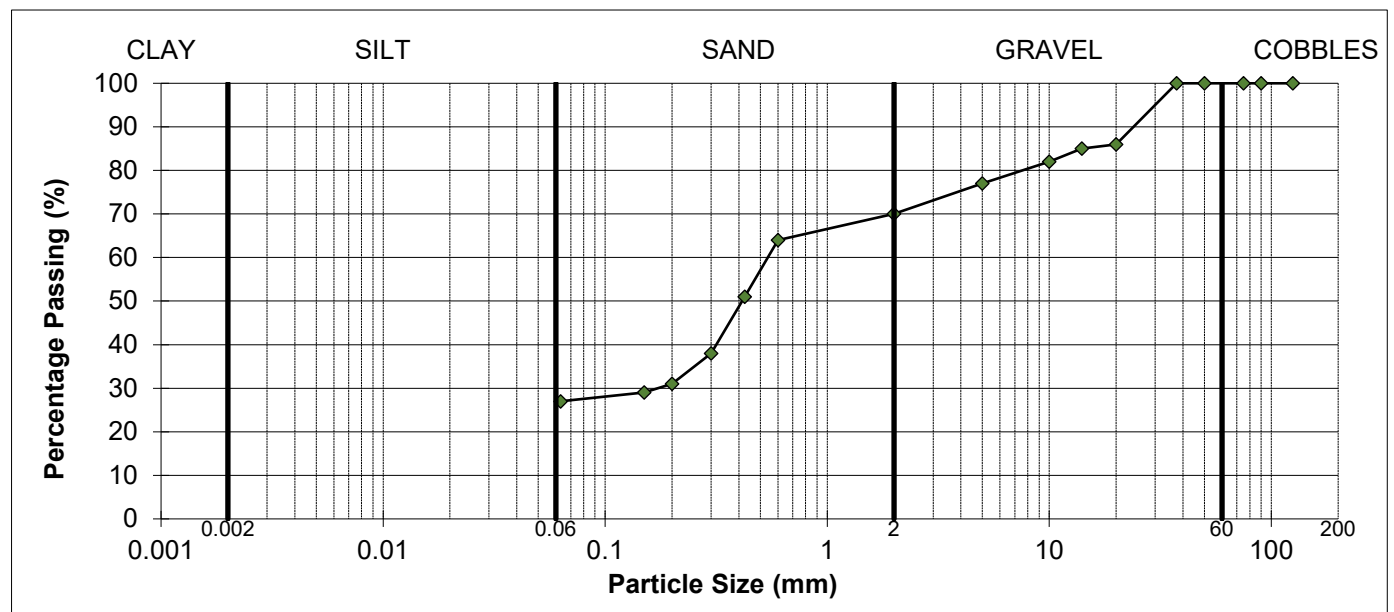
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	16-716 - Domett Street
JOB NUMBER	MRN 24005/146

SAMPLE LABEL	TP202 0.5	DATE SAMPLED	26-Jun-24
LAB SAMPLE No	507901	DATE RECEIVED	03-Jul-24
DATE TESTED	04-Jul-24	SAMPLED BY	Client

MATERIAL	Grey brown very gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	77	
90	100		2	70	15-80
75	100		0.6	64	
50	100		0.425	51	
37.5	100		0.3	38	
20	86		0.2	31	
14	85		0.15	29	
10	82		0.063	27	15-80



SOIL FRACTIONS			
COBBLES	0%	SAND	43%
GRAVEL	30%	SILT / CLAY	27%
As received water content		16.9%	

REMARKS

Sample complies with the advised grading specification for a 2C material (SHW 2016)

SIGNED

NAME

O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

29-Jul-24

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

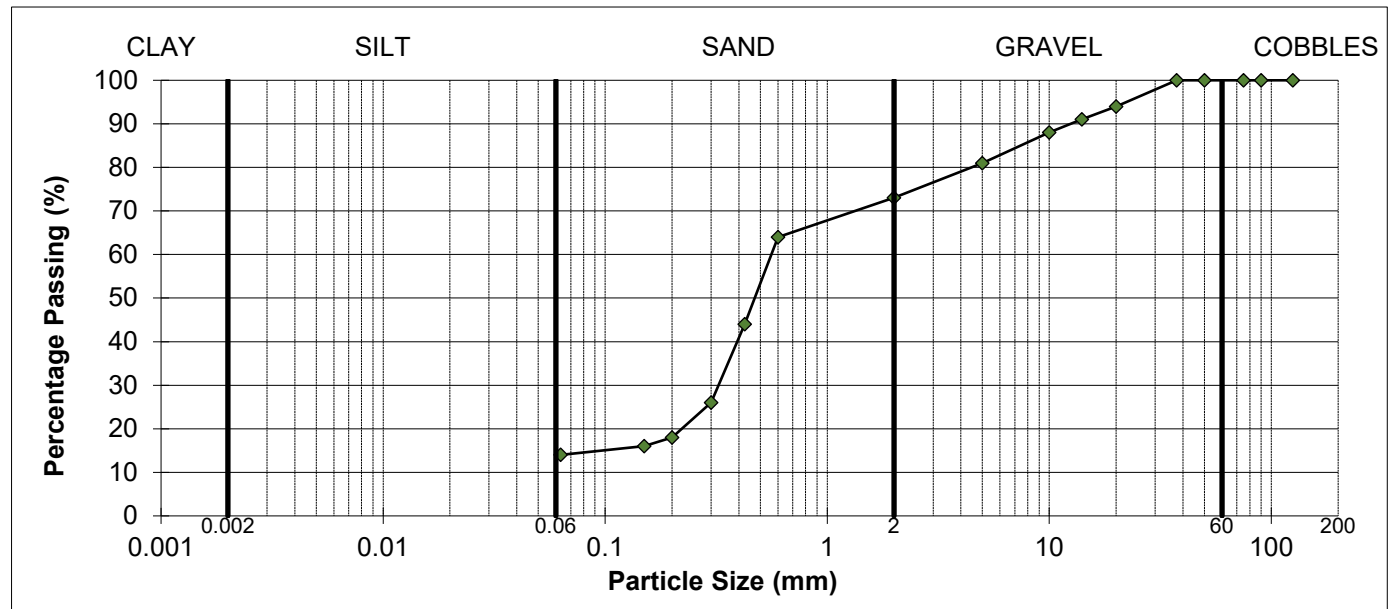
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	16-716 - Domett Street
JOB NUMBER	MRN 24005/146

SAMPLE LABEL	TP203 2.0	DATE SAMPLED	26-Jun-24
LAB SAMPLE No	507902	DATE RECEIVED	03-Jul-24
DATE TESTED	04-Jul-24	SAMPLED BY	Client

MATERIAL	Grey brown very gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	81	
90	100		2	73	
75	100		0.6	64	
50	100		0.425	44	
37.5	100		0.3	26	
20	94		0.2	18	
14	91		0.15	16	
10	88		0.063	14	<15



SOIL FRACTIONS			
COBBLES	0%	SAND	59%
GRAVEL	27%	SILT / CLAY	14%
As received water content		8.8%	

REMARKS

Sample complies with the advised grading specification for a 1B material (SHW 2016), Uniformity coefficient = <10
0.063mm sieve used for U.C. calculation.

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 29-Jul-24

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

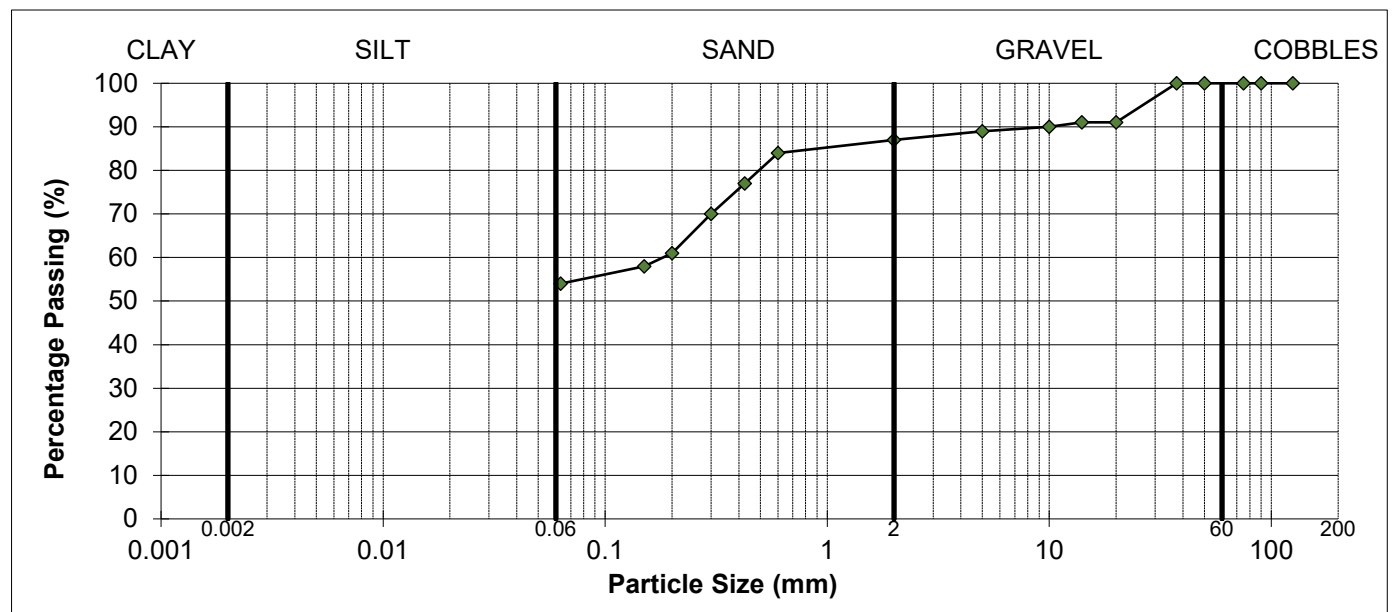
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	16-716 - Domett Street
JOB NUMBER	MRN 24005/146

SAMPLE LABEL	TP204 1.0	DATE SAMPLED	26-Jun-24
LAB SAMPLE No	507903	DATE RECEIVED	03-Jul-24
DATE TESTED	04-Jul-24	SAMPLED BY	Client

MATERIAL	Brown clayey gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	89	
90	100		2	87	80-100
75	100		0.6	84	
50	100		0.425	77	
37.5	100		0.3	70	
20	91		0.2	61	
14	91		0.15	58	
10	90		0.063	54	15-100

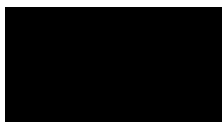


SOIL FRACTIONS			
COBBLES	0%	SAND	33%
GRAVEL	13%	SILT / CLAY	54%
As received water content		20.0%	

REMARKS

Sample complies with the advised grading specification for a 2A/2B material (SHW 2016)

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE 29-Jul-24

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
BS EN ISO 17892-4:2016

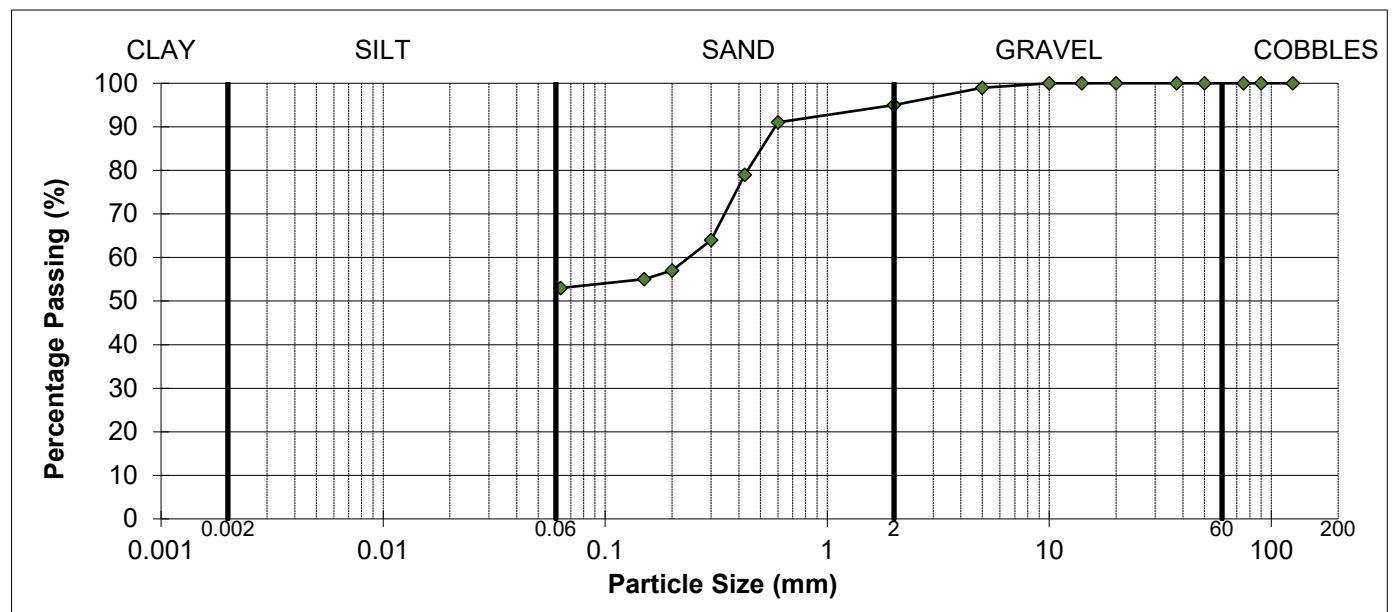
Determination of Water Content in accordance with BS EN ISO 17892-1:2014+A1:2022 (Oven Dry)

CLIENT	e3p
SITE	16-716 - Domett Street
JOB NUMBER	MRN 24005/146

SAMPLE LABEL	TP206 1.5	DATE SAMPLED	26-Jun-24
LAB SAMPLE No	507904	DATE RECEIVED	03-Jul-24
DATE TESTED	04-Jul-24	SAMPLED BY	Client

MATERIAL	Brown clayey gravelly SAND
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100	100	5	99	
90	100		2	95	80-100
75	100		0.6	91	
50	100		0.425	79	
37.5	100		0.3	64	
20	100		0.2	57	
14	100		0.15	55	
10	100		0.063	53	15-100

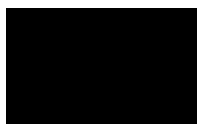


SOIL FRACTIONS			
COBBLES	0%	SAND	42%
GRAVEL	5%	SILT / CLAY	53%
As received water content		16.4%	

REMARKS

Sample complies with the advised grading specification for a 2A/2B material (SHW 2016)

SIGNED



NAME O.P. Davies BA (Hons)
(Laboratory Manager)

DATE

29-Jul-24