

**REMEDIATION METHOD STATEMENT
ANCOATS MOBILITY HUB
POLAND STREET, ANCOATS
BOWMER AND KIRKLAND
RMS-20376-22-276REVB
MAY 2023**

IDOM



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APPENDIX 1

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- Site location plan 9032-BA-XX-00-DR-A-(01)000
- Proposed development layout

APPENDIX 2

- Previous Investigation Reports (E3P)

APPENDIX 3

- Post-demolition trial pits and chemical analysis results (February 2023)

APPENDIX 4

- Post-demolition hotspot delineation and removal (April 2023)

SECTION 1 INTRODUCTION

- 1.1 Bowmer and Kirkland (B&K) proposes to develop an area located at Poland Street Industrial Estate, Ancoats, for a commercial development which encompasses Ancoats Mobility Hub. The proposed development includes the erection of a multi-storey carpark which will include 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit, and a delivery hub.
- 1.2 IDOM Merebrook Limited (IDOM) was commissioned by B&K to provide a Remedial Method Statement (RMS) the first issue of which was dated September 2022.
- 1.3 Following completion of demolition and clearance of the site, previously inaccessible areas have been subject to trial pit investigations and chemical soil testing. In addition, excavation to delineate and remove identified areas of significant hydrocarbon and lead contamination have been completed. A revision of this RMS is now presented which includes the results of these investigations and delineation works. Trial pits records and laboratory certificates are included from these two exercises as Appendices 3 and 4, respectively. From these findings, a revised risk assessment and conceptual site model is presented with updated remedial proposals with regards soil and water contamination and details of ground gas mitigation. This revision is also intended to address comments recently received from Manchester City Council Planning Authority on contaminated land matters.
- 1.4 Desk based and intrusive geo-environmental investigations have been undertaken in relation to the subject site to establish ground conditions and potential contaminated land liabilities. The reports listed below have been referred to during the production of this document, and should be read in conjunction with it:
- i.* E3P; Unit7, Poland Street Industrial Estate, Ancoats – Phase 1 Geoenvironmental Site Assessment (ref: 14-868-r1) dated April 2021;
 - ii.* E3P; Unit7, Poland Street Industrial Estate, Ancoats – Phase 2 Geo-Environmental Site Assessment (ref: 14-868-r2), dated July 2021.
 - iii.* E3P; Unit7, Poland Street Industrial Estate, Ancoats - Phase 2 Geo-Environmental Site Assessment (ref: 15-849-R1-1), dated August 2022.
- 1.5 The objectives of this report are to:
- i.* Summarise the site conditions and contamination present at the site and provide a revised assessment of the associated risks as identified by the previous site investigations and recent post-demolition investigations;
 - ii.* Present an updated remediation strategy to be approved by the environmental regulators;
 - iii.* Confirm the validation procedures and techniques required to ensure that the remediation is effective;

- iv. Confirm the required acceptance criteria for site-derived soils and imported soils;
 - v. Identify soil resources and suitable future uses within the proposed development;
 - vi. Confirm soil waste identification and disposal protocols;
 - vii. Summarise the environmental controls to be implemented during the construction work in order to manage contamination issues.
- 1.6 No reliance upon the third-party reports provided for review has been conferred upon Idom and their contents are treated in good faith. This document sets out the principles and the measures which will be required to remediate the site to provide a platform on which construction of the proposed development can commence. The actions described should be executed as part of a groundworks contract led by the developer. The contractor's performance with regard to geo-environmental matters should be monitored throughout the works by a suitably qualified Environmental Consultant.
- 1.7 This report has been prepared for B&K for the sole purpose outlined above and no extended duty of care to any third party is implied or offered. Third parties making reference to this report should consult B&K and IDOM as to the extent to which the findings may be appropriate for their use.

SECTION 2 SITE INFORMATION

2.1 SITE BACKGROUND

- 2.1.1 The subject site lies to the northeast of Manchester city centre at Poland Street Industrial Estate, Ancoats.
- 2.1.2 The site is located at National Grid Reference 385170, 398900 with the nearest postcode at M4 6AZ.
- 2.1.3 The site is a rectangular shaped parcel of land currently occupied by twelve, two-storey brick and metal clad structures surrounding a central hardstanding carpark. Three storage containers and two skips are also noted to be present on site.
- 2.1.4 The proposed development includes the construction of a multi-storey carpark which will include 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit, and a delivery hub.
- 2.1.5 Earliest historical map records dating to the 1840s show the site to have been previously developed into a series of terraced housing with associated yards and outhouses. The site was later re-developed, with the demolition of the initial dwellings and construction of several structures recorded as 'Street Mains Gas Department'. By 1948, mapping archives show several extensions and additions to the structures and relabel the site as 'Corporation Yard'. In 1980, the site is shown

to have been cleared and replaced by the Poland Street Industrial Estate which remains present to this day.

- 2.1.6 The site is shown to be underlain by glacial deposits which attain several metres thickness in the area. These are in turn underlain by mudstone of the Manchester Marls Formation. Previous investigation has confirmed the presence of stiff clay (Till) to at least 12 m depth.

2.2 GROUND CONDITIONS

- 2.2.1 Pre-demolition intrusive investigations by E3P encountered Made Ground up to 2.6 m bgl with a typical depth of 2.0 m bgl. Underlying the Made Ground the natural stratigraphic sequence included superficial Drift deposits up to 29.0 m bgl, with solid bedrock of the Manchester Marl Formation encountered from 24.0 m bgl.
- 2.2.2 The Made Ground was typically noted to comprise of asphalt to 0.20 m bgl overlying concrete at depths of 0.10 m- 0.40 m. The Made Ground included both granular and cohesive deposits. Granular ground was formed of loose black slightly clayey sandy fine gravel, with gravels fine-medium angular-subrounded including brick, clinker, concrete, sandstone, ash and ceramic. Cohesive ground was formed of firm dark grey silty slightly gravelly reworked clay, with gravels medium-coarse angular to subrounded including brick, ceramic, clinker and calcareous materials.
- 2.2.3 The superficial Drift deposits are classified as a Secondary undifferentiated Aquifer, whilst the underlying Manchester Marl Formation is classified as a Secondary B bedrock Aquifer. The site is not located within a groundwater Source Protection Zone (SPZ).
- 2.2.4 The previous E3P investigations identified perched groundwater at depths between 1.50 m – 4.00 m depth, whilst the natural groundwater table was recorded to lie at 12.00 m depth.
- 2.2.5 A post-demolition trial pit investigation was completed in February 2023, which included 16 machine excavated trial holes. These identified made ground 0.60 to at least 2.10 m thick of variable granular and cohesive materials. The made ground constituents included sandy gravelly clay and clayey gravelly sand. Coarse fractions mainly included coal cinders, brick fragments, whole bricks and various reworked natural lithologies. Underlying natural soils comprised glacial clay.
- 2.2.6 Visual and olfactory evidence of hydrocarbon contamination was observed in two locations (MTP207 and MTP208) within natural clay underlying the made ground.
- 2.2.7 No groundwater ingress was observed during the excavation of the pits. Trial hole logs are included in Appendix 3.

2.3 SOIL CHEMICAL ANALYSIS SUMMARY

- 2.3.1 It is noted that E3P has adopted the same borehole and sample nomenclature for both 2021 and 2022 investigations on its stratigraphic logs and soil analyses (WS101, WS102 etc).
- 2.3.2 As part of the 2021 investigation, soil chemical analysis results from the initial E3P investigation were assessed against *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH¹, and Category 4 screening levels² with respect to a residential end use.
- 2.3.3 The initial assessment identified sporadic exceedances of heavy metals, PAH, mercury and naphthalene within the Made Ground and shallow Drift deposits.
- 2.3.4 Following the further investigations undertaken during June 2022, an updated Tier I human health risk assessment was prepared using data collated from both the 2021 and 2022 investigations. Unlike the previous assessment, soil contamination levels were compared to screening levels for a commercial end-use as opposed to a residential land use. When compared to these criteria, only samples obtained from WS101, WS103, WS104, TP102 and TP105 contained contaminants exceeding screening criteria.
- 2.3.5 Exceedances were observed for the following substances: benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene, with the primary exposure pathway considered to be through dermal contact and ingestion. All sample exceedances (with the exception of WS101) were found within the Made Ground.
- 2.3.6 Asbestos has not been identified within any of the E3P assessments. In addition, none was observed in the post-demolition investigation. Asbestos screening from 21 soil samples did not detect asbestos in soil matrices.
- 2.3.7 Chemical analysis of 21 soil samples was undertaken from the 16 post-demolition trial pits completed in February 2023 for a broad suite of heavy metals, polyaromatic hydrocarbons, petroleum hydrocarbons, BTEX compounds. Chemical laboratory analysis certificates are included in Appendix 3. None of the soil chemical levels exceeded generic assessment criteria appropriate to the proposed end use.
- 2.3.8 The results of hydrocarbon analysis from clays with evidence of staining and odours in MTP207 and MTP208 detected only slightly to moderately elevated

2.4 GROUNDWATER ANALYSIS

¹ Nathanail, C. P., McCaffrey, C., Gillett, A. G., Ogden, R. C. and Nathanail, J. F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*. Land Quality Press, Nottingham. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3100. All rights reserved. Including August 2015 nickel update.

² SP1010 *Development of Category 4 Screening Levels Main Report* (Dec 2013) and SP1010 *Policy Companion Document* (Mar 2014).¹

- 2.4.1 Leachate analyses undertaken as part of the E3P 2021 assessment identified elevated Total Cyanide in Made Ground recovered at WS103. However, supplementary groundwater sampling found no exceedances of cyanide and E3P discounted the WS103 leachate samples as a significant source of cyanide contamination to controlled waters. TPH contamination in groundwater was identified during the 2021 investigation but not in boreholes coinciding with the locations of visual indicators contamination. Possible further TPH sources were considered to exist. E3P considered that whilst low permeability strata would limit migration potential and therefore risks to wider water resources, they recommended further investigation of the hydrocarbon contamination.
- 2.4.2 An additional leachate analysis was conducted in June 2022 with samples of Made Ground recovered from TP101 and WS103 (assumed to be WS103 drilled in 2022). The assessment found no exceedances in excess of DWS. However, it is observed that samples were stated as deviating by the laboratory for both holding times and incorrect sample containers, including for PAH and cyanide.
- 2.4.3 Groundwater sampled in June 2022 found concentrations total cyanide and Aromatic TPH fractions C₁₂-C₃₅ to exceed drinking water standards (DWS) at WS101 (June 2022). Selenium and Aromatic TPH fractions C₁₆-C₂₅ were also found elevated in groundwater sampled at WS102 and WS104 (June 2021).
- 2.5 **CONTAMINATION HOTSPOT DELINEATION AND EXCAVATION APRIL 2023**
- 2.5.1 On 11 April 2023, an IDOM engineer revisited the site to supervise the excavation of the "hotspot" areas for the removal of contaminated materials. The areas of these hotspots were marked out by an engineer prior to excavation. The excavation process involved digging a pit in a 4 m by 4 m square at each location to a depth of 0.5 m bgl, ensuring the removal of all contaminated material. The locations of the delineation pits excavated are illustrated in the figure below.



- 2.5.2 Samples of the made ground were collected from the contaminated areas and from four surrounding points and submitted for laboratory analysis.

2.6 **HAZARDOUS GAS**

- 2.6.1 A hazardous gas risk assessment was completed by E3P in report Phase II Geo-Environmental Site Assessment (ref: 14-868-r2), dated July 2021.
- 2.6.2 During this initial investigation, monitoring on three occasions over 39 days found elevated carbon dioxide (maximum 14.5 % v/v) within two of the centrally located boreholes, slightly elevated methane (0.90 % v/v) in one location and positive borehole gas flows to a maximum of 10.26 litres/hour (although it was not clear whether these were initial peaks or sustained flows). Two of the four installed wells were found to have flooded response zones. E3P assessed that the elevated gas levels were due to made ground and hydrocarbon contamination. Given this limited data, a period of on-going assessment was recommended by IDOM in letter *IDOM; Ancoats Mobility Hub- Critical Review* (ref: L-20376-2.4.2-22-535-AFJ), dated March 2022.
- 2.6.3 Following recommendations, an updated monitoring programme was completed in August 2022. The E3P updated risk assessment was included in their report reference *E3P; Unit7, Poland Street Industrial Estate, Ancoats - Phase 2 Geo-Environmental Site Assessment* (ref: 15-849-R1-1), dated August 2022.
- 2.6.4 This measured ground gas on four monitoring rounds over four weeks in four new boreholes located toward the eastern and western ends, somewhat away from the central areas monitored in the previous year. The recent results showed a significantly different gas regime, where no methane or carbon dioxide was detected

above 0.1 % and no gas flows were detected above 0.1 litres/hour. The earlier boreholes with elevated gas and flow levels do not appear to have been monitored in July/August 2022.

2.6.5 The site was not shown to be in a radon affected area.

2.7 SUMMARY OF IDENTIFIED POLLUTANT LINKAGES

2.7.1 Following completion of the supplementary Phase 2 investigation potentially significant risks were identified to human health via exposure to made ground contamination and ground gases. A risk from permeation and degradation of potable water pipes from organic contaminants was also considered possible. The conceptual model is presented in Table 1 below.

Table 1: Revised Conceptual Model

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Heavy metals and hydrocarbons (made ground)	Contact with contaminated soil	Human health (future residents and construction workers)	Low risk identified Made Ground is impacted by heavy metals and PAH contamination which may pose a risk to site users in contact with soils. However, most of the development will be covered with buildings and hardcover with small areas of landscaping. Made ground is also to be removed from below the new structure.
	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	
Asbestos (made ground and structures)	Ingestion and inhalation of contaminated soil and dust	Human health (future residents and construction workers)	Low risk identified No asbestos has been identified within the E3P assessments; however, in view of the developmental history of the site, its presence cannot be discounted.
Contamination (all forms)	Vertical migration to aquifer	Controlled waters	No risk identified Previous investigations found impact by contamination including hydrocarbons upon shallow perched water. As site rests on a low sensitivity undifferentiated aquifer and hydrocarbon impacted soil is to be removed, no significant remnant risk will remain.
Contamination (all forms)	Horizontal migration to surface water	Controlled waters	No risk identified Considering the distance to the nearest sensitive water receptor and lack of abstraction points, a pollutant linkage is unlikely.
Hydrocarbons	Direct contact	Plastic water pipes	Moderate risk identified Mixed made ground present within pipe laying depths. Visual and olfactory evidence of hydrocarbons reported. Heavy end hydrocarbon and low solubility PAH have been identified within the Made Ground and present a Moderate risk to permeable services.

POSSIBLE POLLUTANT LINKAGE			RISK CHARACTERISATION
POTENTIAL SOURCES	PATHWAYS	RECEPTORS	
Hazardous Gas/Vapours In soil	Ingress into buildings and voids	Human health (Future residents and construction workers)	Low-Moderate risk identified Worse case Characteristic Situation 2 (CS2) identified 2021. The subsequent investigation found no detectable gas concentrations.
Adjacent Land	Horizontal migration of groundwater/gas.	Neighbouring properties	Low risk identified The subject site is set within an industrial estate and surfaced with hardstanding. The E3P data available indicates a low risk to adjacent properties.

SECTION 3 REMEDIAL ACTION PLAN

3.1 OVERVIEW

3.1.1 The identified risks at the site can be mitigated by removal of either the source, pathway or receptor. With reference to the conceptual model for the site a remediation strategy, based on source or pathway removal, has been designed.

3.1.2 The remedial measures for this site can be summarised by the below:

- i.* Watching brief my suitably trained personnel to aid in identification and management of asbestos containing material and unknown contamination;
- ii.* A clean cover system comprising of hardstanding, or a validated clean cover layer over a suitable geo-membrane;
- iii.* Incorporation of passive measures to prevent ingress of ground gases;
- iv.* The appropriate assessment and management of any unexpected contamination; and
- v.* Minimising dust and other emissions from site during the development phase.

3.2 HUMAN HEALTH

3.2.1 Asbestos

3.2.2 Whilst no significant occurrences of asbestos have been found, vigilance will be maintained during the ground works phase. A part-time watching brief will be also maintained by IDOM during the earthworks phase to aid in the identification of Asbestos Containing Materials (ACM). Any identified ACM will require removal by appropriately trained personnel. B&K will ensure that removal works are undertaken in accordance with the Control of Asbestos Regulations (2012), its Approved Code of Practice and employing procedures in accordance with appropriate the CL:AIRE/JIWG work category.

- 3.2.3 Strict dust control measures will be employed to ensure the risk of airborne fibres is kept to a minimum.
- 3.2.4 All works will be carried out in strict accordance with an Asbestos Management Plan (AMP) to be issued under a separate title.
- 3.2.5 Regular visits to inspect for adherence to the AMP, evidence of which will be issued within a validation report following completion of works on the site.
- 3.2.6 Clean Cover
- 3.2.7 Any areas not covered with hardstanding will be required to have a clean/ validated subsoil and topsoil layer. The cover system shall comprise:
 - i. 300 mm thickness of clean validated material, including a minimum of 150mm topsoil over,
 - ii. A geotextile membrane marker layer segregating the clean validated material from the made ground beneath. The specification for the geotextile membrane must be approved by the relevant authorities prior to use to ensure suitability for this project. Parallel layers of the membrane should be suitably secured together, or overlapped by a minimum of 0.20 m.
- 3.2.8 Suitable topsoil is unlikely to arise from engineering/ reprofiling works on the site. Where suitable cover soil is not available, imported material complying with the criteria below will be required.
- 3.2.9 Within the limited areas of soft landscaping surrounding the perimeter of the site, it is anticipated that a number of trees may be planted. In order to facilitate healthy growth, it is considered that a greater thickness of soil may be required as a tree pit. Final landscape designs have not been provided at this time however tree pits will be excavated to the required depth as specified by the landscape architect, lined with a geo-membrane to the same specification stated in 3.2.7 (where this does not impact the healthy growth and development of the tree) and filled with suitable clean cover.
- 3.2.10 Validation of the clean cover depth once placed will be undertaken by IDOM, with samples submitted for chemical analysis at a minimum rate of one sample per 250 m³ (minimum of three per source).
- 3.2.11 Topsoil and subsoil used for the formation of soft landscaped areas shall meet the criteria set out in Table 2 below. The criteria below are derived from *Suitable for Use Levels* (S4ULs) published in 2015 by LQM/CIEH. For the purposes of selecting imported growing media, S4ULs derived for the most sensitive residential end use are considered appropriate and will be protective of future maintenance workers.

Table 2: Criteria for imported Topsoil and Subsoil materials.

CONTAMINANT	UNITS	SCREENING LEVEL (SL)
HUMAN HEALTH RISK ASSESSMENT		
Asbestos in soil	-	absent
pH	-	5 – 9
Staining and odours		absent
Arsenic	mg.kg ⁻¹	37
Cadmium	mg.kg ⁻¹	11
Chromium (total)	mg.kg ⁻¹	910
Hexavalent Chromium	mg.kg ⁻¹	6
Lead	mg.kg ⁻¹	200
Mercury	mg.kg ⁻¹	40
Nickel	mg.kg ⁻¹	130
Selenium	mg.kg ⁻¹	250
TPH Aliphatic >EC ₅ - EC ₆	mg.kg ⁻¹	42
TPH Aliphatic >EC ₆ - EC ₈	mg.kg ⁻¹	100
TPH Aliphatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	27
TPH Aliphatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	130
TPH Aliphatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	1100
TPH Aliphatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	65000
TPH Aliphatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	65000
TPH Aromatic >EC ₅ - EC ₇	mg.kg ⁻¹	70
TPH Aromatic >EC ₇ - EC ₈	mg.kg ⁻¹	130
TPH Aromatic >EC ₈ - EC ₁₀	mg.kg ⁻¹	34
TPH Aromatic >EC ₁₀ - EC ₁₂	mg.kg ⁻¹	74
TPH Aromatic >EC ₁₂ - EC ₁₆	mg.kg ⁻¹	140
TPH Aromatic >EC ₁₆ - EC ₂₁	mg.kg ⁻¹	260
TPH Aromatic >EC ₂₁ - EC ₃₅	mg.kg ⁻¹	1100
Benzene	mg.kg ⁻¹	0.087
Toluene	mg.kg ⁻¹	130
Ethylbenzene	mg.kg ⁻¹	47
Xylene	mg.kg ⁻¹	56
Acenaphthene	mg.kg ⁻¹	210
Acenaphthylene	mg.kg ⁻¹	170
Anthracene	mg.kg ⁻¹	2400
Benz(a)anthracene	mg.kg ⁻¹	7.2
Benzo(a)pyrene	mg.kg ⁻¹	2.2
Benzo(b)fluoranthene	mg.kg ⁻¹	2.6
Benzo(ghi)perylene	mg.kg ⁻¹	77
Benzo(k)fluoranthene	mg.kg ⁻¹	320
Chrysene	mg.kg ⁻¹	15
Dibenz(ah)anthracene	mg.kg ⁻¹	0.24
Fluoranthene	mg.kg ⁻¹	280
Fluorene	mg.kg ⁻¹	170

CONTAMINANT	UNITS	SCREENING LEVEL (SL)
Indeno(123-cd)pyrene	mg.kg ⁻¹	27
Naphthalene	mg.kg ⁻¹	2.3
Phenanthrene	mg.kg ⁻¹	95
Pyrene	mg.kg ⁻¹	620
Phenol	mg.kg ⁻¹	120

3.2.12 In addition to the above chemical criteria, it shall be ensured that the imported / re-used soils are free from any staining, odours or deleterious materials.

3.2.13 The validation report will provide details of the chemical quality and depth of material placed in soft landscaping areas. The validation report will be provided to the local environmental health officer upon completion of the works.

3.3 CONTROLLED WATERS

3.3.1 Low level impact upon shallow groundwater quality has been identified which is likely to reflect the interaction between shallow waters and the made ground. Currently, this localised risk is unlikely to result in wider impact on water resources and supplementary investigation has not identified significant volumes of perched water. In addition, localised delineation and removal of hydrocarbon impacted soil has recently been undertaken and the developer has advised they will be excavating made ground from beneath the proposed structure. However, control measures shall be retained to contain and mitigate as part of the development works. These include:

- i.* Watching brief as part of the role outlined in 3.2.1 to identify previously unknown contamination and evidence of gross or potentially mobile contamination such as tanks, underground pipes, chambers, free phase oils and fuels. Where identified such occurrences to be investigated, assessed and remediated where appropriate (see also 3.4).
- ii.* Penetrative groundworks to be undertaken in accordance with measures in a Piling Works Risk Assessment to minimise creation of contamination pathways.

3.4 UNEXPECTED CONTAMINATION

3.4.1 If unexpected contamination such as: fuels, oils, discoloration, putrescible wastes, drums/containers are encountered works will cease in the affected area immediately and the site manager will contact IDOM for advice. Following an appropriate assessment, IDOM will advise on the best course of action to proceed and contact the necessary authorities if appropriate.

3.5 SERVICES

- 3.5.1 It is recommended that the utility provider is consulted with respect to their requirements for water supply pipes. At this stage protected pipe materials should be chosen which are resistant to permeation and degradation by organic contaminants.
- 3.5.2 Service corridors should be backfilled with material that will not create any unacceptable risk to personnel who may need to access them in the future, if certified clean imported material is not to be used further testing may be required. Backfill material should conform to specifications specified by the utility company or client.
- 3.6 **WASTE**
- 3.6.1 Materials, including waste soils which are not to be retained on site, should be removed and disposed of in accordance with all relevant statutes including the *Environmental Protection Act 1990* (as amended), *The Controlled Waste Regulations 2012* (as amended), *The Waste (England and Wales) Regulations 2011* (as amended), *The Hazardous Waste (England and Wales) Regulations 2005* as amended, *The Waste Management (England and Wales) Regulations 2006*, and *The Environmental Permitting (England and Wales) Regulations 2016* (as amended).
- 3.6.2 As part of the supplementary report produced in June 2022, WAC analyses were undertaken on selected samples of Made Ground ranging from 0.30m bgl and 1.30m bgl (WS102, WS103, WS105).
- 3.6.3 Existing soil tests results indicate materials tested would generally be considered non-hazardous and suitable for disposal in a Non-Hazardous waste facility. Made ground materials are unlikely to be suitable for disposal to an inert licensed facility. however further testing may be required prior to any offsite disposal of material. Acceptance of any material will ultimately be at the discretion of the waste facility.
- 3.7 **GROUND GAS AND VAPOURS**
- 3.7.1 The site has been subject to two campaigns of gas monitoring by E3P Ltd. The two phases of work produced significantly differing results.
- 3.7.2 The first campaign from May/June 2021 showed some occasions when the borehole gas flow rates were above 5 litres per second. The results do not indicate whether the flow rates reported are peak values or steady flows. Two of the boreholes were flooded above the response zones. In the absence of any identified active gassing sources, the most likely explanation of these flow rates is due to water level increases in the borehole standpipe causing a 'piston' effect. to calculate gas screening values
- 3.7.3 The boreholes generally did not show the presence of methane. A single positive detect of 0.9 % was noted in one borehole on one occasion.

- 3.7.4 Carbon dioxide concentrations were reported as “initial” and “steady” values which were in all cases identical. High levels of carbon dioxide were reported to a maximum of 14.5%
- 3.7.5 Based on the first round of monitoring, the Characteristic Situation as defined in BS8485:2015 +A1:2019, *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*, was reported as CS2.
- 3.7.6 The second campaign was undertaken in July and August 2022 when a further four distinct boreholes were monitored. In this exercise the wells were monitored on four occasions. Water levels appear had generally fallen with respect to the 2021 monitoring exercise.
- 3.7.7 No borehole flow or detectable methane or carbon dioxide was measured.
- 3.7.8 Based on the second campaign the Characteristic Situation was assessed as CS1.
- 3.7.9 The empirical, semi -quantitative assessment reported above must be considered in the context of the other information available to the investigators.
- 3.7.10 The desk studies has not identified any on-site source of gas generation. A former canal is present to the east of the site. This feature is of small size and any filling must have been completed in excess of 120 years ago. It is not considered a plausible source of active gas generation.
- 3.7.11 The site has been subject to good density of investigation and the only plausible source for the generation of hazardous gas is shallow made ground with organic content or hydrocarbon contamination.
- 3.7.12 It is proposed address the low but remaining risk of gas ingress into the structure by removing all made ground from any part of the footprint which will be covered by sealed occupied rooms.
- 3.7.13 The removal of maded ground from this footprint will be subject to a verification programme. Inspection will be made by suitably qualified geoenvironmental engineers and a photographic record of the inspections will be prepared.
- 3.7.14 The above approach will also remove the potential for any vapours from hydrocarbon contaminated made ground to enter the occupied structure.

SECTION 4 ENVIRONMENTAL CONTROL

4.1 GENERAL

- 4.1.2 The developer shall have in place a Construction Plan which details the measures to minimise dust and other emissions.
- 4.1.3 Working hours shall be restricted to those imposed by the local Planning Department to minimise the nuisance to nearby residents.

4.1.4 Every precaution shall be taken to avoid interference with, or damage to public utilities, buildings and other services, in or near the site and prevent the interruption or pollution of any adjoining watercourses, drains and ditches.

4.1.1 All Contractors shall be instructed to comply with all relevant Planning Conditions with respect to the execution of the works.

4.2 NUISANCE FROM NOISE

4.2.1 Acoustic advice in relation to the proposed development has been sought by Sandy Brown Consultants Ltd and provides acoustic advice in line with industry guidance.

4.2.2 The aforementioned report, *Sandy Brown; Ancoats Mobility Hub- Acoustic Planning Report (ref: 20291-R05-D), dated May 2021*, is included within Appendix 2 and should be referred to throughout site activities.

4.3 NUISANCE FROM DUST

4.3.1 A potential for nuisance dust-generation affecting adjacent off-site properties is also recognised, irrespective of contaminant levels. It is recommended that dust suppression measures are employed whilst groundworks and any other potential dust-generating activities are ongoing.

4.3.2 Given the possibility of asbestos on site following the demolition of current structures, it is recommended that slab surfaces are cleared, and soil is kept sufficiently dampened (approximately 10 % moisture content) to ensure the risk of fibre release is kept to a minimum.

4.3.3 A Competent Person (the Site Manager) shall be nominated on site to ensure dust is monitored and/or suppressed by damping down, and to ensure any complaints of nuisance made are logged and measures reviewed accordingly.

4.4 STOCKPILED MATERIALS

4.4.1 Excavated soils destined either for off-site disposal or re-use shall be stockpiled separately, labelled and fenced.

4.4.2 Stockpiles shall be formed to prevent dust generation and to shed water. They shall not be placed near drains or watercourses.

4.5 BURNING

4.5.1 The disposal of any materials on site by burning shall not be permitted.

4.6 WHEEL CLEANSING / PUBLIC HIGHWAYS

4.6.1 A wheel cleansing facility shall be provided at the site entrance for the duration of the works. A Competent Person (the Site Manager) shall be nominated on site to ensure all vehicles entering the public highway from the site have been inspected and all mud and debris removed from the undercarriage and wheels prior to leaving

the site. A road sweeper shall be made available and deployed to clear dust, mud and debris from the public highway when necessary.

4.6.2 All vehicles carrying materials from site shall be fully sheeted before leaving the site and loaded in such a way that no loose material can fall onto any highway.

4.6.3 Public highways shall not be used for the storage of materials or plant.

SECTION 5 GENERAL SITE PRACTICES

5.1 Operatives should not be allowed to eat, drink or smoke on site except in designated areas and should be required to wash all exposed skin at the end of each shift. Operatives should be informed of the potential hazards at the site and should be required to report any observations of suspect materials.

5.2 As with any sampling exercise, it is possible that groundworks will discover conditions or soils different from those found to date. Construction managers and supervisors should be aware that further remediation measures may be required if such conditions are found.

5.3 Any observations of ground conditions potentially atypical of those described above shall be reported to IDOM for assessment. Where, upon initial inspection, it is confirmed that potential new contamination has been encountered then the works will cease and IDOM will prepare and submit a Method Statement for assessing and dealing with the suspected contamination. This may include additional risk assessment and/or removal of contaminated material if this is deemed necessary. Contamination encountered shall be reported to the local environmental health officer ensuring remedial measures are agreed in writing.

5.4 All works will be carried out to the satisfaction of the local environmental health officer.

SECTION 6 VALIDATION REPORTING

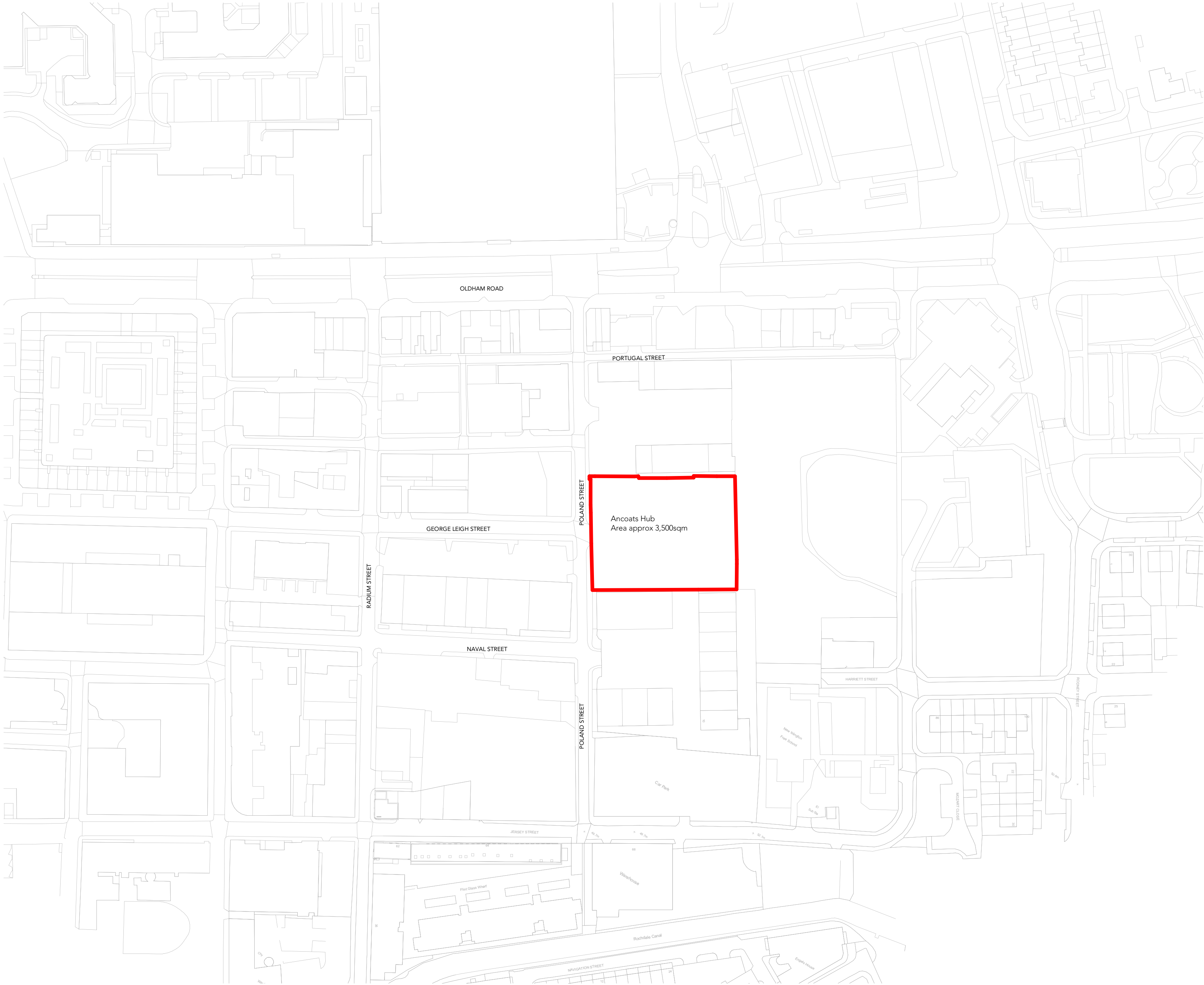
6.1 As works progress IDOM will maintain a watching brief to ensure adherence to this RMS. A validation report will be submitted following the completion of remediation works that will include *inter alia*:

- i.* Examples of site diaries completed by a suitably trained engineer with details of daily activities and communications. The site diaries will contain pictures showing key stages of works and highlight compliance of any key remediation strategy points (e.g. Placement of geo-membrane, excavation and backfilling of service trenches etc.).
- ii.* Testing certificates of any materials intended to be reused for service trench backfill.
- iii.* Waste transfer notes for any materials that are required to be disposed of during works.

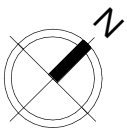
- iv. Records of removal of made ground from the footprint of occupied parts of the structure.
 - v. Any records relating to specialist advisors responding to unforeseen conditions.
- 6.2 Verification of the clean imported subsoil and topsoil will be undertaken by IDOM. Samples of the imported clean cover material will be tested at a rate of 1 per 250 m³. Samples will be submitted to an MCERTS/UKAS accredited laboratory for analysis of a suite of contaminants including asbestos fibres. Laboratory certificates shall be included within the verification report.
- 6.3 In areas not covered with hardstanding, depth checks will be undertaken to prove that the minimum requirement of clean subsoil and topsoil has been placed over a geotextile membrane barrier. Hand dug observation pits shall be excavated to the geo-membrane layer and inspected by a suitably trained engineer. Pictures will be captured to clearly show the depth of the pit and included within the verification report.

APPENDIX 1

- Drawings
- Site location plan 9032-BA-XX-00-DR-A-(01)000
- Proposed development layout



Note:
Do Not Scale from this drawing.
Dimensions are to be checked on site.
If in doubt please ask.



P0	29/04/21	AMP	Planning
Rev	Date	Intls	Details

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Project Title	Ancoats Hub
Client	Manchester Life
Location	Poland Street Manchester

Drawing ref Site Location Plan

Date	26/04/2021 15:57:42	Scale	1 : 1250
Checker	MB	Orig Paper Size	A2

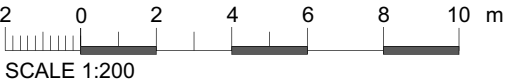
Job No: 9032 Status PLANNING

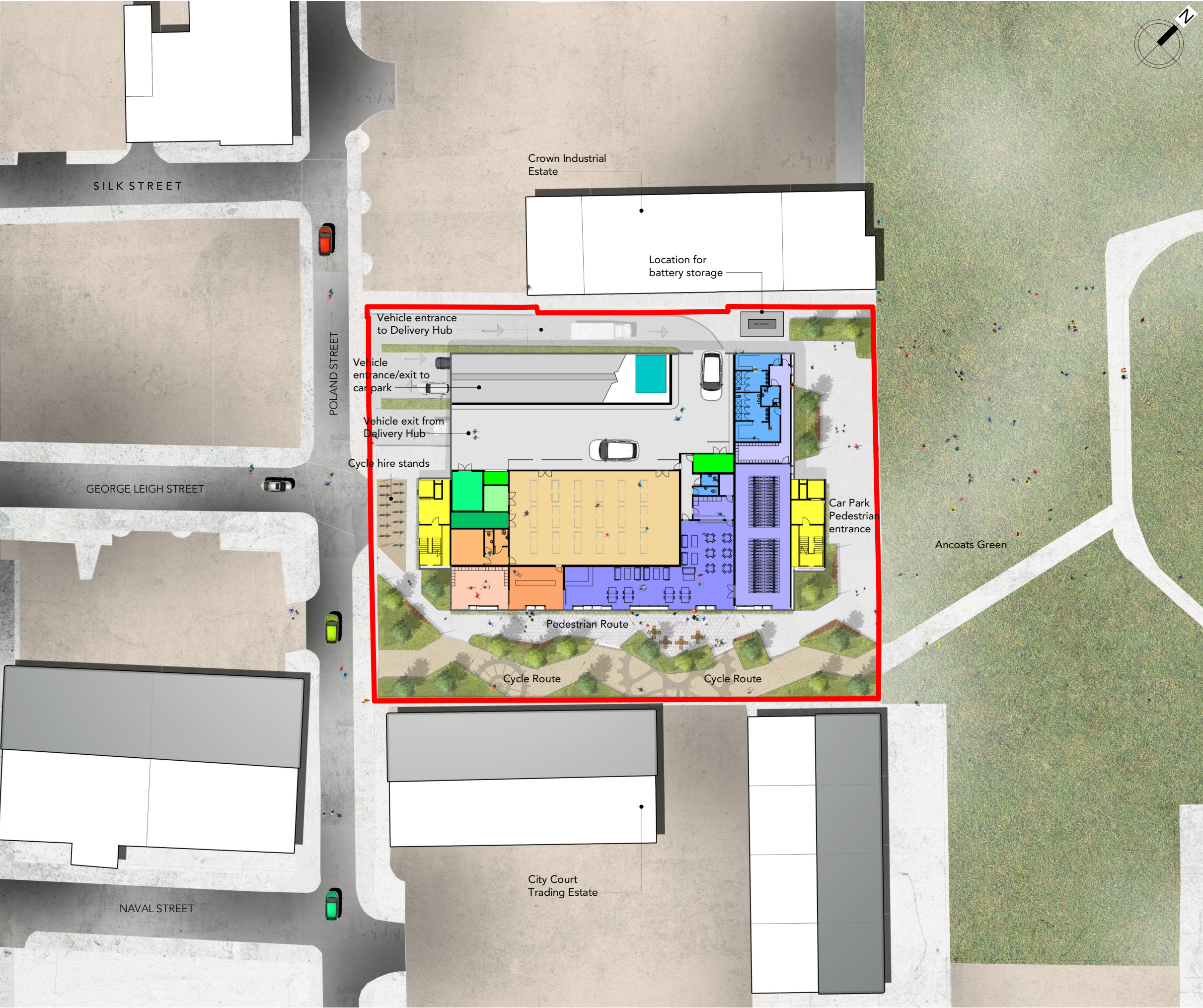
Project: Origin: Zone: Level: Type: Disc: Number: Rev:

9032-BA-XX-00-DR-A- (01)000- P0

Site Location Plan

1 : 1250





Note:
Do not scale from this drawing.
Dimensions are to be checked on site.
If in doubt please ask.

KEY

- Stair/lift Core
- Pick Up Lockers
- Delivery Counter
- Staff Welfare
- LV Switchroom
- Bin Store
- Transformer Room
- ENW/RMU Room
- Delivery Hub Storage Area
- Delivery Hub Vehicle Access
- Cafe
- Kitchen
- Cycle Hub Cycle Storage
- Cycle Hub Lockers
- Cycle Hub Changing
- Cold Water Storage

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Project Title	Ancoats Hub
Client	Manchester Life
Location	Poland Street Manchester
Drawing Title	Site GA Plan

Date	07/05/2021 15:41:59	Scale	As indicated				
Checked	MB	Orig Paper Size	A3				
Job No:	9032		Status	PLANNING			
Project:	Origin:	Zone:	Level:	Type:	Disc:	Number:	Rev:

9032-BA-XX-00-DR-A- (04)010- P0

APPENDIX 2 ▪ Previous Investigation Reports (E3P)



e3p

Phase II Geoenvironmental Site Assessment
Manchester Life, Back of Ancoats Phase 1 –
Ancoats Mobility Hub
Reference:14-868-R2-1
Date: July 2021



PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Manchester Life, Back of Ancoats Phase 1 – Ancoats Mobility Hub

Prepared for:

Manchester Life Strategic Development Company Limited

Report Ref: 14-868-r2

Date Issued: July 2021

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QUALITY ASSURANCE

PROJECT NUMBER	14-201		
VERSION	Version 1		
REMARKS	Final		
DATE	July 2021		
PREPARED BY	M Dee		
QUALIFICATIONS	MeSci (Hons)		
CHECKED BY	S Ellis		
QUALIFICATIONS	BSc (Hons), FGS, CEnv		
AUTHORISED BY	D Cox		
QUALIFICATIONS	BSc (Hons), FGS, PIEMA, MIEnvSci, CEnv		



Cert No 18890

ISO 9001 (2015)
ISO 14001 (2015)
ISO 45001 (2018)



EXECUTIVE SUMMARY

Site Address	Poland Street Industrial Estate, Poland Street, Manchester, M4 6AZ	
Grid Reference	E385170, N398900.	
Site Area	0.33Ha.	
Proposed Development	It is understood that the client intends to deliver a mobility hub development of up to 8 storeys including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit, and a delivery hub.	
Current Site Use	The subject site is a rectangular-shaped parcel of land located to the northeast of Manchester city centre and the Site is currently occupied by low-rise, multi-tenanted industrial estate units, and hardstanding. The Site can be accessed by pedestrians and vehicles via Poland Street. Security fencing runs along the eastern boundary where the Site meets Ancoats Green.	
Site History	The site was formerly occupied by terraced housing prior to 1891, when then redeveloped into Street Main Gas Department. The site then underwent numerous alterations and extensions and was relabeled as Corporation Yard. In 1980, the site was cleared and replaced by the Poland Street Industrial Estate which has remained present to date.	
Environmental Setting	Drift Geology	Glacial Till – Sand, Gravel and Clay.
	Bedrock Geology	Manchester Marls Formation – Mudstone.
	Faults	Two unnamed faults are recorded ca 50 m to the east and ca 50 m to the west.
	Hydrogeology	Secondary undifferentiated aquifer (drift) overlying secondary B bedrock aquifer. No groundwater abstractions recorded in the vicinity of the site.
	Hydrology	The Rochdale Canal is recorded approximately 250 m south of the site.
	Flood Risk	Unaffected by flooding from rivers.
Previous Reports	The following previous reports have been completed for the site:  E3P Phase 1 Geoenvironmental Site Assessment, report ref: 14-868-R1-1 dated April 2021 A full summary of findings is provided in Section 2.1	
Utility Locations	A formal drainage survey has been completed by Hill Cannon (ref: 20-050/DR/AMSCP Flood Risk Assessment and Drainage Strategy (Rev B), dated April 2021. Electricity cables were identified in the south, west and northern boundaries feeding into the back of the current structures on site. Surface water drainage is present across the centre of the site. BT enters the site in the south west from the road and splits along the central facing front of both sets of buildings currently present on site. Two gas lines are present on site, entering the site from the road in the south west and running in line with the central facing sides of the buildings present on site.	
Landfill Sites and Ground Gases	No landfill sites (current or historic) are recorded within 500 m of the site.	



Landfill Sites and Ground Gases continued	The site and surrounding land have undergone several phases of development, including the infilling of a former canal adjacent to the north of the site. Made Ground associated with the historic development may produce hazardous ground gases such as methane and carbon dioxide.
Radon	The Envirocheck report indicates the site is situated in an area where less than 1% of homes are above the "Action Level" and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.
Coal Mining/Land Stability	E3P has concluded that the subject site is classified as low risk from potential shallow coal mining risks and is not located within a development high-risk area.
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.
Initial Conceptual Site Model	Contaminant Sources - Made Ground (historical on-site and adjacent industrial land uses including a corporation yard) – Heavy metals, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, asbestos containing materials and hazardous ground gases Pathways - Direct contact and ingestion - Volatilisation/indoor explosion - Vapour inhalation - Dust inhalation Receptors - Future site users (proposed commercial end-users and construction workers) - Buildings

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: 4 x window sample boreholes; 4 x sonic drilling boreholes to 25.00m – 29.00m bgl; - Construction of four environmental monitoring installations; - Ground gas monitoring; and - Geoenvironmental and geotechnical sampling.
Ground Conditions	Made Ground – 0.0m to 2.60m bgl depths Made Ground deposits were encountered within all exploratory hole locations to depths of between ground level and 2.60 m bgl. Made ground was typically encountered to depths of 2.00m bgl.



Ground Conditions	At ground level locations comprised of asphalt to 0.20m bgl overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded to be present in the north of the site within BH102 and BH104. Made Ground deposits largely comprised of loose black slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic. Granular Made Ground was encountered across the centre and south east areas of the site at depths from 0.20m – 2.60m bgl. Additionally, areas of cohesive made ground was encountered in the northern areas of the site between 0.20m – 2.00m bgl comprising firm dark grey slightly silty gravelly reworked clay. Gravel is medium to coarse angular to subrounded of brick, ceramic, clinker and calcareous deposits.
	DRIFT – 1.4mbgl - 29.00m bgl Drift deposits were encountered within all locations underlying the Made Ground between 1.40m – 29.00m bgl (unproven). Shallow drift deposits (<12.00m bgl) typically comprised stiff medium strength to very stiff high strength dark brown slightly silty slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone and mudstone. At greater depth granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone.
	SOLID – Encountered from 24.00m bgl The solid bedrock geology of the Manchester Marl Formation was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl.
	GROUNDWATER Perched groundwater was encountered during the site investigation at depths between 1.50m bgl and 4.00 m bgl. A deeper groundwater strike was recorded at 12.00m bgl in BH102.



CONTAMINATED LAND ASSESSMENT

Human Health	A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria. This assessment has identified the presence of elevated lead, naphthalene, mercury, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene across the site. The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion. Where hardstanding is present these exceedances will be mitigated. If any soft landscaping is to be incorporated into the design these exceedances can be mitigated through the installation of a 300 mm chemically suitable cover system within all landscaped areas. With regards to the elevated naphthalene and mercury, these present a potential volatilisation to indoor air risk and have been identified throughout the site. Therefore, it is recommended to undertake a more detailed quantitative risk assessment (DQRA) and supplementary site investigation. This would include: ✦ Completing speciation of elevated mercury samples to understand if this poses a theoretical vapour risk. ✦ Installation of dedicated Vapour Monitoring Wells with specialist Carbon Sorption Tubes; ✦ DQRA assessment of sorption tube analysis to assess the actual risk to the proposed dwellings; and, Further investigation may be required within the footprint of the existing buildings.
Controlled Waters	Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS). Elevated total cyanide was identified from leachate analysis undertaken in Made Ground soils in WS103 at 0.75m and 1.50m bgl, following the receipt of supplementary groundwater samples showing no elevated concentration when compared to DWS was identified. Therefore, the cyanide is not considered to be a significant site contaminant source at WS103. Exceedances of heavy metals (selenium and total cyanide), TPH (C16-C35 - aromatic) and PAH (benzo[b]fluoranthene, benzo(a)pyrene, fluoranthene) were recorded within groundwater samples from WS102 and WS104. The presence of low permeability drift deposits up to 12.00m bgl and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway.



Controlled Waters	Elevated TPH C16-C21 exceedances (710 - 940 µg/l) have been recorded within both groundwater samples. However, no TPH C16-C21 exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis of the Made Ground within WS103. A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits in BH101 and BH103. However, this was identified within exploratory holes located in the southern and eastern areas of the site away from where water samples were taken; due to the low permeability strata it is unlikely a pathway is present that would allow TPH from this source to migrate vertically into the groundwater. Therefore, is unlikely that the visual and olfactory hydrocarbons identified within BH101 and BH10 is related to the TPH impact recorded within the groundwater. As such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk. In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters due to no viable migration pathway. However, further works are necessary to assess the risk and potential on-site source associated with TPH impact recorded within groundwater samples as this may pose a human health risk.
Ground Gas	Characteristic Situation 2 (pending completion of gas monitoring by the end of July 2021). Consideration for vapour membranes due to elevated mercury and naphthalene.
Potable Water Infrastructure	Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development. 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	Obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots. All 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 CLAY drift deposits have been assessed as being stiff to very stiff with a net with a net ABP in the order of 150 - 440 kN/m² at circa 1 – 5.00m bgl decreasing with depth to circa 290 - 350kN/m² at circa 20 – 29.00m bgl. Soft very low strength CLAY drift deposits were identified between 2 – 3.00m bgl within WS103 and BH101 with ABP of 37 kN/m². Dense SAND deposits were encountered between 10 – 15.00m bgl with a net ABP of 346 – 372kN/m² decreasing to 304 - 324kN/m² at circa 15 – 20.00m bgl. Medium dense SAND was encountered between 20 – 29.00m bgl with ABP of circa 255 - 286kN/m².



Foundation Options	MUDSTONE bedrock of the Manchester Marl Formation was encountered at 28.00m bgl within BH102 in the north west of the site and BH104 in the east of the site at 24.00m bgl. The bedrock was not encountered within BH103 which was taken to 29.00m bgl. During a phase of enabling works to create a developable platform, all Made Ground will require processing to ensure the material is suitable for reuse in the future development to enable the construction of proposed plots. Based on the proposed redevelopment to an 8 storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended. Given the proposed development a programme of enabling works will be required to reengineer the loose and variable Made Ground to a 95% compaction specification with the base of formation meeting a minimum shear strength. However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.
Building Floor Slabs	Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement. Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding. A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation. Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer. The ground bearing flood slab should be designed by a suitable qualified structural engineer.



Soakaway Drainage	Falling head tests undertaken in natural drift deposits calculated a soil infiltration rate of 2.53E-05 m/s to 2.53E-09. The majority of the falling head tests indicated a poor infiltration rate, As such the use of soakaway drainage is unlikely to be feasible. However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. Should soakaways be used in the development, all soakaways should be designed in accordance with BRE Special Digest 365 – <i>Soakaway Design</i>.
Sulphate Assessment	Majority of the site falls under concrete classification DS1 AC1s. Isolated area of DS3-AC3s within BH104 at 1.50m bgl identified.
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 likely be required to prepare the development platform.
Civil Engineering Excavations	Site observations indicated that excavations should be feasible in the near surface with normal plant equipment. Obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots. Due to the depth and variability of the Made Ground and 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.
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:

- ✿ **Further investigation of inaccessible areas.- beneath the existing building;**
- ✿ **Further investigation to identify source of TPH impact within the groundwater;**
- ✿ **Project-specific foundation schedule (upon receipt of the final development levels);**
- ✿ **Arboricultural survey;**
- ✿ **Detailed Gas assessment;**
- ✿ **Further assessment of Volatile Organic Compounds and Mercury;**
- ✿ **Settlement Analysis for earthworks design;**
- ✿ **Geotechnical earthworks strategy (infrastructure); and**
- ✿ **Remediation and enabling works strategy.**



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DRAWING LIST

14-868-001 - Site Location Plan
14-868-002 - Proposed Development Plan
14-868-003 - Historical Features Plan
14-868-004 - Site Features Plan
14-868-005 - Exploratory Hole Location Plan
14-868-006 - Depth of Made Ground Plan
14-868-010 - Conceptual Site Model Plan
14-868-012 - Depth of Bedrock Plan
14-868-018 - Contamination Exceedances Plan



1. INTRODUCTION

1.1. BACKGROUND

E3P Ltd has been commissioned by MACE on behalf of Manchester Life to undertake a detailed Phase II Geoenvironmental Site Assessment for Unit 7, Poland Street Industrial Estate, Manchester, M4 6AZ.; herein referred to as the site.

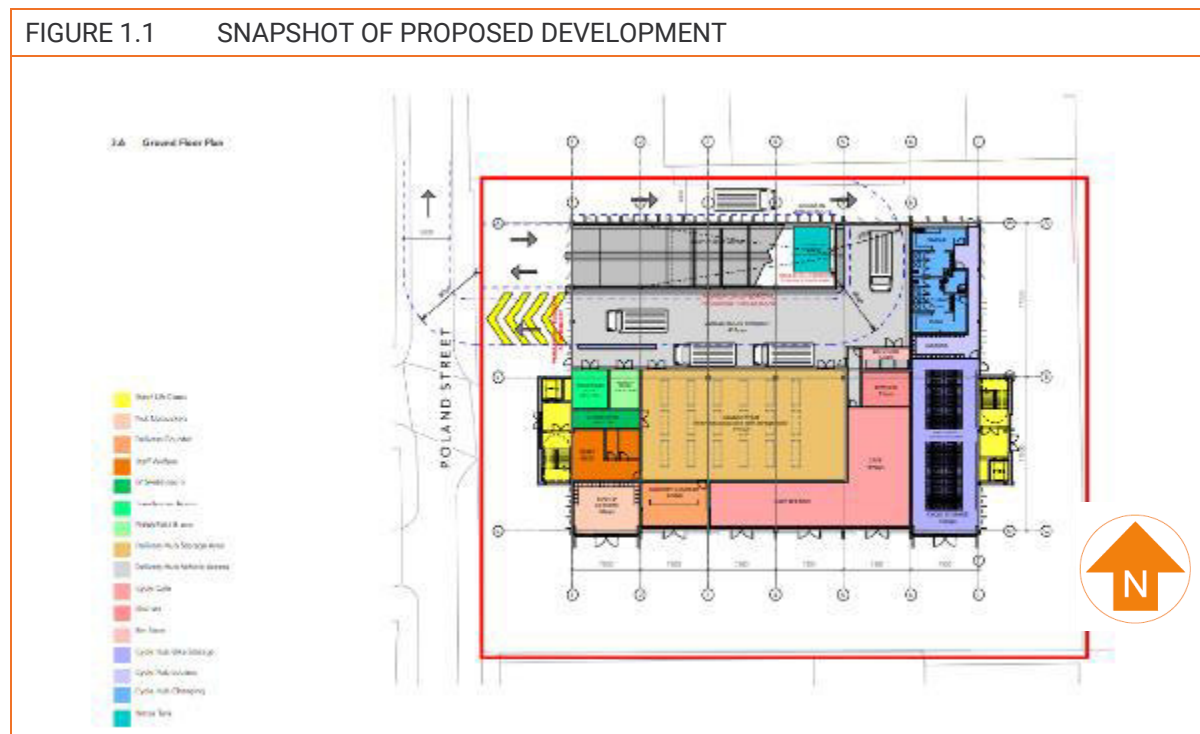
This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed low-rise residential development.

1.2. PROPOSED DEVELOPMENT

E3P understands that the proposed development will comprise a mobility hub development of up to 8 storeys including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit and a delivery hub.

The Proposed Development Scheme is shown in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



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) (2019)*;
- ✦ 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; and
- ✦ Provide recommendations regarding future works required.

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

- ✦ Detailed review of historic information;
- ✦ Design of suitable intrusive ground investigation;
- ✦ Window sample probeholes with, and construction of, environmental monitoring installations;
- ✦ In-situ geotechnical testing;
- ✦ Dynamic sampling boreholes to bedrock;
- ✦ Chemical and geotechnical laboratory analysis;
- ✦ Groundwater monitoring and sampling;
- ✦ Ground gas monitoring;
- ✦ Permeability testing;
- ✦ 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

No previous site investigations have taken place, however E3P have previously completed a Phase 1 report (ref 14-868-R1-1) dated April 2021 that has been summarised below:

Site use

The site is currently occupied by 12 units within an industrial estate. Site tenants include a Community Equipment Store, H2O Ltd, Zenobia Media Production and House of Ethnic Foods Ltd. Externally to the units, the site is surfaced with associated hardstanding where three storage containers and two skips were observed.

Historical Site Use

Historical mapping from 1848 indicates the site was formerly occupied by terraced housing prior to 1891, when then redeveloped into Street Main Gas Department. The site then underwent numerous alterations and extensions and was relabeled as Corporation Yard. In 1980, the site was cleared and replaced by the Poland Street Industrial Estate which has remained present to date

Geology

-  Hydrogeology- Drift - Secondary undifferentiated; and Bedrock - Secondary B aquifer.
-  Drift Geology- Glacial Till (Devensian) – Clay, Sand and Gravel
-  Bedrock Geology- Manchester Marls Formation - Mudstone.
-  Coal Mining- The site is not within a Coal Authority Development High Risk Area and there are no recorded or unrecorded underground coal workings at shallow depth (>30m) beneath the site. E3P has concluded that the subject site is classified as low risk from potential shallow coal mining risks. No further assessment is deemed to be required.
-  No areas of in-filling have been identified and the site is not underlain by any historic shallow mine workings or compressible ground / instability issues which may pose a future subsidence risk.

Human Health

Onsite and adjacent Made Ground deposits associated with existing and historic development are considered to represent a potential source of heavy metal, PAH, TPH, asbestos contamination. ACM is also considered likely to be present within the fabric of the existing onsite structures.

-  Site Sensitivity- Site sensitivity is to be considered low.
-  Ground Gas- Due to the potentially significant thickness of Made Ground underlying the site and adjacent to the site, the generation of methane and carbon dioxide cannot be entirely discounted. The proposed end-use somewhat reduces the sensitivity of the site, however, an assessment of the ground gas regime will likely be required.



Controlled Waters

The existing and historic subject site usage is considered to be a potential source of soluble and mobile contaminants. A weighbridge was formerly recorded within the central area which is considered to represent a potential source of hydrocarbon contamination. Furthermore, a canal was formerly recorded adjacent to the eastern site boundary which was noted to have been infilled and is considered a potential source of mobile contamination which may impact the site. However, risks to the underlying aquifer are considered somewhat reduced given the low sensitivity of the receptor, the presence of impermeable hardstanding surfaces within development proposals and the presence of c.20 m of likely low permeability cohesive deposits underlying the site.

2.2. GENERAL OVERVIEW

A ground investigation has been designed by the structural engineer Hill Cannon Consulting Engineers Ltd on behalf of Manchester Life. Exploratory holes were advanced to target potential contaminant sources identified within the Phase 1 geoenvironmental site assessment. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed on the 26th of April to 4th May 2021. The works are summarised in Table 2.1.

2.3. LIMITATIONS OF THE INVESTIGATION

The site investigation was subject to limitations as access to under the building footprints was not possible. Additionally, to allow the continued access to current industrial units locations were set away from current parking and loading bays. The exploratory hole locations are illustrated in Drawing 14-868-005 (Appendix III).

2.4. SCOPE OF INVESTIGATION

A summary of site works undertaken is presented within table 2.1.



TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions / Install Environmental Monitoring Well	WS101	Window Sample Probehole	5.45	2.00 – 2.50
General Ground Conditions / Install Environmental Monitoring Well	WS102	Window Sample Probehole	5.45	2.00 – 5.00
General Ground Conditions / Install Environmental Monitoring Well	WS103	Window Sample Probehole	5.45	1.50 – 3.50
General Ground Conditions / Install Environmental Monitoring Well	WS104	Window Sample Probehole	5.45	0.50 – 1.50
General Ground Conditions	BH101	Sonic Drilling Borehole	25.00	-
General Ground Conditions	BH102	Sonic Drilling Borehole	29.00	-
General Ground Conditions	BH103	Sonic Drilling Borehole	29.00	-
General Ground Conditions	BH104	Sonic Drilling Borehole	26.00	-

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

Sonic boreholes were advanced to greater depths to undertake in-situ detailed geotechnical testing and obtain environmental samples of underlying soils.

The sampling locations are illustrated in Drawing 14-868-005 (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 and are summarised in Section 4.5.

Falling head permeability testing was undertaken within monitoring wells, the results of which are summarised in Section 3.13.

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 and quantification; and
- ✦ Speciated and banded total petroleum hydrocarbon (TPH).

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 PSL Laboratory where the following geotechnical tests were undertaken:

- ✦ Moisture Content;
- ✦ Atterberg limits determinations;
- ✦ Particle Size Distribution;
- ✦ Optimum Moisture Content/Dry Density;
- ✦ One Dimensional Consolidation; and
- ✦ Single-stage triaxial tests.

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	SOFT CLAY	STIFF TO VERY STIFF CLAY	DENSE SAND	BEDROCK
WS101	0.00 – 2.60	–	2.60 – 5.45*	–	–
WS102	0.00 – 1.40	–	1.40 – 5.45*	–	–
WS103	0.00 – 1.90	1.90 – 3.00	3.00 – 5.45*	–	–
WS104	0.00 – 1.50	–	1.50 – 5.45*	–	–
BH101	0.00 – 2.00	2.00 – 2.40	2.40 – 12.20 12.50 – 15.00 15.60 – 16.20 16.50 – 17.80 18.20 – 19.50 19.80 – 20.00 21.50 – 24.00 24.90 – 25.00*	12.20 – 12.50 15.00 – 15.60 16.20 – 16.50 17.80 – 18.20 19.50 – 19.80 20.00 – 21.50 24.00 – 24.90	–
BH102	0.00 – 2.00	–	2.00 – 12.00 19.70 – 28.00	12.00 – 19.70	28.00 – 29.00*
BH103	0.00 – 1.50	–	1.50 – 13.00 14.00 – 16.00 19.50 – 22.00 24.50 – 29.00*	13.00 – 14.00 16.00 – 19.50 22.00 – 24.50	–
BH104	0.00 – 2.00	–	2.00 – 14.00 20.00 – 24.00	14.00 – 20.00	24.00 – 26.00*

* = Base not proven

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths of between ground level and 2.60 m bgl. Made ground was typically encountered to depths of 2.00m bgl.

At ground level locations comprised of asphalt to 0.20m bgl overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded to be present in the north of the site within BH102 and BH104.

Made Ground deposits largely comprised of loose black slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic. Granular Made Ground was encountered across the centre and south east areas of the site at depths from 0.20m – 2.60m bgl. Additionally, areas of cohesive made ground was encountered in the northern areas of the site between 0.20m – 2.00m bgl comprising firm dark grey slightly silty gravelly reworked clay. Gravel is medium to coarse angular to subrounded of brick, ceramic, clinker and calcareous deposits.

A Depth of Made Ground Plan is presented as Drawing 14-868-006 in Appendix III.



3.3. DRIFT DEPOSITS

Drift deposits were encountered within all locations underlying the Made Ground between 1.40m – 29.00m bgl.

Shallow drift deposits (<12.00m bgl) typically comprised stiff medium strength to very stiff high strength dark brown slightly silty slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone and mudstone.

At greater depth granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone.

3.4. SOLID GEOLOGY

The solid bedrock geology of the Manchester Marls Formation (Mudstone) was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl. The bedrock was encountered as Grey Mudstone at both locations.

A Depth to Bedrock Plan is presented as Drawing 14-868-012 in Appendix III.

3.5. GROUNDWATER

Perched groundwater was encountered during the site investigation at depths between 1.50m bgl and 4.00 m bgl. A deeper groundwater strike was recorded at 12.00m bgl in BH102.

TABLE 3.2 SUMMARY GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
WS101	3.00	Perched within cohesive stratum
	3.80	
WS102	4.00	Perched within cohesive stratum
WS103	1.50	Seepage within Made Ground, perched above cohesive stratum
	3.50	Perched within cohesive stratum
WS104	4.00	Perched within cohesive stratum
BH101	1.60	Seepage within Made Ground, perched above cohesive stratum
BH102	12.00	Encountered within Granular Strata

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present within installed wells. These results are summarised in Table 4.8.

3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has been identified during the site investigation and these are summarised in Table 3.3.



TABLE 3.3 SUMMARY VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
WS101	0.40 – 1.50	Made Ground	Ash
	0.40 – 2.60	Made Ground	Clinker
WS102	0.30 – 1.40	Made Ground	Clinker
WS103	0.30 – 1.90	Made Ground	Clinker & Ash
WS104	0.30 – 1.50	Made Ground	Clinker
BH101	0.40 – 1.20	Made Ground	Hydrocarbon Odour Hydrocarbon Staining Ash
BH103	0.20 – 1.00	Made Ground	Hydrocarbon Odour

3.7. SOIL CONSISTENCY

Undrained shear strength values were measured using laboratory undrained triaxial tests. Results of the tests are presented in Table 3.4, which indicate the clay soils to vary between firm and stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils.

Table 3.4 Summary of Undrained Shear Strength Test Results

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m ²)	CONSISTENCY
CP101	2.00 – 2.50	Stiff brown sandy CLAY.	114	Stiff
CP101	7.50 – 8.00	Firm brown slightly gravelly sandy CLAY.	65	Firm
CP103	5.00 – 5.50	Stiff brown slightly sandy CLAY.	114	Stiff
CP104	10.00 – 10.50	Firm brown slightly gravelly very sandy CLAY.	54	Firm

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 3.5.



TABLE 3.5 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	MG: Gravel	5	5.04	Loose	N/A	N/A	N/A	50.40
	2	MG: Gravel	7	6.39	Loose	N/A	N/A	N/A	63.94
	3	CLAY	19	16.52	N/A	High strength	Very Stiff	82.62	169.86
	4	CLAY	23	19.43	N/A	High strength	Very Stiff	97.16	199.76
	5	CLAY	10	8.30	N/A	Medium strength	Stiff	41.48	85.29
WS102	1	MG: Gravel	4	4.03	Loose	N/A	N/A	N/A	40.32
	2	CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
	3	CLAY	26	22.61	N/A	High strength	Very Stiff	113.05	232.44
	4	CLAY	25	21.12	N/A	High strength	Very Stiff	105.61	217.13
	5	CLAY	16	13.27	N/A	Medium strength	Stiff	66.37	136.46
WS103	1	MG: Gravel	2	2.02	Very Loose	N/A	N/A	N/A	27.60
	2	CLAY	4	3.65	N/A	Very low strength	Soft	18.27	37.56
	3	CLAY	22	19.13	N/A	High strength	Very Stiff	95.66	196.68
	4	CLAY	20	16.90	N/A	High strength	Very Stiff	84.49	173.70
	5	CLAY	11	9.13	N/A	Medium strength	Stiff	45.63	93.81



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)*
WS104	1	MG: Gravel	6	6.05	Loose	N/A	N/A	N/A	28.90
	2	CLAY	15	13.70	N/A	Medium strength	Stiff	68.52	140.87
	3	CLAY	26	22.61	N/A	High strength	Very Stiff	113.05	232.44
	4	CLAY	27	22.81	N/A	High strength	Very Stiff	114.05	234.50
	5	CLAY	21	17.42	N/A	High strength	Very Stiff	87.11	179.10
BH101	1.2	MG: Gravel	21	20.61	Medium Dense	N/A	N/A	N/A	206.06
	2	CLAY	4	3.65	N/A	Very low strength	Soft	18.27	37.56
	3	CLAY	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
	4	CLAY	50	42.24	N/A	Very high strength	Very Stiff	211.21	434.25
	5	CLAY	50	41.48	N/A	Very high strength	Very Stiff	207.41	426.43
	6	CLAY	37	30.34	N/A	Very high strength	Very Stiff	151.68	311.85
	8	CLAY	50	40.47	N/A	Very high strength	Very Stiff	202.37	416.07
	10	CLAY	50	40.26	N/A	Very high strength	Very Stiff	201.31	413.89



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)*
BH101	12	CLAY	50	37.21	N/A	Very high strength	Very Stiff	186.07	382.55
	14	CLAY	50	34.64	N/A	Very high strength	Very Stiff	173.18	356.06
	16	CLAY	50	32.40	N/A	Very high strength	Very Stiff	162.02	333.10
	18	CLAY	50	30.43	N/A	Very high strength	Very Stiff	152.17	312.86
	20	SAND	50	28.67	Medium Dense	N/A	N/A	N/A	286.72
	22	CLAY	50	27.08	N/A	High strength	Very Stiff	135.39	278.37
	24	SAND	50	25.62	Medium Dense	N/A	N/A	N/A	256.23
	25	CLAY	50	24.94	N/A	High strength	Very Stiff	124.70	256.39
BH102	1.2	MG: Gravel	6	5.89	Loose	N/A	N/A	N/A	58.87
	2	CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
	5	CLAY	10	8.30	N/A	Medium strength	Stiff	41.48	85.29
	6	CLAY	9	7.38	N/A	Low strength	Firm	36.89	75.86
	8	CLAY	24	19.43	N/A	High strength	Very Stiff	97.14	199.71



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)*
BH102	12	SAND	50	37.21	Dense	N/A	N/A	N/A	372.13
	14	SAND	50	34.64	Dense	N/A	N/A	N/A	346.35
	16	SAND	50	32.40	Dense	N/A	N/A	N/A	324.03
	18	SAND	50	30.43	Dense	N/A	N/A	N/A	304.33
	20	CLAY	50	28.67	N/A	High strength	Very Stiff	143.36	294.75
	22	CLAY	50	27.08	N/A	High strength	Very Stiff	135.39	278.37
	24	CLAY	50	25.62	N/A	High strength	Very Stiff	128.12	263.41
	26	CLAY	50	24.29	N/A	High strength	Very Stiff	121.43	249.65
	28	MUDSTONE	50	23.05	Medium Dense	N/A	N/A	N/A	230.46
	29	MUDSTONE	50	22.46	Medium Dense	N/A	N/A	N/A	224.59
BH103	1.2	MG: Gravel	5	4.91	Loose	N/A	N/A	N/A	49.06
	2	CLAY	45	41.11	N/A	Very high strength	Very Stiff	205.55	422.60
	4	CLAY	16	13.52	N/A	Medium strength	Stiff	67.59	138.96
	6	CLAY	13	10.66	N/A	Medium strength	Stiff	53.29	109.57
	10	CLAY	50	40.47	N/A	Very high strength	Very Stiff	202.37	416.07



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)*
BH103	12	CLAY	50	40.26	N/A	Very high strength	Very Stiff	201.31	413.89
	14	CLAY	50	37.21	N/A	Very high strength	Very Stiff	186.07	382.55
	16	SAND	50	34.64	N/A	Very high strength	Very Stiff	173.18	356.06
	18	GRAVEL	50	30.43	Dense	N/A	N/A	N/A	304.33
	20	CLAY	50	28.67	N/A	High strength	Very Stiff	143.36	294.75
	22	SAND	50	27.08	Medium Dense	N/A	N/A	N/A	270.78
	24	SAND	50	25.62	Medium Dense	N/A	N/A	N/A	256.23
	26	CLAY	50	24.29	N/A	High strength	Very Stiff	121.43	249.65
	28	CLAY	50	23.05	N/A	High strength	Very Stiff	115.23	236.91
	29	CLAY	50	22.46	N/A	High strength	Very Stiff	112.30	230.88
BH104	1.2	MG: Gravel	9	8.83	Loose	N/A	N/A	N/A	88.31
	2	CLAY	11	41.11	N/A	Very high strength	Very Stiff	205.55	422.60
	3	CLAY	14	13.91	N/A	Medium strength	Stiff	69.57	143.04



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)*
BH104	5	CLAY	13	10.79	N/A	Medium strength	Stiff	53.93	110.87
	8	CLAY	16	40.47	N/A	Very high strength	Very Stiff	202.37	416.07
	12	CLAY	50	37.21	N/A	Very high strength	Very Stiff	186.07	382.55
	14	SAND	50	34.64	Dense	N/A	N/A	N/A	346.35
	16	SAND	50	32.40	Dense	N/A	N/A	N/A	324.03
	18	SAND	50	30.43	Dense	N/A	N/A	N/A	304.33
	20	CLAY	50	28.67	N/A	High strength	Very Stiff	143.36	294.75
	22	CLAY	50	27.08	N/A	High strength	Very Stiff	135.39	278.37
	24	MUDSTONE	50	25.62	Medium Dense	N/A	N/A	N/A	256.23
	26	MUDSTONE	50	24.29	Medium Dense	N/A	N/A	N/A	242.85

NOTES

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

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

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



3.8. SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 3.6, show the clay to be of moderate to low plasticity clay.

TABLE 3.6 SUMMARY OF PLASTICITY INDEX TEST RESULTS

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS102	3.00	17	21	47	26	100	26	Medium
WS104	2.00	21	22	49	27	98	26.46	Medium
BH101	3.00	23	21	43	22	97	21.34	Medium
BH102	2.00	21	18	37	19	95	18.05	Low
BH103	1.00	26	22	45	23	80	18.40	Low
BH104	1.00	21	18	33	15	62	9.30	Low

The results of the Atterberg limits testing confirmed that the soils would be deemed to be “Medium to Low Volume Change Potential” in accordance with the classification system utilised by the LABC/NHBC industry guidance. Designs should be made assuming a medium volume change potential clay.

3.9. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix V (summarised in Table 3.7), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005). One isolated area of DS-3, AC-2s classification have been identified within BH104 at 1.50m bgl.



TABLE 3.7 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (mg/l)	pH VALUE	CLASSIFICATION
WS101	0.75	191	7.5	DS-1, AC-1s
	1.50	104	7.8	DS-1, AC-1s
	2.25	77.7	7.9	DS-1, AC-1s
	3.00	215	7.9	DS-1, AC-1s
WS102	0.75	81.8	7.3	DS-1, AC-1s
	1.50	45.3	8.1	DS-1, AC-1s
	2.25	29.5	7.7	DS-1, AC-1s
	3.00	67.1	7.9	DS-1, AC-1s
WS103	0.75	99.7	7.6	DS-1, AC-1s
	1.50	129	7.6	DS-1, AC-1s
	2.25	52.6	7.7	DS-1, AC-1s
	3.00	49.3	7.8	DS-1, AC-1s
WS104	0.75	52.8	7.4	DS-1, AC-1s
	1.50	252	7.9	DS-1, AC-1s
	2.25	48.0	7.8	DS-1, AC-1s
	3.00	63.1	8.00	DS-1, AC-1s
BH102	0.75	199	8.4	DS-1, AC-1s
	1.50	69.8	8.4	DS-1, AC-1s
	2.25	135	8.9	DS-1, AC-1s
	3.00	318	8.1	DS-1, AC-1s
BH104	0.75	162	8.8	DS-1, AC-1s
	1.50	1640	7.4	DS-3, AC-2s
	2.25	128	7.9	DS-1, AC-1s
	3.00	116	7.8	DS-1, AC-1s



3.10. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples via wet sieve to obtain information on the soil fractions. The results are included in Table 3.8. The full results can be found in Appendix VIII.

TABLE 3.8 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
BH104	1.00 (Made Ground)	0	35	30	35
BH104	5.00 (Drift)	0	12	30	58

3.11. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising a 4.5kg rammer. The results of the tests has been summarised in Table 3.9. The full test results can be found in Appendix VIII.

TABLE 3.9 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 (%)
BH104	Brown gravelly very sandy CLAY.	5.00	4.5kg	19	16	0	1.79	0

The compaction tests have indicated that the materials on site are variable with the material in BH104 being wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

Engineering of this type of material will need to be completed during dry weather periods only.

3.12. SOIL COMPRESSIBILITY

Three undisturbed samples of the drift deposits were submitted for oedometer analysis. The results are provided in Table 3.10.



TABLE 3.10 SUMMARY CONSOLIDATION TEST DATA

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	Mv (m ² /MN)	Cv (m ² /year)
CP101	2.00-2.50	U100	23	0-45	0.294	42.938
				45-90	0.224	1.433
				90-180	0.168	0.767
				180-360	0.114	0.724
				360-45	0.082	0.640
CP103	5.00-5.50	U100	27	0-105	0.177	4.552
				105-210	0.167	0.964
				210-420	0.114	0.866
				420-840	0.076	0.843
				840-105	0.044	0.744
CP104	10.00-10.50	U100	17	0-205	0.234	2.069
				205-410	0.108	0.933
				410-820	0.070	0.809
				820-1640	0.041	0.786
				1640-205	0.018	2.057

When considered at over-burden pressure with an additional load of 110 kPa the coefficient of volume compressibility (Mv) ranged from 0.018m²/MN up to 0.294 m²/MN. The material is considered to be low to medium compressibility.

The rate at which settlement is likely to occur is determined by the coefficient of consolidation (Cv). As shown in Table 3.10, the coefficient ranges from 0.64 m²/yr to 42.94 m²/yr. The rate at which settlement will occur is increased by the presence of sand within the Glacial Till and it is likely that settlement will occur over a period of months to years.

Engineering of this type of material will need to be completed during dry weather periods only.

3.13. SOIL INFILTRATION

In-situ variable (falling) head permeability tests were undertaken within the monitoring well installations located in four probeholes (WS101, WS102, WS103 and WS104). Water was present within all monitoring wells prior to infiltration testing; all locations were bailed before the test was undertaken. As a result, the data has been interpreted as soakaway tests rather than permeability tests. Testing in WS102 was undertaken within monitoring wells with response zones located in the natural cohesive drift stratum.

The results are presented in Table 3.11 and the test certificates are included within Appendix IX.



TABLE 3.11 SOIL INFILTRATION RESULTS

LOCATION	DEPTH (m)	MATERIAL	TEST No.	SOIL INFILTRATION RATE (m/s)
WS101	2.0–2.5	Made Ground: Loose slightly clayey, sandy GRAVEL.	1	3.03E-06
WS102	2.0–5.0	Very stiff slightly gravelly CLAY	1	2.53E-09
WS103	0.5–1.5	Made Ground: Very loose slightly clayey, sandy GRAVEL.	1	3.92E-05
WS104	0.5–1.5	Made Ground: Loose slightly clayey, sandy GRAVEL.	1	2.54E-08

Falling head tests undertaken in natural drift deposits calculated a soil infiltration rate of 2.53E-05 m/s to 2.53E-09. The majority of the falling head tests indicated a poor infiltration rate, as such the use of soakaway drainage is unlikely to be feasible. Additionally, there is currently hydrocarbon impact in the groundwater which would impede the use of soakaways in certain areas of the site.

However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. Should soakaways be used in the development, all soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.



4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 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. DEVIATING SAMPLES

Deviating samples were to be avoided during the ground investigation by using best practice sampling procedures including use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis undertaken.

4.2. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 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 1 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 within Table 4.1.

TABLE 4.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE WITHOUT PLANT UPTAKE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	40	24	37	N/A	1	No Further Action
Cadmium	mg/kg	85	24	<0.2	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	24	<4.0	N/A	1	No Further Action
Lead	mg/kg	200	24	710 650 590 400 280 250	WS104 0.75m WS102 0.75m WS103 0.75m WS103 1.50m WS101 0.75m WS101 1.50m	1	Further Action
Mercury	mg/kg	1.2	24	2.1 1.4	WS103 1.50m WS104 1.50m	4	Further Action
Nickel	mg/kg	180	24	76	N/A	1	No Further Action
Selenium	mg/kg	430	24	<1.0	N/A	1	No Further Action
Copper	mg/kg	7100	24	250	N/A	1	No Further Action
Zinc	mg/kg	40000	24	160	N/A	1	No Further Action
Cyanide – Total	mg/kg	791	24	210	N/A	1	No Further Action
Phenols – Total	mg/kg	210	24	3.9	N/A	1	No Further Action
Asbestos	Fibres	NFD	24	NFD	N/A	3	No Further Action
Naphthalene	mg/kg	2.3	24	3.6 2.9 2.8 2.6	WS103 2.25m WS103 1.50m WS101 2.25m WS103 0.75m	4	Further Action



DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Acenaphthylene	mg/kg	2900	24	1.5	N/A	2	No Further Action
Acenaphthene	mg/kg	3000	24	7.3	N/A	1	No Further Action
Fluorene	mg/kg	2800	24	6.0	N/A	1	No Further Action
Phenanthrene	mg/kg	1300	24	43	N/A	2	No Further Action
Anthracene	mg/kg	31000	24	12	N/A	2	No Further Action
Fluoranthene	mg/kg	1500	24	56	N/A	2	No Further Action
Pyrene	mg/kg	3700	24	57	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	11	24	37 30 24 19 17 13	WS103 0.75m WS101 2.25m WS104 0.75m WS103 1.50m WS102 0.75m WS103 2.25m	2	Further Action
Chrysene	mg/kg	30	24	36 31	WS101 2.25m WS103 0.75m	2	Further Action
Benzo(b)Fluoranthene	mg/kg	3.9	24	46 30 26 21 20 12 11 9.8 6.4 4.7	WS103 0.75m WS101 2.25m WS104 0.75m WS102 0.75m WS103 1.50m BH104 0.75m WS103 2.25m WS101 0.75m WS101 1.50m WS101 3.00m	2	Further Action
Benzo(k)Fluoranthene	mg/kg	110	24	17	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	3.2	24	48 36 28 25 17 12 10 10 5.6 4.7	WS103 0.75m WS101 2.25m WS104 0.75m WS102 0.75m WS103 1.50m WS103 2.25m BH104 0.75m WS101 0.75m WS101 1.50m WS101 3.00m	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	45	24	22	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.31	24	5.9 5.8 5.2 2.8 2.7 1.6 1.3 1.2 0.57 0.41	WS103 0.75m WS101 2.25m WS104 0.75m WS103 1.50m WS102 0.75m BH104 0.75m WS101 1.50m WS101 3.00m WS103 2.25m WS101 0.75m	2	Further Action



DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Benzo(ghi)Perylene	mg/kg	360	24	31	N/A	2	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	24	< 0.001	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	24	< 0.001	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	250	24	5.9	N/A	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	1800	24	50	N/A	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	1900	24	270	N/A	1	No Further Action
TPH C21-C35 (aromatic)*	mg/kg	1900	24	510	N/A	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 1 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 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 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.

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:

- ☛ Lead;
- ☛ Mercury;
- ☛ Naphthalene;
- ☛ Benzo(a)Anthracene;
- ☛ Chrysene;
- ☛ Benzo(b)Fluoranthene
- ☛ Benzo(a)Pyrene; and
- ☛ Dibenzo(a,h)Anthracene.

The laboratory analysis confirms the assessment within the initial conceptual site model that the main constituents of concern were likely to be PAHs and heavy metals. Naphthalene and mercury were also identified throughout the site.



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

✿ The main exposure pathways based on the Tier I exceedances are:

- Soil ingestion;
- Dermal contact and ingestion; and
- Vapour Inhalation (indoor).

The exceedances for all determinands have been identified between 0.75m and 3.00m bgl within Made Ground deposits and drift deposits across the site.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion. The development is proposed to consist of hardstanding across the site, where hardstanding is present this risk will be mitigated. Should any areas of soft landscaping be incorporated into the design these exceedances can be mitigated by the installed of a 300 mm chemically suitable cover system within all proposed landscaping areas.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy; however, industry best practice (as outlined within BRE 465) will require the following minimum depths of certified clean cover:

✿ Landscaped areas– **300 mm**

With regards to the elevated naphthalene and mercury, these present a potential volatilisation to indoor air risk and have been identified throughout the site. Therefore, it is recommended to undertake a more detailed DQRA and supplementary site investigation.

This would include:

- ✿ Completing speciation of elevated mercury samples to understand if this poses a theoretical vapour risk;
- ✿ If speciation of samples identifies a vapour risk - installation of dedicated Vapour Monitoring Wells with specialist Carbon Sorption Tubes;
- ✿ DQRA assessment of sorption tube analysis to assess the actual risk to the proposed dwellings.

Chemical analysis of the natural drift deposits has identified these soils to be unacceptable for use as subsoil within any landscaping areas. Additionally, no suitable topsoil source was identified on site.

Further investigation will be required to determine the chemical analysis for soils underneath the existing buildings.

4.3. 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.



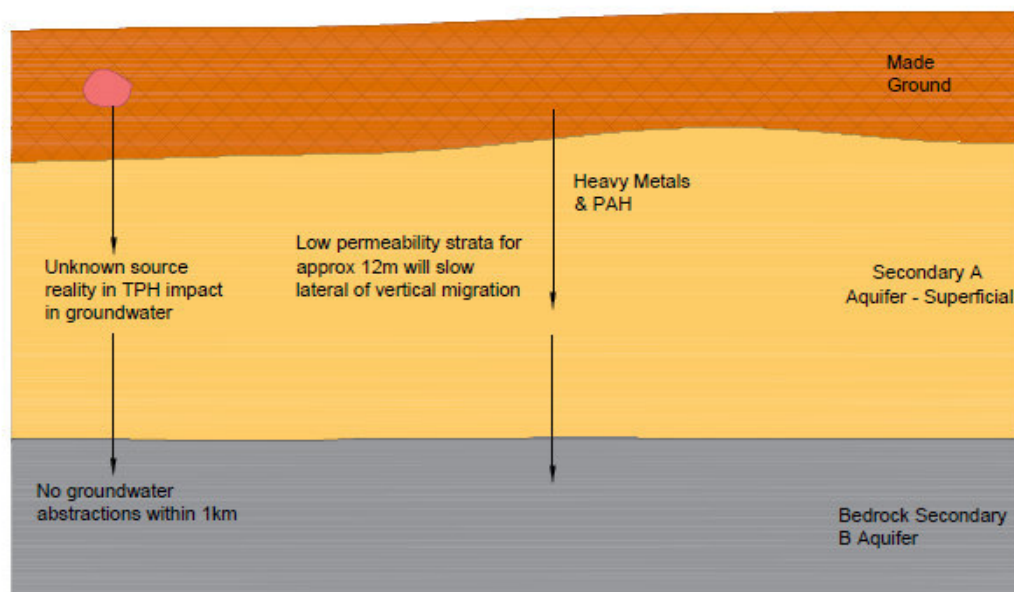
TABLE 4.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Heavy metals, PAH, mercury and naphthalene contamination are present within Made Ground and shallow drift deposits on site.		Medium
Pathway		
Vertical Migration Due to the site being underlain by largely by cohesive drift deposits, vertical migration of contaminants is reduced due to the low permeability of the drift deposits inhibiting vertical migration of contaminants. Additionally, hardstanding across the majority of the site will reduce the vertical migration of contaminants.		Low
Lateral migration Lateral migration of contaminants will be reduced due to the presence of low permeability drift deposits underlying the site.		Low
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated aquifer	Low
Aquifer Classification in Bedrock	Secondary B aquifer	Low
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected	Low
Distance to the Closest Groundwater Abstraction Point	None recorded within 1km of the site	Low
Is the Site Located Within 50 m of a Surface Watercourse?	There are no surface water features located within 50 m of the site.	Low

In addition to above, E3P has developed a diagrammatic conceptual model which considers the factors in Table 4.2. This is available as Drawing 14-868-010 and a snapshot is included in Figure 4.1.



FIGURE 4.1 DIAGRAMMATIC CONCEPTUAL SITE MODEL (CONTROLLED WATERS)



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
BTEX > 1 mg/kg	No source identified on site and no exceeding levels of volatile TPH.	None
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	Was not tested for due to no source located on site, however, PAH analysis has identified elevated levels above the laboratory LOD and human health risk thresholds throughout the site.	Further discussion
C5-C10 > 5 mg/kg	Concentrations of C5-C10 have not been recorded above 5 mg/kg on site.	None
C10-C12 > 10 mg/kg	Concentrations of C10-C12 have not been recorded above 10 mg/kg on site.	None
C12-C16 > 50 mg/kg	Concentrations of C12-C16 have been recorded at (WS103 0.75m bgl) or below 50 mg/kg across the site.	None
Phenols > 2 mg/kg	All concentrations are below 1.0 mg/kg.	None
Naphthalene > 2 mg/kg	Concentrations of naphthalene have been recorded above 2.0 mg/kg at WS101 2.25m, WS103 0.75m, 1.50m and 2.25m bgl.	Further discussion
Total PAH > 10 mg/kg	Concentrations of Total PAH have been recorded above 10 mg/kg across the site with values up to 420 mg/kg recorded (WS103 at 0.75m bgl).	Further discussion
PCB > 1 mg/kg	No potential sources of PCB have been identified	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have been recorded in WS101 at 0.75m and 1.50m, WS102 at 0.75m, WS103 at 0.75m and 1.50m and WS104 at 0.75m (Lead).	Further discussion



Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS). The table below includes site investigation data from E3P from May 2021.

These are presented in Table 4.4.



TABLE 4.4 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS ^{1,2,3}	DWS ^{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Arsenic	µg/l	50	10	2	2.30	N/A	2	7.00	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	2	0.02		2	<0.08		No Further Action
Chromium (VI)	µg/l	3.4	–	2	<5.0		2	<5.0		No Further Action
Chromium (III)	µg/l	4.7	50	2	2.7		2	0.7		No Further Action
Copper	µg/l	1	2000	2	4.1		2	24		No Further Action
Total Cyanide	µg/l	1	50	2	22		2	340 95	WS103 0.75m and 1.50m	Further Action
Lead	µg/l	1.2	10	2	0.5		2	4.8	N/A	No Further Action
Mercury	µg/l	–	1.0	2	<0.05		2	<0.5		No Further Action
Nickel	µg/l	4	20	2	6.5		2	2.6		No Further Action
Selenium	µg/l	–	10	2	31, 11	2	<4.0	Further Action		
Zinc	µg/l	10.9	–	2	10	N/A	2	13		No Further Action
pH	6–9			2	7.3		2	8.1	No Further Action	
Polycyclic Aromatic Hydrocarbons										
Naphthalene	µg/l	2	10*	2	1.1	N/A	2	<0.01	N/A	No Further Action
Anthracene	µg/l	0.1	10*	2	3.2		2	0.30		No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	2	13, 16	WS102 and WS104	2	<0.01		Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	2	7.1	N/A	2	<0.01		No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	2	14, 17	WS102 and WS104	2	<0.01		Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	2	7.6	N/A	2	<0.01		No Further Action
Fluoranthene	µg/l	0.0063	10*	2	16, 22	WS102 and WS104	2	<0.01		Further Action



DETERMINAND	UNIT	EQS ^{1, 2, 3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Benzo(ghi)perylene	µg/l	1.7–4	10*	2	10	N/A	2	<0.01	N/A	No Further Action
Aromatic Hydrocarbon ⁵										
TPH C5-C6 (benzene)	µg/l	10	1	2	<1.00	N/A	2	<1.00	N/A	No Further Action
TPH C6-C8 (toluene)	µg/l	74	700	2	<1.00		2	<1.00		No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	2	<1.00		2	<1.00		No Further Action
TPH C10-C12 (xylene)	µg/l	30	500	2	<1.00		2	<10		No Further Action
TPH C10-C12 (xylene)	µg/l	30	500	2	<1.00		2	<10		No Further Action
TPH C12-C16	µg/l	2	90 ⁵	2	<1.00		2	<10		No Further Action
TPH C16-C35	µg/l	50#	90 ⁵	2	710, 940	WS102 and WS104	2	<10		Further Action
Aliphatic Hydrocarbon ⁵										
TPH C5-C6	µg/l	–	15000	2	<1	N/A	2	<1	N/A	No Further Action
TPH C6-C8	µg/l	–	15000	2	<1		2	<1		No Further Action
TPH C8-C10	µg/l	–	300	2	<1		2	<1		No Further Action
TPH C10-C12	µg/l	–	300	2	<10		2	<10		No Further Action
TPH C12-C16	µg/l	–	300	2	<10		2	<10		No Further Action
TPH C16-C21	µg/l	–	300**	2	<10		2	<10		No Further Action
TPH C21-C35	µg/l	–	300**	2	<10		2	<10		No Further Action
Volatile Organic Compounds										
Tetrachloroethylene	µg/l	0.4	10	2	<1			N/A	N/A	No Further Action
Trichloroethylene	µg/l	10	10	2	<1			N/A		No Further Action



DETERMINAND	UNIT	EQS ^{1, 2, 3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Trichlorobenzene	µg/l	0.4	–	2	<1	N/A		N/A	N/A	No Further Action
Trichloromethane	µg/l	2.5	–	2	<1			N/A		No Further Action
Dichloromethane	µg/l	20	200	2	<1			N/A		No Further Action
Carbon Tetrachloride	µg/l	12	3	2	<1			N/A		No Further Action
Vinyl Chloride	µg/l	–	0.3	2	<1			N/A		No Further Action

Notes

Solubility <0.01µg/l

AA – Annual Average

MAC- Maximum Admissible Concentration

* 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 Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



4.3.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

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

- ✿ Total Cyanide (leachate);
- ✿ Selenium;
- ✿ Benzo[b]fluoranthene;
- ✿ Benzo(a)pyrene;
- ✿ Fluoranthene; and
- ✿ TPH C16-C35 (Aromatic).

Elevated total cyanide values were identified from leachate analysis undertaken in Made Ground soils in WS103 at 0.75m and 1.50m bgl. Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation, therefore following the receipt of supplementary groundwater samples which have sampled the true dissolved phase impact and found no exceedance in total cyanide when compared to the DWS, the total cyanide is not considered to be a significant site contaminant source at WS103.

In relation to the remaining exceedances, Table 4.5 provides a summary.

TABLE 4.5 SUMMARY OF ELEVATED CONTAMINANTS WITHIN GROUNDWATER

CONTAMINANT	DWS (µg/l)	WS102 (µg/l)	WS104 (µg/l)
		Contaminant Source	
		Made Ground	Made Ground
Selenium	10	31	11
Benzo[b]fluoranthene	10	13	16
Benzo[k]fluoranthene	10	5.4	7.1
Benzo(a)pyrene	10	14	17
Fluoranthene	10	16	22
TPH C16-C35 (aromatic)	90	710	940

It should be noted that the Tier I assessment criteria provides a conservative view, which may overstate the risk.

The presence of low permeability drift deposits up to 12.00m bgl and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway.

Elevated TPH C16-C21 exceedances (710 - 940 µg/l) have been recorded within both groundwater samples. However, no TPH C16-C21 exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis of the Made Ground within WS103.

A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits in BH101 and BH103. However, this was identified within exploratory holes located in the southern and eastern areas of the site away from where water samples were taken; due to the low permeability strata it is unlikely a pathway is present



that would allow TPH from this source to migrate into the groundwater. Therefore is unlikely that the visual and olfactory hydrocarbons identified within BH101 and BH10 is related to the TPH impact recorded within the groundwater. As such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters due to no viable migration pathway. However, further works are necessary to assess the risk and potential on-site source associated with TPH impact recorded within groundwater samples as this may pose a human health risk. Additional assessment should be undertaken in areas where visual hydrocarbon impact was identified on site (BH101 0.40-1.20m bgl and BH103 0.20-1.00m bgl).

4.4. GROUND GAS

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). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

4.4.1 INVESTIGATION RATIONALE

The ICSM has identified that the underlying Made Ground may represent a potential source of ground gas generation. Based on the identification of this source, E3P has determined that the site represents a low ground gas source generation potential. Within the context of the proposed residential end use and ground gas generation potential, the gas assessment requires that four visits are required over two months, with at least two sets of readings at low or falling atmospheric pressure as set out within CIRIA 665 Tables 5.5a and 5.5b.

TABLE 4.6 GROUND GAS MONITORING LOCATION RATIONALE

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL RESPONSE ZONE (m bgl)
WS101	Made Ground	2.00 – 2.50
WS102	Natural Drift (CLAY)	2.00 – 5.00
WS103	Made Ground	0.50 – 1.50
WS104	Made Ground	0.50 – 1.50

4.4.2 MONITORING METHODOLOGY

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

Gas measurements were recorded for a minimum of 300 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 4.8.

CIRIA C665 and NHBC Report No 10627-R01 provide assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site based GSVs for steady state methane and carbon dioxide are based upon the following equation:



$$GSV = \frac{\text{concentration (by vol)}}{100} \times \text{flowrate (1 / hr)}$$

The GSVs within CIRIA C665 are based upon all buildings other than standard residential houses. The NHBC GSVs are based upon standard residential houses with precast concrete floors (block and beam). The CIRIA 665 report author (Steve Wilson) since provided further clarification regarding which guidance should be adopted for residential houses that have suspended cast in-situ concrete floor slab: for the avoidance of doubt, it was confirmed that the GSVs within the CIRIA 665 guidance should be adopted. The thresholds for GSVs based upon NHBC and CIRIA guidance are provided within Table 4.7.

TABLE 4.7 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665 AND NHBS REPORT NO 10627-R01 – RESIDENTIAL END USE

CIRIA – NO SUBFLOOR VOID		NHBC – SUBFLOOR VOID		
CLASSIFICATION	GSV (METHANE AND CARBON DIOXIDE)	CLASSIFICATION	GSV (METHANE)	GSV (CARBON DIOXIDE)
CS1	< 0.07	Green	< 0.13	< 0.76
CS2	< 0.70	Amber 1	< 0.63	< 1.60
CS3	< 3.5	Amber 2	< 1.60	< 3.10
CS4	< 15	Red	> 1.60	> 3.10
CS5	< 70	N/A	N/A	N/A
CS6	> 70	N/A	N/A	N/A

4.4.3 SUMMARY OF MONITORING RESULTS

Table 4.8 presents of the ground gas and groundwater monitoring results to date.



TABLE 4.8 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH ₄ INITIAL (%V/V)	CH ₄ STEADY (%V/V)	CH ₄ GSV (l/hr)	CO ₂ INITIAL (%V/V)	CO ₂ STEADY (%V/V)	CO ₂ GSV (l/hr)	O ₂ (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	17/05/2021	0.10	0.10	0.00128	0.60	0.60	0.00768	18.90	998	Rising	1.28	2.00 – 2.50	2.30	1.40
	04/06/2021	0.10	0.10	0.00098	0.70	0.70	0.00686	18.70	1015	Rising	0.98		2.30	1.68
	25/06/2021	0.10	0.10	0.00531	0.40	0.40	0.02124	18.80	1015	Falling	5.31		2.07	1.49
WS102	17/05/2021	0.10	0.10	0.00026	1.90	1.90	0.00494	16.90	998	Rising	0.26	2.00 – 5.00	5.00	0.80
	04/06/2021	0.10	0.10	0.00052	1.50	1.50	0.00780	17.20	1015	Rising	0.52		5.00	0.98
	25/06/2021	0.10	0.10	0.00781	4.60	4.60	0.35926	9.70	1015	Falling	7.81		4.90	1.43
WS103	17/05/2021	0.10	0.10	0.00010	7.70	7.70	0.00770	7.30	998	Rising	0.10	1.00 – 1.50	1.55	1.40
	04/06/2021	0.10	0.10	0.00013	6.10	6.10	0.00793	8.90	1015	Rising	0.13		1.54	1.43
	25/06/2021	0.10	0.10	0.00010	14.50	14.50	0.01450	1.20	1015	Falling	0.10		1.55	1.54
WS104	17/05/2021	0.10	0.10	0.00983	4.80	4.80	0.47184	4.70	998	Rising	9.83	0.50 – 1.50	1.10	0.90
	04/06/2021	0.10	0.10	0.01026	4.20	4.20	0.43092	6.10	1015	Rising	10.26		1.10	0.92
	25/06/2021	0.90	0.90	0.00010	12.20	12.20	0.0122	1.60	1015	Falling	0.10		1.07	1.06

NOTES

Values in BLUE denote water above monitoring well



4.4.1. SOURCES OF GROUND GAS

The Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

- ✦ Made Ground deposits
- ✦ Offsite infilled canal.

4.4.2. GROUNDWATER

Monitoring wells WS101 and WS102 were flooded on three occasions and cannot therefore be included within the gas assessment.

Within the remaining wells, groundwater levels were observed to fluctuate over the monitoring period, with levels generally decreasing over the monitoring period. The greatest groundwater change occurred within WS102 where levels decreased by 0.63m over the monitoring period. WS102 was set within a low-permeability clay stratum and groundwater may be a result of surface water collecting in the well rather than a measure of true groundwater.

4.4.3. GAS FLOW

During the monitoring a positive flow was noted in all window sample locations. The measure of positive flow is considered to be the result of ground gas generation from the made ground identified on site, as gas flows were at the highest during periods of low groundwater levels. However, groundwater fluctuations and flooding of the well causing compression cannot be ruled out.

4.4.4. GAS CONCENTRATIONS

Methane has been recorded within all of the monitoring wells at maximum concentrations of 0.1% v/v.

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.1% v/v to 14.50% v/v (WS103). The maximum carbon dioxide levels were also associated with low oxygen concentrations and appear to be associated with Made Ground.

4.4.5. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 4.9.

TABLE 4.9 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CH ₄ (% v/v)	CH ₄ GSV (l/hr)	MAX CO ₂ (% v/v)	CO ₂ GSV (l/hr)	CLASSIFICATION
WS101	N/A – Well Flooded				
WS102	N/A – Well Flooded				
WS103	0.10	0.00013	14.50	0.1450	CS2
WS104	0.10	0.01026	12.20	0.47184	CS2



The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area. GSV's are below CS1 levels, however CO₂ has been recorded above 10% concentration. Hydrocarbon exceedances were recorded within groundwater samples taken at WS104 and WS102 which may be a potential source of ground gas. No water sample was taken within WS103, however, given its location proximal to WS102 it is likely that hydrocarbon impacted groundwater is present at WS103. As such, gas protection measures, or removal of the source of ground gas is deemed to be necessary.

Consideration should be given for the installation of vapour membranes should the source of elevated mercury and naphthalene remain on site as these contaminants present a potential volatile risk.

Preliminary ground gas monitoring suggests that the site can be classified as CS2, should the source of ground gas not be removed properties within this area will likely require specialist protection measures as detailed below.

4.5. RESIDENTIAL BUILDING GAS RISK MITIGATION

British Standard BS8485 (2015)+A1(2019) provides two types of residential property that require assessment. These building types are:

 **Type C Building** – Commercial building with central building management control of any alterations to the building or its uses and central building management control of the maintenance of the building, including the gas protection measures. Single occupancy of ground floor and basement areas. Small to large-size rooms with active ventilation or good passive ventilation of all rooms and other internal spaces throughout ground floor and basement areas. Probably civil engineering construction. Examples include offices, some retail premises, and parts of some public buildings (such as schools, hospitals, leisure centres and parts of hotels).

Based on the ground gas risk assessment and the proposed Type C Building, it is envisaged that a point score of 2.5 will be required for affected properties, as summarised in Table 4.10.

TABLE 4.10 BS 8485 (2015) POINTS REQUIRED FOR TYPE C BUILDINGS

CHARACTERISTIC SITUATION	MINIMUM GAS PROTECTION SCORE (POINTS)
	MEDIUM RISK
	TYPE A BUILDING TYPE B BUILDING
1	0
2	2.5
3	3
4	4.5
5	5.5
6	– B)

Notes

A) Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

B) The gas hazard is too high for this empirical method to be used to define the gas protection measures.

The requisite 2.5 points must be achieved by installation of a suitable combination of measures detailed in Table 4.11.



TABLE 4.11 SUMMARY OF GROUND GAS MITIGATION MEASURES – BS8485 (2015)+A1(2019)

GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER	SCORE ^A
Floor and Substructure Design	
Precast Suspended Segmental Subfloor (Beam and Block)	0
Cast In-Situ Ground-Bearing Floor Slab (With Only Nominal Mesh Reinforcement)	0.5
Cast In-Situ Monolithic Reinforced Ground-Bearing Raft or Reinforced Cast In-Situ Suspended Floor Slab With Minimal Penetrations	1 or 1.5 ^B
Basement Floor and Walls Conforming to BS 8102:2009, Grade 2 Waterproofing ^C	2
Basement Floor and Walls Conforming to BS 8102:2009, Grade 3 Waterproofing ^C	2.5
^A) The scores are conditional on breaches of floor slabs, etc. being effectively sealed. ^B) To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see A.2.2.2). ^C) The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product (see C.3, Note 4).	

PROTECTION ELEMENT SYSTEM		SCORE	COMMENTS
Gas protection scores for ventilation protection measures			
(a) Pressure Relief Pathway – Usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.		0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is 0.
(b) Passive Subfloor Dispersal Layer – Media used to provide the dispersal layer are: Clear void; Polystyrene void former blanket; Geocomposite void former blanket; No-fines gravel layer with gas drains; and No-fines gravel layer.	Very good performance	2.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS 8485 (2015). Passive ventilation should be designed to meet at least “good performance”.
	Good performance	1.5	
		1.5 to 2.5	
(c) Active Dispersal Layer – Usually comprising fans with active abstraction (suction) from a subfloor dilution layer with roof-level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.			



PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
(d) Active Positive Pressurisation – Provided by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.	1.5 to 2.5	This system relies on continued operation of the pumps; therefore alarm and response systems should be in place. The score assigned should be based on the efficient “coverage” of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least “good performance”.
(e) Ventilated Car Park – Floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park.	4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].
Gas Protection Score for the Gas-Resistant Membrane		
Gas-resistant membrane meeting all of the following criteria: ☛ Sufficiently impervious to the gases with a methane gas transmission rate < 40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); ☛ Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; ☛ Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); ☛ Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre-reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools); ☛ Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and ☛ Verified in accordance with CIRIA C735.	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. For example, a minimum 0.4 mm thickness (equivalent to 370 g/m² for polyethylene) reinforced membrane (virgin polymer) meets the performance criteria opposite. If a membrane is installed that does not meet all the criteria opposite, then the score is 0.
This table should be read in conjunction with the notes presented in BS 8485 (2015)+A1 (2019)		

4.6. POTABLE WATER SUPPLY

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



TABLE 4.12 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	<0.001
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	15
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	830
Phenols (From SVOC Analysis)*	2	3.90
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	NA
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	WS103 at 1.50m – EC16-EC40 Hydrocarbons WS101 at 1.50m – Phenols	
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 – heavy end hydrocarbon impact and low solubility PAH has been identified within Made Ground. Groundwater levels are generally deeper than pipeline depth.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	No	
Will soils be imported to site as part of any future earth works	Currently unknown, however it is unlikely soils will be required to be imported to site.	

Notes - Pipe line depth normally between 0.50m–1.35m

Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development.



4.7. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 4.14 has been prepared for the site.

TABLE 4.13 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	High	LOW
Discussion: Site wide heavy metals (lead) has been identified in shallow Made Ground and drift deposits from 0.75m to 1.50m bgl. PAH (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene) has also been identified in the Made Ground and shallow drift deposits at site wide from 0.75m to 3.00m bgl. These contaminants have likely arisen from the historic development and activities on the site and have a risk to human health via dermal contact and ingestion of soils. Recommendation: Where hardstanding is present the risk associated with this contaminant is negated as it will prevent exposure to future site users. Should any soft landscaping be incorporated into the final design an inert cover system will be required to 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.	Likely	Moderate	LOW
Assessment: Asbestos has not been identified within the sample tested, however once the demolition of the building present on site occurs this may change due to the age of the buildings. Recommendation:						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
No further assessment. Should any ACM be identified during the enabling works, these should be dealt with in accordance with protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (Asbestos in Soil and Made Ground: A guide to understanding risk).						
PL4	Volatile Contaminants such as hydrocarbons, (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Likely	High	TO BE DETERMINED
Assessment: Naphthalene was identified within WS101 at 2.25m bgl in drift deposits and WS103 at 0.75m, 1.50m and 2.25m bgl in drift and made ground deposits. Mercury was identified at WS103 and WS104 at 1.50m bgl within drift deposits. Recommendation: These contaminants present a potential volatilisation to indoor air risk. Therefore, it is recommended to undertake a more detailed DQRA and supplementary site investigation. Where a potentially unacceptable degree of risk is identified, the impacted soils should either be remediated or alternatively the proposed structure should be designed with appropriate mitigation measures to remove the potential pollution linkage						
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.	Likely	High	LOW
Assessment: Deep Made Ground has been identified as potential sources of hazardous ground gas with preliminary findings recording CO₂ concentrations above 10% v/v. No elevated methane concentrations have been recorded to date. Ground gas migration is a risk to human health due to the inhalation of gases and the risk of asphyxiation.						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
Recommendation: Initial monitoring suggests that the site can be classified as CS2, however this will be confirmed on completion of the monitoring.						
PL5	Mobile contaminants such as metals and PAHs (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (secondary A aquifer).	Likely	Low	LOW
Assessment: Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS). Elevated total cyanide was identified from leachate analysis undertaken in Made Ground soils in WS103 at 0.75m and 1.50m bgl, following the receipt of supplementary groundwater samples showing no elevated concentration when compared to DWS, the cyanide is not considered to be a significant site contaminant source at WS103. Exceedances of heavy metals (selenium and total cyanide), TPH (C16-C35 - aromatic) and PAH (benzo[b]fluoranthene, benzo(a)pyrene, fluoranthene) were recorded within groundwater samples from WS102 and WS104. The presence of low permeability drift deposits up to 12.00m bgl and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway. Elevated TPH C16-C21 exceedances (710 - 940 µg/l) have been recorded within both groundwater samples. However, no TPH C16-C21 exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis of the Made Ground within WS103. A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits in BH101 and BH103. However, this was identified within exploratory holes located in the southern and eastern areas of the site away from where water samples were taken; due to the low permeability strata it is unlikely a pathway is present that would allow TPH from this source to migrate into the groundwater. Therefore, is unlikely that the visual						



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
and olfactory hydrocarbons identified within BH101 and BH10 is related to the TPH impact recorded within the groundwater. As such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk. In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters. However, further works are necessary to assess the risk and potential on site source associated with TPH impact recorded within groundwater samples. Recommendation: Further assessment to investigate source of TPH impact in groundwaters and within areas of visual and olfactory hydrocarbon impact (BH101 and BH103).						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/Low	LOW
Assessment: The majority of soils at the site meet class DS-1, AC-1s. Soils within BH104 meet class DS-3, AC-2s at 1.50m bgl. Recommendation: Concrete should be designed in accordance with the chemical testing results.						
PL7	Organic contaminants such as hydrocarbons (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	LOW
Assessment: No elevated concentrations have been identified within the Tier 1 Human Risk assessment. However, when compared to PE pipeline threshold concentrations exceedances of phenols and aliphatic and aromatic hydrocarbons (C10-C16 and C16-C40) were recorded at the proposed pipeline depth (0.75 m – 1.35 m). Additional elevated concentrations of C16-C40 were identified in WS103 at 1.50m bgl and elevated concentrations of phenols in WS101 at 1.50m bgl outside of pipeline depth. Recommendation: Based on the assessment of current site conditions, it is likely that barrier pipe will be required. This will need to be confirmed with a UKWIR risk assessment post remediation.						



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POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	LOW

Assessment:

Contamination has been encountered within shallow Made Ground in the form of heavy metals. The levels are considered to be significantly high and may therefore, impact the growing potential of any proposed vegetation or trees, these may also 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 and allow full, substantial root growth or placement of soils in an area where no vegetation is proposed.

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

E3P understands that the proposed development will comprise a mobility hub development of up to 8 storeys including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit and a delivery hub.

The scheme will involve the demolition of the existing buildings on site.

5.2. SUMMARY OF GROUND CONDITIONS

MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths of between ground level and 2.60 m bgl. Made ground was typically encountered to depths of 2.00m bgl.

At ground level locations comprised of asphalt to 0.20m bgl overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded to be present in the north of the site within BH102 and BH104.

Made Ground deposits largely comprised of loose black slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic. Granular Made Ground was encountered across the centre and south east areas of the site at depths from 0.20m – 2.60m bgl. Additionally, areas of cohesive made ground was encountered in the northern areas of the site between 0.20m – 2.00m bgl comprising firm dark grey slightly silty gravelly reworked clay. Gravel is medium to coarse angular to subrounded of brick, ceramic, clinker and calcareous deposits.

A Depth of Made Ground Plan is presented as Drawing 14-868-006 in Appendix III.

DRIFT DEPOSITS

Drift deposits were encountered within all locations underlying the Made Ground between 1.40m – 29.00m bgl.

Shallow drift deposits (<12.00m bgl) typically comprised stiff medium strength to very stiff high strength dark brown slightly silty slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone and mudstone.

At greater depth granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone.

SOLID GEOLOGY

The solid bedrock geology of the Manchester Marls Formation (Mudstone) was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl. The bedrock was encountered as Grey Mudstone at both locations.

A Depth to Bedrock Plan is presented as Drawing 14-868-012 in Appendix III.



GROUNDWATER

Perched groundwater was encountered during the site investigation at depths between 1.50m bgl and 4.00 m bgl. A deeper groundwater strike was recorded at 12.00m bgl in BH102.

A summary of groundwater strikes is given as Table 3.2 in section 3.5 of this report.

5.3. 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.
- ✿ Demolition of all existing buildings and removal of all concrete hardstanding.
- ✿ Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- ✿ Buried structures and old foundations are likely to be present under current building footprints. These should be excavated from below the proposed development footprint with the resulting void backfilled.

5.4. 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

COHESIVE SOILS			
Description	Depth (Range m bgl)	Undrained Shear Strength (Cu) (kN/m ²)	Allowable Bearing Pressure (kN/m ²)
Soft very low strength CLAY (WS103 and BH101)	2.00 - 3.00	18	37
Stiff medium strength CLAY	2.00 - 5.00	41 - 69	85 - 143
	5.00 - 10.00	36	75
Stiff to very stiff high to very high strength CLAY	2.00 - 5.00	82 - 217	169 - 447
	5.00 - 10.00	97 - 207	199 - 426
	10.00 - 15.00	173 - 201	356 - 413
	15.00 - 20.00	143 - 173	294 - 356
	20.00-29.00	112 - 143	230 - 294



GRANULAR SOILS			
Description	Depth (range m bgl)	Relative Density	Allowable Bearing Pressure (kN/m ²)
Medium dense SAND	20.00 - 29.00	Medium Dense	256 - 286
Dense SAND	10.00 - 15.00	Dense	346 - 372
	15.00 - 20.00	Dense	304 - 324
Dense GRAVEL (BH103)	15.00 - 20.00	Dense	304
MUDSTONE	20.00-29.00	Medium Dense	224 - 256

Based on the proposed redevelopment to an 8 storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended.

Given the existing buildings present on site a programme of remediation and enabling works will be required to remove the extensive buried obstructions and to reengineer the loose and variable Made Ground to a 95% compaction specification with the base of formation meeting a minimum shear strength.

However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

Therefore, upon completion of these enabling works, the Made Ground is likely to be present at varying depths and as such it is likely that the most cost effective option for the site would be to construct the structure on a driven piled foundation.

Consideration should be given for ground improvement should a ground bearing slab be adopted.

Differential settlement should be considered between structural loadings, ground bearing floor slabs and external areas when utilising a piled foundation option. Compaction of the Made Ground for the lightly loaded floor slab would be required.

Based on our extensive experience of similar sites, we would anticipate that the final foundation solution would be a combination of the following:

- ✳ Piled foundation into bedrock geology; and
- ✳ Re-engineer the Made Ground to support the ground bearing slab.

5.5. GROUND FLOOR SLABS

Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement.



Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding.

A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.

Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Where it is necessary to undertake cut-and-fill works utilising site-derived cohesive soils, careful consideration must be given to seasonal climatic conditions, which will have a significant impact of moisture conditions and the ability to compact clay soils in the wetter winter months. It may be necessary to undertake an element of stabilisation works through the addition of lime to ensure the soils can be engineered to the required performance standards.

It would be possible to utilise soil stabilisation techniques that incorporate the addition of lime and OPC to construct a stiffened soil horizon with a CBR > 15% to constitute a sub-base replacement layer that could then be capped with Type 1 MOT. The use of soil stabilisation could be extended within the conjectured zone of tree influence to modify the structure of clay soils and negate the potential for volumetric instability.

5.6. HEAVE PRECAUTIONS

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

As the clay is deemed to be medium volume change, heave precautions are not required to the internal face of the external load-bearing walls (outside or within tree influence).

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.

If the ground floor slab is to be constructed with a beam and block floor, a minimum subfloor void of 200 mm is required within any structures located in the zone of conjectured tree influence.

If the ground floor slab is constructed with a cast in-situ suspended floor slab, then heave precautions that can tolerate 50 mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

A summary of heave precautions is presented in Table 5.2.



TABLE 5.2 SUMMARY OF HEAVE PRECAUTIONS

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRECAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	Required Foundation Depth (m)	Thickness of Void Former Against Side of Foundation or Ground Beam (mm)	Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)	Void Dimension (mm)
High Plasticity (> 40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	35	150	300
	1.5–2.0	25	75	
Moderate Plasticity (20–40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	25	100	250
	1.5–2.0	25	50	
Low Plasticity (< 20)	2.0–2.5	N/A	50	200
	> 2.0	No Special Precautions		

5.7. 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.

5.8. DRAINAGE

Falling head tests undertaken in natural drift deposits calculated a soil infiltration rate of 2.53E-05 m/s to 2.53E-09. The majority of the falling head tests indicated a poor infiltration rate, as such the use of soakaway drainage is unlikely to be feasible. Additionally, there is currently hydrocarbon impact in the groundwater which would impede the use of soakaways in certain areas of the site.

However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. Should soakaways be used in the development, all soakaways should be designed in accordance with BRE Special Digest 365 – *Soakaway Design*.



5.9. 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). With the exception of BH104 that will required to be designed in accordance with Design Sulphate Class DS-3 Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2s.

5.10. EXCAVATIONS

Site observations indicate that excavations should be feasible in the near surface with normal plant equipment.

Obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Due to the depth and variability of the Made Ground and 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 5.3 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	No	Bedrock has been encountered at depth above 24.00m bgl.



5.11. CONSTRUCTION ACTIVITY AND INSPECTION

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

- ✳ Excavation and grubbing out any obstructions below the current structure on site.
- ✳ 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 with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
- ✳ Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✳ The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).



5.12. GEOTECHNICAL RISK REGISTER

POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils		Site Wide	100	PAH and heavy metals were present on site, that can be mitigated through the aid of a cover system. Volatiles (mercury and naphthalene) are present across the site and will require removal of contaminated soils to prevent a vapour risk. Additional testing of soils beneath structures and within areas not currently investigated is required.
Shallow Bedrock		N/A	0	Bedrock encountered at depths of 24.00m bgl - 28.00m bgl.
Cohesive Stratum overlying shallow Bedrock (<3.00m)		N/A	0	Cohesive deposits located site wide to depths >10.00m bgl. No shallow bedrock present.
Obstructions		Under current buildings	30	Site has been subject to historical development with current buildings still in place.
Artificially levelled and filled platforms		Site Wide	100	The site is generally level, this is likely as a result of the historical development and artificially levelling of the site.
Retaining walls		N/A	0	No retaining walls were recorded on site.
Mature trees		Periphery	10	Sporadic peripheral semi-mature and mature trees are located on the eastern and western site boundaries.
Running sands		N/A	N/A	Data searches indicate very low risk.
Ground dissolution		N/A	N/A	Data searches indicate no hazard.



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POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Concrete design		Site Wide	100	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 <i>Special Digest 1</i> (2005). With the exception of BH104 that will required to be designed in accordance with Design Sulphate Class DS-3 Aggressive Chemical Environment for Concrete Classification (ACEC) AC-2s.
Low-permeability ground		Site Wide	100	The use of soakaway drainage is not likely due to cohesive drift, additionally the lateral continuity of the Made Ground cannot be assured, as such it is not recommended that soakaways are utilised for disposal of surface water runoff.
Services/sensitive structures		Periphery	25	Electricity cables were identified in the south, west and northern boundaries feeding into the back of the current structures on site. Surface water drainage is present across the centre of the site. BT enters the site in the north west from the road and splits along the front of both sets of buildings currently present on site. Two gas lines are present on site, entering the site from the road in the south west and running in line with the central facing sides of the buildings present on site.
Abnormal foundation solutions		Site Wide	100	Due to the proposed development comprising an 8 storey building a piled foundation solution is recommended.
Areas not investigated		Under current buildings	30	Beneath the existing buildings.



5.13. FURTHER WORKS

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

- ✧ Further investigation of inaccessible areas.- beneath the existing buildings;
- ✧ Project specific foundation schedule (upon receipt of the final development levels);
- ✧ Further investigation to identify source of TPH impact in ground waters;
- ✧ Arboricultural survey;
- ✧ Detailed Gas assessment;
- ✧ Further assessment of Volatile Organic Compounds and Mercury;
- ✧ Settlement Analysis for earthworks design;
- ✧ Geotechnical earthworks strategy (infrastructure); and
- ✧ Remediation and enabling works strategy.



6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria. This assessment has identified the presence of elevated lead, naphthalene, mercury, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene across the site. The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion. Where hardstanding is present these exceedances will be mitigated. If any soft landscaping is to be incorporated into the design these exceedances can be mitigated through the installation of a 300 mm chemically suitable cover system within all landscaped areas. With regards to the elevated naphthalene and mercury, these present a potential volatilisation to indoor air risk and have been identified throughout the site. Therefore, it is recommended to undertake a more detailed DQRA and supplementary site investigation. This would include:  Installation of dedicated Vapour Monitoring Wells with specialist Carbon Sorption Tubes;  DQRA assessment of sorption tube analysis to assess the actual risk to the proposed dwellings; and,  Completing speciation of elevated mercury samples to understand if this poses a theoretical vapour risk. Further investigation may be required within the footprint of the existing buildings.
Controlled Waters	Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS). Elevated total cyanide was identified from leachate analysis undertaken in Made Ground soils in WS103 at 0.75m and 1.50m bgl, following the receipt of supplementary groundwater samples showing no elevated concentration when compared to DWS, the cyanide is not considered to be a significant site contaminant source at WS103.



	Exceedances of heavy metals (selenium and total cyanide), TPH (C16-C35 - aromatic) and PAH (benzo[b]fluoranthene, benzo(a)pyrene, fluoranthene) were recorded within groundwater samples from WS102 and WS104. The presence of low permeability drift deposits up to 12.00m bgl and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway. Elevated TPH C16-C21 exceedances (710 - 940 µg/l) have been recorded within both groundwater samples. However, no TPH C16-C21 exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis of the Made Ground within WS103. A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits in BH101 and BH103. However, this was identified within exploratory holes located in the southern and eastern areas of the site away from where water samples were taken; due to the low permeability strata it is unlikely a pathway is present that would allow TPH from this source to migrate into the groundwater. Therefore, is unlikely that the visual and olfactory hydrocarbons identified within BH101 and BH10 is related to the TPH impact recorded within the groundwater. As such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk. In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters due to no viable migration pathway. However, further works are necessary to assess the risk and potential on-site source associated with TPH impact recorded within groundwater samples as this may pose a human health risk.
Ground Gas	Characteristic Situation 2 (pending completion of gas monitoring by the end of July 2021). Consideration should be given for the installation of vapour membranes should the source of elevated mercury and naphthalene remain on site.
Potable Water	Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development. 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.



6.2. GEOTECHNICAL ASSESSMENT

Based on the proposed redevelopment to an 8 storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended. However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

Upon completion of these enabling works, the Made Ground is likely to be present at varying depths and as such it is likely that the most cost effective option for the site would be to construct the structure on a driven piled foundation and to re-engineer the Made Ground to support the ground bearing slab.

Differential settlement should be considered between structural loadings, ground bearing floor slabs and external areas when utilising a piled foundation option. Compaction of the Made Ground for the lightly loaded floor slab would be required.

A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.

Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Designs should be made considering a medium plasticity clay underlying the site.

Concrete classification will be DS1 AC1s. Isolated area of DS3-AC3s within BH104.

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



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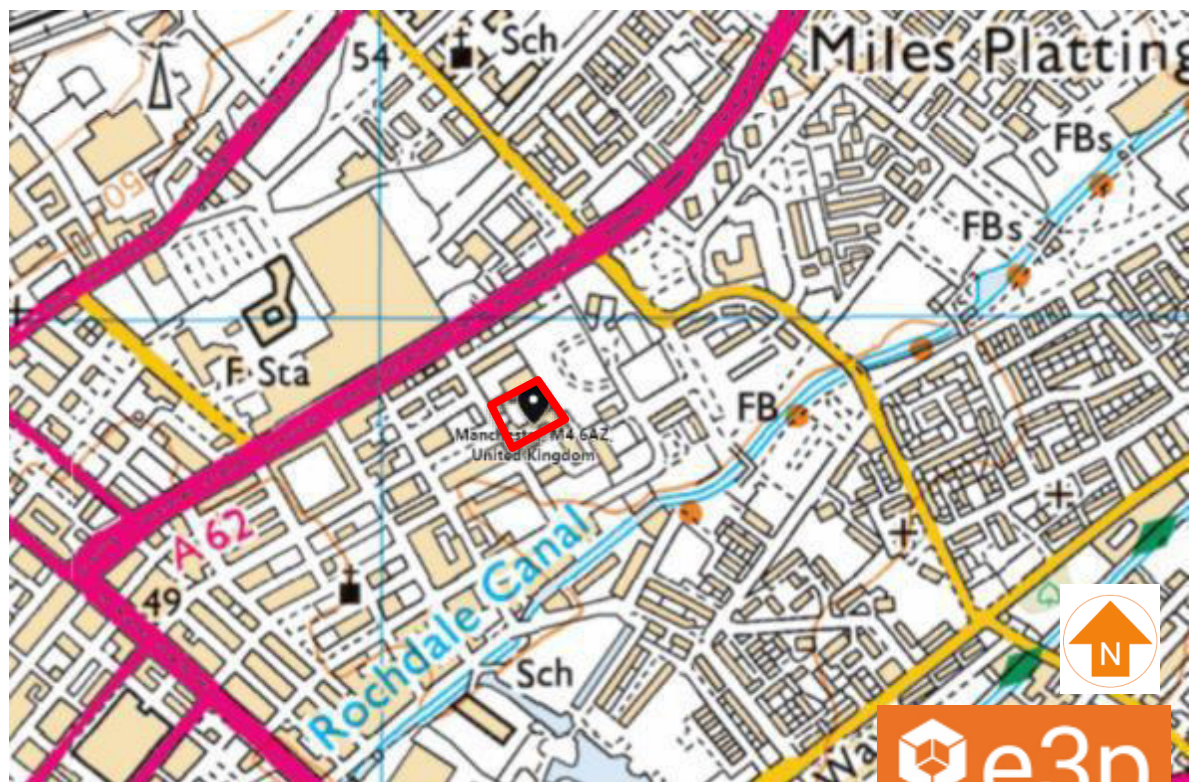
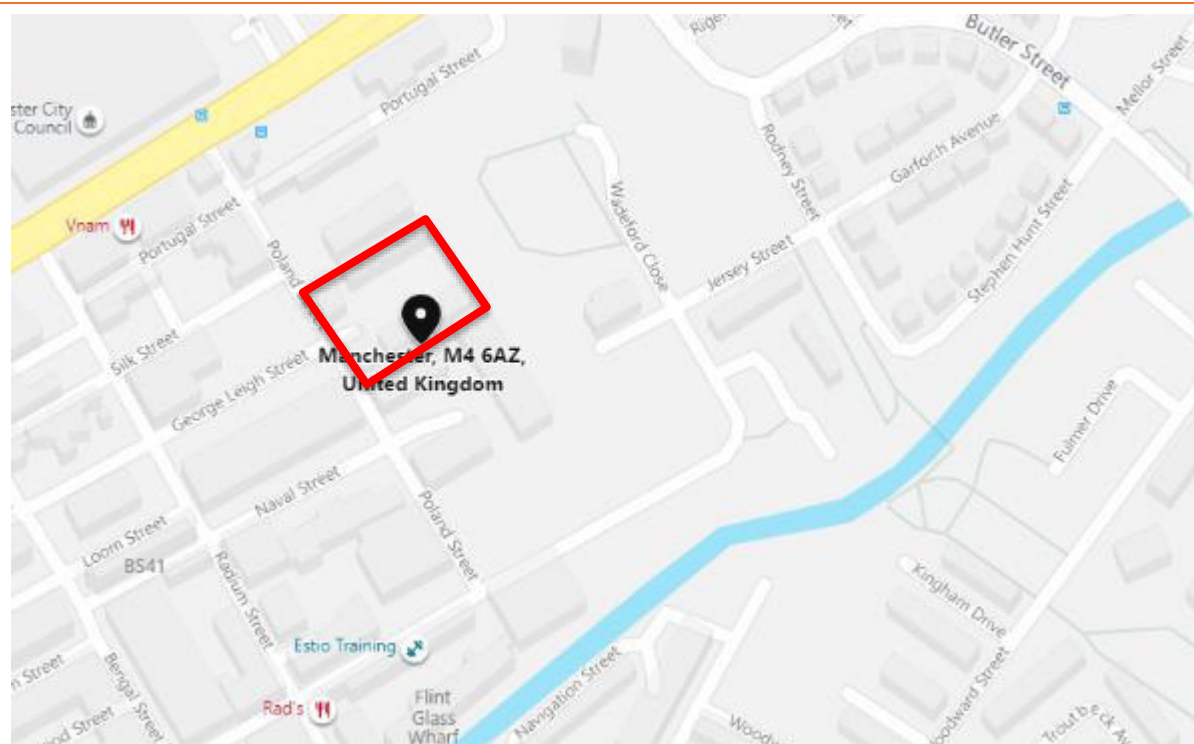
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance 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 14-868-001 – SITE LOCATION PLAN





Notes:				
P1	REVA	09.04.2021	LM	SE
Phase	Issue	Date	Drawn	Checked

Client:	
MACE	
Job Title:	
Ancoats MSCP	

Job No:	14-868	Date:	09.04.2021
Drawing No:	002	Scale:	NTS
Drawing Title:		Proposed Development Plan	



Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
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Historical Features

- Former Buildings
- Former Buildings
- Current Buildings
- Corporation Yard

Notes:

P1	REVA	08.04.2021	LM	SE
Phase	Issue	Date	Drawn	Checked

Client:

MACE

Job Title:

Ancoats MSCP

Job No:	14-868	Date:	08.04.2021
Drawing No:	003	Scale:	NTS

Drawing Title:

Historical Features Plan

Environmental Engineering Partnership Ltd
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Site Features Buildings Soft Landscaping and trees Storage Containers Skip Hardstanding	Notes:					Client: MACE		Job No: 14-868	Date: 08.04.2021	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: 004	Scale: NTS	
	P1 REVA 08.04.2021 LM SE Phase Issue Date Drawn Checked					Job Title: Ancoats MSCP		Drawing Title: Site Features Plan		



Location Symbols WS101 Approximate Window Sample Probehole Location BH101 Approximate Cable Percussive Borehole Location	Notes:					Client: MACE	Job No: 14-868	Date: 13.07.2021	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
						Job Title: Ancoats MSCP	Drawing No: 005	Scale: NTS	
	P1 Phase	REVA Issue	13.07.2021 Date	LM Drawn	SE Checked	Drawing Title: Exploratory Hole Location Plan	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 Cable Percussive Borehole Location

Made Ground Depth (m)

Depth of Made Ground 0.00 - 0.24m

Depth of Made Ground 0.25 - 0.49m

Depth of Made Ground 0.50 - 0.74m

Depth of Made Ground 0.75 - 0.99m

Depth of Made Ground 1.00 - 1.24m

Depth of Made Ground 1.25 - 1.49m

Depth of Made Ground 1.50 - 1.74m

Depth of Made Ground 1.75 - 1.99m

Depth of Made Ground >2.00m

Notes:

P1	REVB	19.07.2021	EB	SE
P1	REVA	14.07.2021	LM	SE
Phase	Issue	Date	Drawn	Checked

Client:

MACE

Job Title:

Ancoats MSCP

Job No:

14-868

Drawing No:

006

Date:

19.07.2021

Scale:

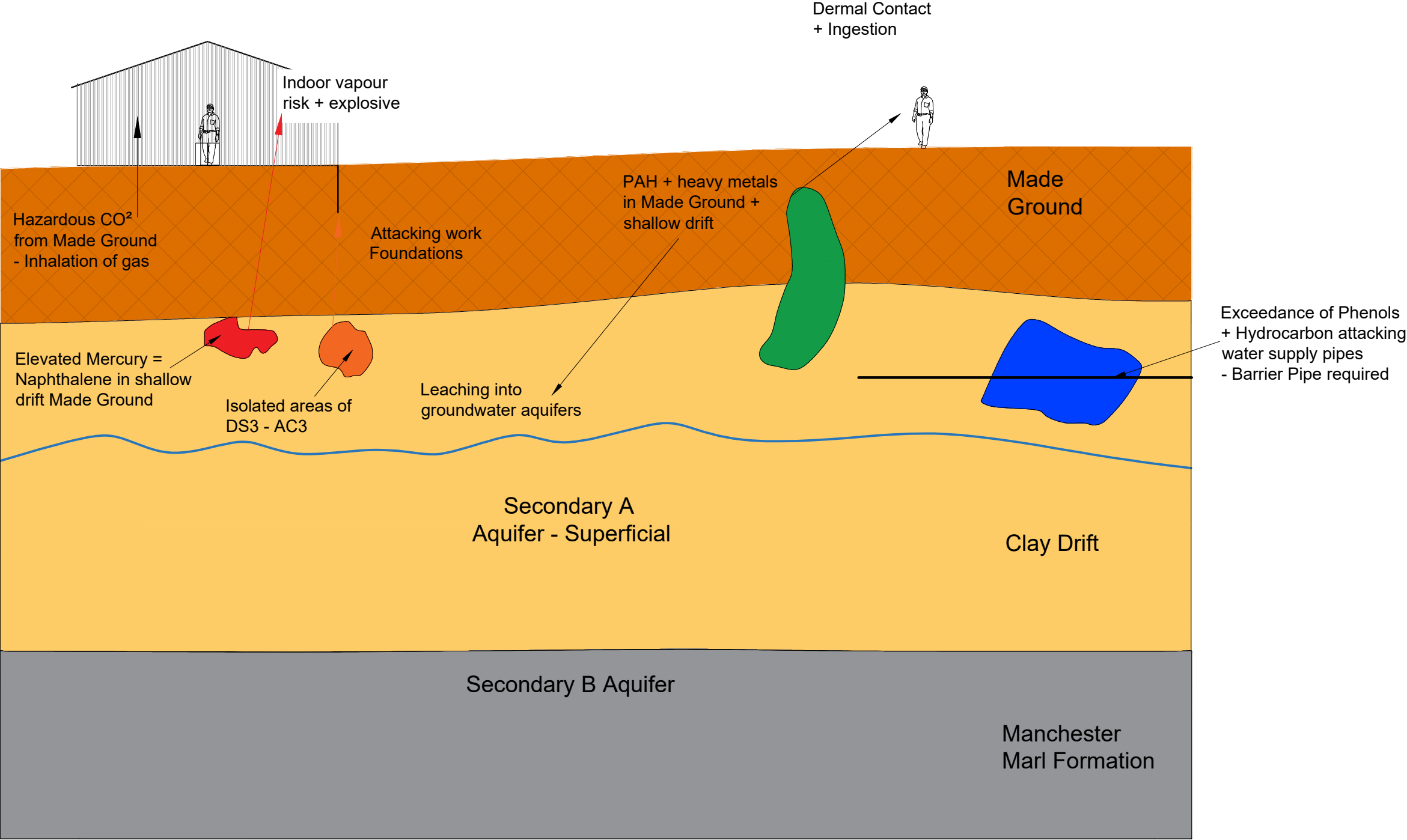
NTS



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

Depth of Made
Ground Plan

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Geology Key

- Made Ground
- Clay Drift
- Manchester Marl Formation
- Isolated DS3 - AC3
- Mercury + Naphthalene
- PAH + Heavy Metals
- Phenols + Hydrocarbons
- Water Pipe

Notes:

P1	REVA	20.07.2021	LM	MD
Phase	Issue	Date	Drawn	Checked

Client:

MACE

Job Title:

Ancoats MSCP

Job No:

14-868

Drawing No:

010

Date:

20.07.2021

Scale:

NTS

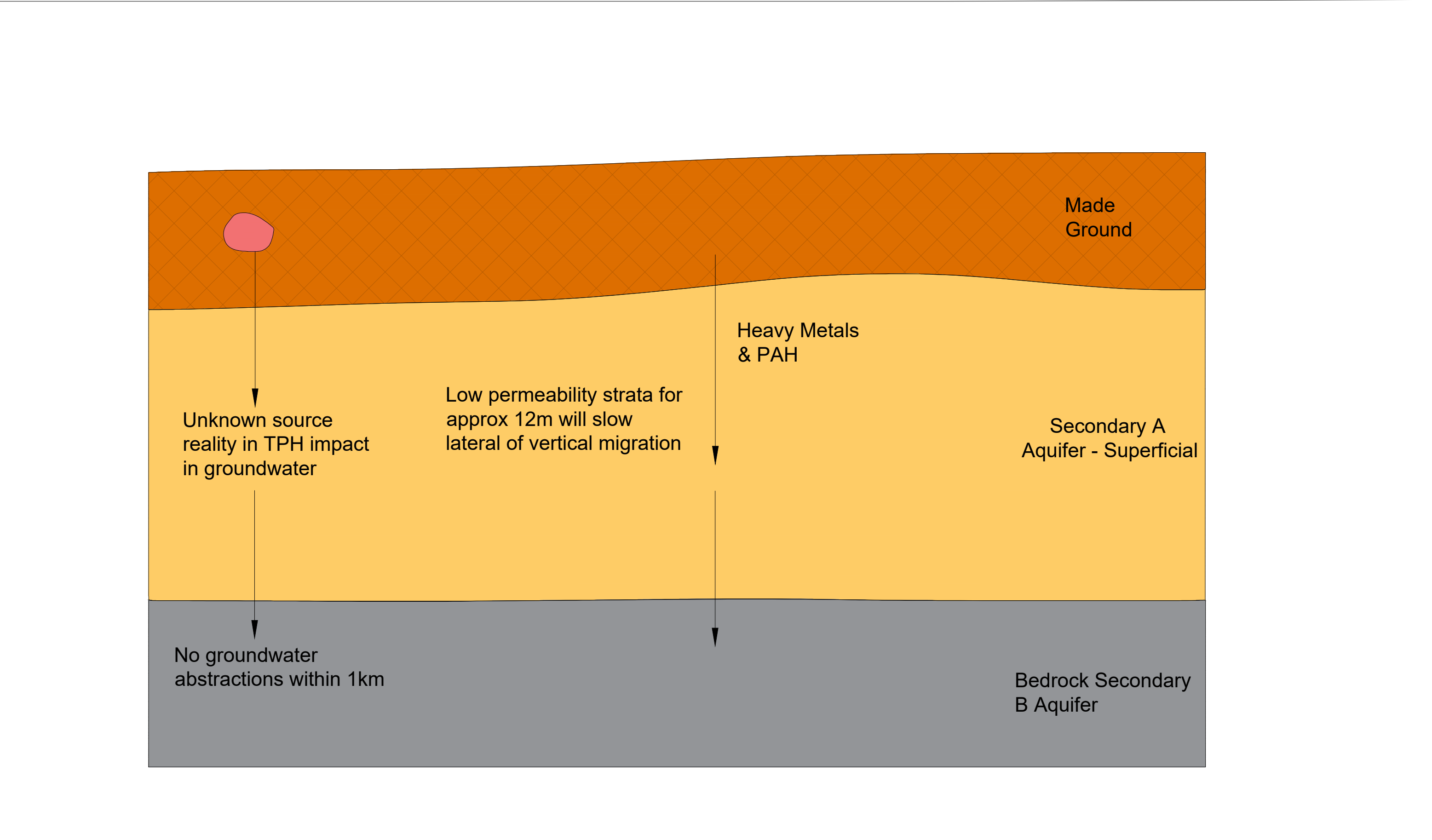
Drawing Title:

Conceptual Site Model - Soils

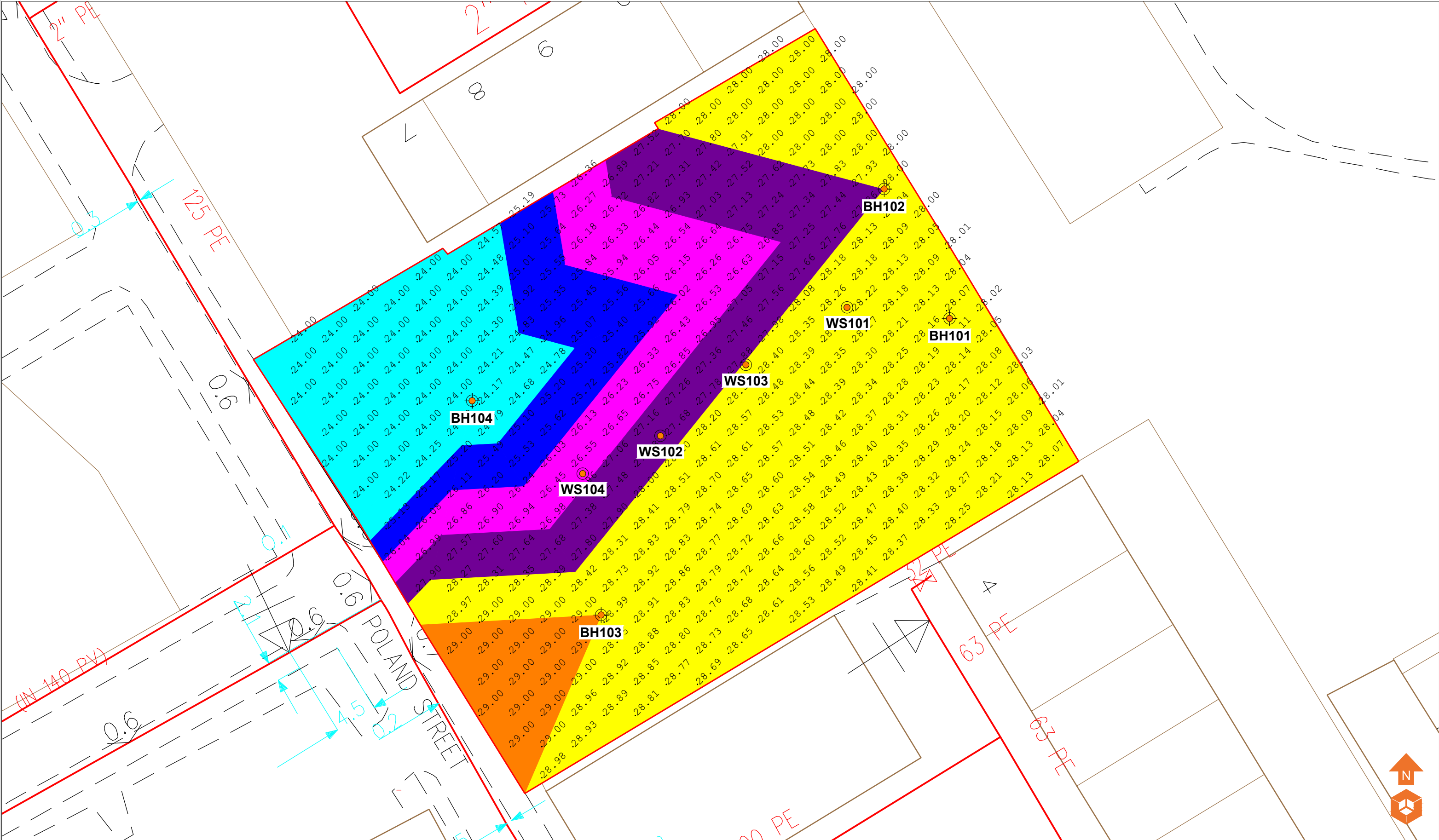


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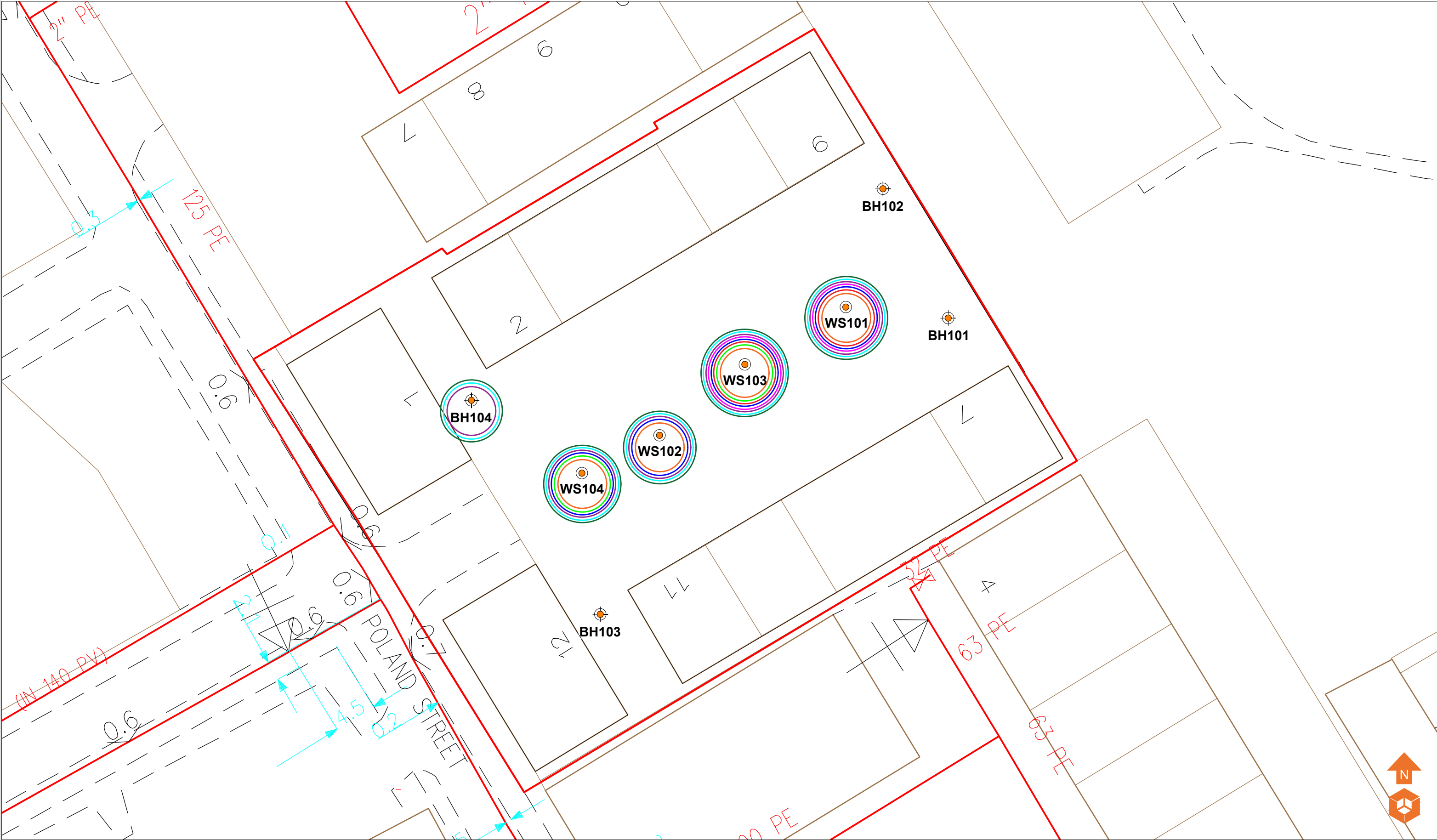
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Geology Key Made Ground Clay Drift Manchester Marl Formation Unknown Source	Notes:					Client:		Job No:	Date:	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk
						MACE		14-868	20.07.2021	
								Drawing No:	Scale:	
						Job Title:		Drawing Title:		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	20.07.2021	LM	MD	Ancoats MSCP		Conceptual Site Model - Waters		
	Phase	Issue	Date	Drawn	Checked					



Location Symbols WS101 Approximate Window Sample Probehole Location BH101 Approximate Cable Percussive Borehole Location		Depth to Bedrock (m) Depth to Bedrock 22.00 - 22.99m Depth to Bedrock 23.00 - 23.99m Depth to Bedrock 24.00 - 24.99m Depth to Bedrock 25.00 - 25.99m Depth to Bedrock 26.00 - 26.99m Depth to Bedrock 27.00 - 27.99m Depth to Bedrock 28.00 - 28.99m Depth to Bedrock 29.00 - 29.99m Depth to Bedrock >30.00m		Notes:		Client: MACE		Job No: 14-868		Date: 14.07.2021		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	
				P1REVA14.07.2021LMSE		Job Title: Ancoats MSCP		Drawing No: 012		Scale: NTS			
				PhaseIssueDateDrawnChecked		Drawing Title: Depth to Bedrock Plan		The client must not amend any drawing, design or other intellectual property produced by E3P Ltd without permission in writing from E3P Ltd in advance of any amendments being made. In the event that such written permission is not obtained in advance of the amendments being made, E3P Ltd shall not be liable for any damage and/or losses occurring as a result of the amended drawing, design or intellectual property.					



Location Symbols WS101 Approximate Window Sample Probehole Location BH101 Approximate Cable Percussive Borehole Location Contamination Exceedances Dibenzo(ah)Anthracene Benzo(a)pyrene Lead Mercury Naphthalene Benzo(b)Fluoranthene Benzo(A)Anthracene Chrysene	Notes:					Client: MACE		Job No: 14-868	Date: 21.07.2021	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
						Job Title: Ancoats MSCP		Drawing No: 018	Scale: NTS	
	P1 Phase	REVA Issue	21.07.2021 Date	LM Drawn	SE Checked	Drawing Title: Contamination Exceedances Plan		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 LOOKING NORTH OF THE SITE



PLATE 2 ON SITE SKIPS



PLATE 3 WS101 ARISINGS



PLATE 4 WS102 ARISINGS



PLATE 5 WS103 ARISINGS



PLATE 6 WS104 ARISINGS



PLATE 7 EXAMPLE OF MONITORING WELL INSTALL (WS101)



PLATE 8 BH101 ARISINGS



PLATE 9 BH101 DEEP DRIFT DEPOSITS



PLATE 10 BH102 ARISINGS (CLAY)



PLATE 11 BH103 ARISINGS (CLAY + SAND)



APPENDIX V

E3P EXPLORATORY HOLE LOGS

Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385188E - 398905N

Hole Type
WS

Location: Manchester

Level: 51.30 m AOD

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 26/04/2021

Logged By
G. Calvert

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.10	51.30		MADE GROUND: Asphalt.	
								MADE GROUND: Concrete.	
					0.40	51.20		MADE GROUND: Loose black slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic.	1
		0.75	ES						
		1.00	SPT	N=5 (1,1/1,1,1,2)					
		1.20	PP	11.04					
		1.50	ES		1.50	50.90			
					1.80	49.80		MADE GROUND: Dark grey slightly silty gravelly reworked clay. Gravel is medium to coarse angular to subrounded of brick, ceramic, clinker and calcareous deposits.	2
		2.00	SPT	N=7 (1,0/1,2,2,2)				MADE GROUND: Loose black slightly clayey sandy fine gravel. Gravel is fine to medium subangular to subrounded of brick, clinker, concrete, sandstone and ceramic.	
		2.25	ES						
		2.50	U		2.60	49.50		Very stiff, high strength dark brown slightly silty slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone and mudstone. (Becoming stiff, medium strength circa 5.00m bgl)	3
		3.00	ES						
		3.00	SPT	N=19 (2,2/4,4,5,6)					
		4.00	SPT	N=23 (4,4/5,5,6,7)					4
		5.00	SPT	N=10 (1,2/2,3,2,3)					5
					5.45	48.70		End of Borehole at 5.45m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Water strike encountered at 3.00m and at 3.80m bgl. 3. Response zone: 2.00-2.50m bgl. 4. Collapsed at 3.00m due to water.

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385173E - 398895N

Hole Type
WS

Location: Manchester

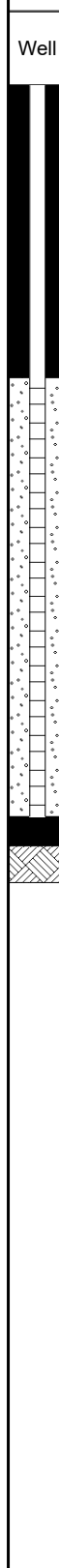
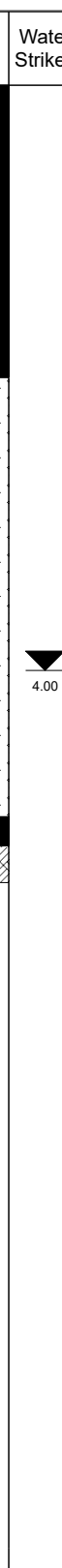
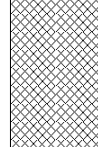
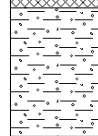
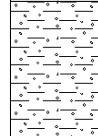
Level: 51.36 m AOD

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 26/04/2021

Logged By
G. Calvert

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.10	51.36		MADEGROUND: Asphalt.		
					0.30	51.26		MADE GROUND: Concrete.		
								MADE GROUND: Loose black slightly clayey sandy fine gravel. Gravel is fine to medium subangular to subrounded of brick, clinker, concrete, sandstone, coal and ceramic.	1	
		0.75	D							
		0.75	ES							
		1.00	SPT	N=4 (2,2/2,1,0,1)						
					1.40	51.06		Stiff, medium strength grey slightly silty slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	2	
		1.50	ES							
		1.70	PP	49.05						
		2.00	SPT	N=12 (1,2/2,3,3,4)						
		2.25	ES		2.25	49.96		Very stiff, high strength brown and grey mottled slightly gravelly CLAY. Gravel is fine subrounded of mudstone (Becoming stiff, medium strength circa 5.00m bgl)		
		2.50	U							
		2.60	PP	88.29						
		3.00	ES							
		3.00	SPT	N=26 (3,5/5,6,7,8)					3	
		4.00	SPT	N=25 (3,5/5,6,7,7)						4
5.00	SPT	N=16 (3,3/3,4,4,5)						5		
			5.45	49.11	End of Borehole at 5.45m					
								6		
								7		
								8		
								9		
								10		

Remarks

1. Complete. 2. Water strike encountered at 4.00m bgl. 3. Response zone: 2.00-5.00m bgl.

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385180E - 398902N

Hole Type
WS

Location: Manchester

Level: 51.33 m AOD

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 26/04/2021

Logged By
G. Calvert

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	51.33		MADE GROUND: Asphalt.	
		0.30			0.30	51.23		MADE GROUND: Concrete.	
		0.75	ES					MADE GROUND: Very loose black slightly clayey sandy fine gravel. Gravel is fine to medium subangular to subrounded of brick, frequent clinker, concrete, sandstone, coal, ash and ceramic.	1
		1.00	SPT	N=2 (2,1/0,1,0,1)					
		1.50	ES					Soft, very low strength light grey gravelly silty CLAY. Gravel is fine to coarse angular to subrounded of brick and clinker. (Becoming very stiff, high strength circa 3.00m bgl) (Becoming stiff, medium strength circa 5.00m bgl)	2
		2.00	SPT	N=4 (0,1/1,1,1,1)	1.90	51.03			
		2.25	ES						
		3.00	ES						3
		3.00	SPT	N=22 (2,4/4,5,6,7)					
		3.80	PP	76.03				End of Borehole at 5.45m	4
		4.00	SPT	N=20 (2,3/4,4,6,6)					
		5.00	SPT	N=11 (2,2/2,3,3,3)					5
		5.45			5.45	49.43			6
									7
									8
									9
									10

Remarks

1. Complete. 2. Water strike encountered at 1.50m and 3.50m bgl. 3. Response zone: 0.50-1.50m bgl.

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385165E - 398890N

Hole Type
WS

Location: Manchester

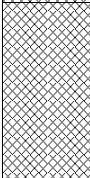
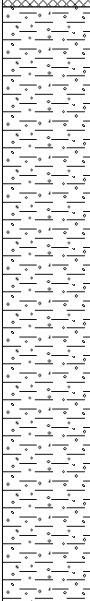
Level: 51.22 m AOD

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 26/04/2021

Logged By
G. Calvert

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.10	51.22		MADE GROUND: Asphalt.		
					0.30	51.12		MADE GROUND: Concrete.		
		0.75	ES						MADE GROUND: Loose black slightly clayey sandy fine gravel. Gravel is fine to medium subangular to subrounded of brick, clinker, concrete, sandstone and ceramic.	
		1.00	SPT	N=6 (2,1/1,1,2,2)						1
		1.50	ES							
		1.60	PP	53.96	1.50	50.92		Stiff medium strength grey mottled brown slightly gravelly CLAY. Gravel is fine subrounded of mudstone. (Becoming very stiff, high strength circa 3.00m bgl)		
		2.00	SPT	N=15 (2,2/2,4,4,5)						2
		2.25	ES							
		2.60	PP	78.48						
		3.00	ES							
3.00	SPT	N=26 (3,3/5,6,7,8)				3				
	 4.00	4.00	SPT	N=27 (3,4/6,6,7,8)					4	
		5.00	SPT	N=21 (2,3/5,5,5,6)					5	
					5.45	49.72		End of Borehole at 5.45m		
									6	
									7	
									8	
									9	
									10	

Remarks

1. Complete. 2. Water strike encountered at 1.50m and 4.50m bgl. 3. Response zone: 0.50-1.50m bgl.

Borehole Log

Borehole No.

BH101

Sheet 1 of 3

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385197E - 398906N

Hole Type
BH

Location: Manchester

Level:

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 27/04/2021

Logged By
M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15 0.30 0.40			MADE GROUND: Asphalt.	
								MADE GROUND: Black very sandy gravel. Gravel fine to medium angular to subrounded of asphalt, mudstone and sandstone.	
								MADE GROUND: Concrete with laid brick.	
		0.75	ES					MADE GROUND: Medium dense black slightly sandy gravel with sweet hydrocarbon odour and staining.	
		1.00	D					Gravel fine to coarse angular to subrounded of ash, clinker, brick, mudstone and sandstone.	1
		1.20	SPT	N=21 (3,4/3,4,7,7)	1.20			MADE GROUND: Medium dense grey sandy, clayey gravel with very strong hydrocarbon odour and staining. Gravel is fine to medium angular to subrounded of ash, brick, sandstone and mudstone.	
		1.50	ES						
		2.00	D		2.00			Soft very low strength grey slightly gravelly CLAY. Gravel is fine subrounded of sandstone.	2
		2.00	SPT	N=4 (1,1/1,0,1,2)					
		2.20	PP	11.28					
		2.25	ES		2.40				
		2.50	U					Very stiff very high strength brown slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	
		3.00	D						3
		3.00	ES						
		3.00	SPT	50 (7,11/50 for 225mm)					
		4.00	D						4
		4.00	SPT	50 (4,4/50 for 230mm)					
		5.00	D						5
		5.00	SPT	50 (6,7/50 for 235mm)					
		6.00	D						6
		6.00	SPT	N=37 (4,7/10,11,7,9)					
		7.50	U						7
		8.00	D						8
		8.00	SPT	50 (5,7/50 for 240mm)					
		9.50	U						9
		10.00	D						10

Remarks

				Borehole Log				Borehole No. BH101 Sheet 2 of 3		
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385197E - 398906N		Hole Type BH		
Location: Manchester				Level:		Scale 1:50				
Client: Hill Cannon Consulting Engineers Ltd				Dates: 27/04/2021		Logged By M. Jackson				
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		10.00	SPT	50 (10,13/50 for 205mm)				Very stiff very high strength brown slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone.	11	
						11.50				
		12.00	SPT	50 (25 for 70mm/50 for 80mm)				Very stiff brown slightly gravelly, sandy CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.	12	
						12.20				
						12.40			Dense brown gravelly SAND. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.	
						12.50			Dense brown very clayey SAND.	
									Very stiff very high strength brown slightly gravelly, sandy CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.	13
						13.50				
		14.00	SPT	50 (25 for 60mm/50 for 40mm)				Very stiff brown slightly gravelly, sandy CLAY. Gravel is coarse sunrounded of sandstone.	14	
						14.20			Very stiff very high strength brown sandy CLAY.	
						15.00				
						15.60			Dense brown slightly gravelly, clayey SAND. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.	15
		16.00	SPT	50 (25 for 50mm/50 for 30mm)				Very stiff very high strength brown slightly gravelly, sandy CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.	16	
						16.20				
						16.50			Dense orangeish brown medium to coarse slightly clayey SAND.	
									Very stiff very high strength brown gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.	17
						17.80				
		18.00	SPT	50 (25 for 75mm/50 for 145mm)				Dense orangeish brown fine to medium clayey SAND.	18	
						18.20				
				18.40			Stiff high strength brown slightly gravelly, sandy CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.			
							Very stiff brown slightly gravelly, sandy CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.	19		
				19.50						
				19.80			Dense Brown fine to medium SAND.			
				20.00			Very stiff very high strength brown CLAY.	20		
Remarks										

					Borehole Log			Borehole No. BH101 Sheet 3 of 3		
Project Name: Ancoats MSCP					Project No. 14868		Co-ords: 385197E - 398906N		Hole Type BH	
Location: Manchester					Level:			Scale 1:50		
Client: Hill Cannon Consulting Engineers Ltd					Dates: 27/04/2021			Logged By M. Jackson		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		20.00	SPT	50 (25 for 70mm/50 for 135mm)				Medium dense brown fine to medium SAND.	21	
					21.50					
		22.00	SPT	50 (25 for 65mm/50 for 125mm)				Stiff high strength brown gravelly CLAY. Gravel is fine subangular to sunrounded of sandstone and mudstone.	22	
					22.80					
								Stiff high strength greyish brown CLAY.	23	
		24.00	SPT	50 (25 for 75mm/50 for 130mm)	24.00				24	
								Brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sunrounded of sandstone and mudstone.		
		25.00	SPT	50 (25 for 60mm/50 for 125mm)	24.90 25.00				25	
								Stiff high strength brown CLAY.		
									26	
									27	
									28	
									29	
									30	
Remarks										

Borehole Log

Borehole No.

BH102

Sheet 1 of 3

Project Name: Ancoats MSCP

Project No.
14868

Co-ords: 385184E - 398922N

Hole Type
BH

Location: Manchester

Level:

Scale
1:50

Client: Hill Cannon Consulting Engineers Ltd

Dates: 06/05/2021

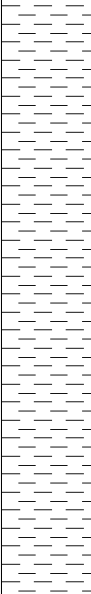
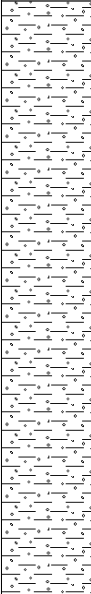
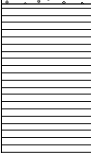
Logged By
E.Canham

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Asphalt.	
		0.75	ES					MADE GROUND: Firm black gravelly clay. Gravel is fine to medium angular to subrounded of asphalt, mudstone, sandstone and brick.	1
		1.00	ES						
		1.20	SPT	N=6 (2,1/1,1,2,2)	1.10			MADE GOUND: Firm brown gravelly clay. Gravel is fine to coarse angular to subrounded of mudstone and brick.	
		1.50	ES						
		2.00	D			2.00		Stiff medium strength brown gravelly CLAY. Gravel is fine to coarse angular to subrounded of mudstone.	2
		2.00	ES	N=10 (2,2/1,2,2,5)					
		2.00	SPT						
		3.00	D			3.00		Stiff medium strength brown gravelly CLAY. Gravel is fine to coarse angular to subrounded of mudstone and brick.	3
		3.00	U			3.20		Stiff medium strength brown CLAY.	
		4.00	D						4
		4.00	U						
		5.00	D						5
		5.00	SPT	N=10 (2,3/3,2,2,3)	5.20			Stiff medium strength brown slightly sandy CLAY.	
					5.30			Stiff medium strength brown CLAY.	
		6.00	SPT	N=9 (2,2/2,2,2,3)	6.00			Firm low strength brown gravelly CLAY. Gravel is fine to coarse angular to subrounded of mudstone.	6
									7
					7.20			Stiff medium strength brown sandy CLAY.	
		8.00	SPT	N=24 (4,6/6,5,6,7)	8.00			Very stiff high strength brown CLAY.	8
									9
		10.00	U						10

Remarks

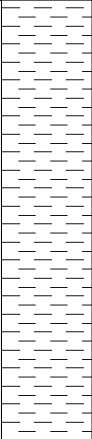


				Borehole Log				Borehole No. BH102	
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385184E - 398922N		Sheet 3 of 3	
Location: Manchester				Level:		Hole Type BH			
Client: Hill Cannon Consulting Engineers Ltd				Dates: 06/05/2021		Scale 1:50			
Logged By E.Canham									

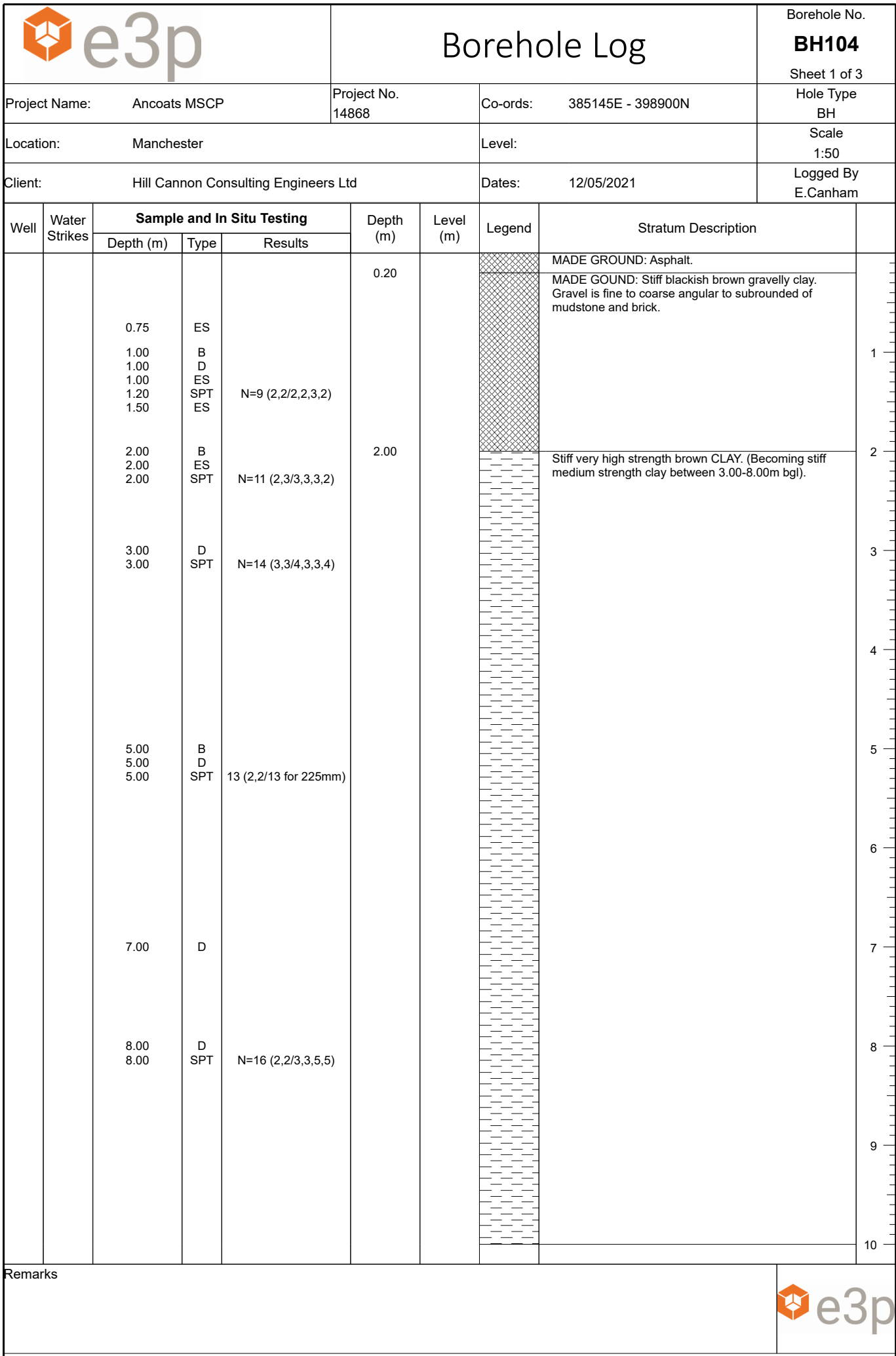
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00	SPT	50 (25 for 90mm/50 for 160mm)				Very stiff high strength brown CLAY.	21
		22.00 22.00	D SPT	50 (7,11/50 for 250mm)				22	
		24.00 24.00	D SPT	50 (11,13/50 for 210mm)	24.00				Very stiff high strength orange gravelly CLAY. Gravel is fine to coarse bands of mudstone.
		26.00	SPT	50 (25 for 110mm/50 for 200mm)			25		
		28.00 28.00	D SPT	50 (25 for 100mm/50 for 150mm)	28.00				Grey MUDSTONE.
		29.00 29.00	D SPT	50 (25 for 70mm/50 for 90mm)	29.00			29	
								30	

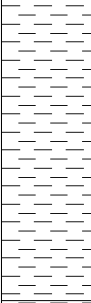
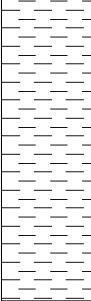
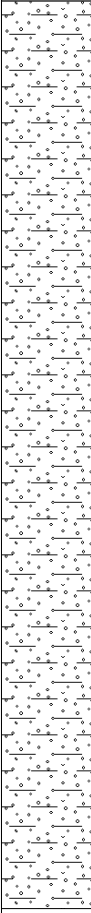
Remarks								
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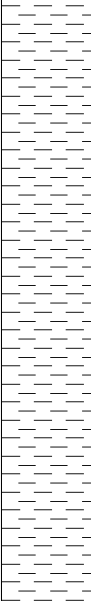
				Borehole Log				Borehole No. BH103 Sheet 1 of 3	
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385155E - 398882N		Hole Type BH	
Location: Manchester				Level:		Scale 1:50			
Client: Hill Cannon Consulting Engineers Ltd				Dates: 10/05/2021		Logged By E.Canham			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Concrete.	
		0.75	ES	N=5 (1,1/1,1,1,2)	1.00		MADE GROUND: Loose black sandy clayey gravel with slight hydrocarbon odour. Gravel is fine to coarse angular to subrounded of concrete and brick.	1	
		1.00	D						
		1.00	ES						
		1.20	SPT						
		1.50	ES		1.50		MADE GROUND: Very stiff grey gravelly clay. Gravel is fine to coarse subangular of brick.		
		2.00	D	N=45 (8,8/9,10,12,14)	4.00		Stiff very high strength grey and brown mottled gravelly CLAY. Gravel is fine to coarse angular to subrounded of mudstone.	2	
		2.00	ES						
		2.00	SPT						
		3.00	U						
4.00	D	N=16 (2,3/3,4,4,5)	4.00		Stiff medium strength brown CLAY. (Becoming very stiff very high strength circa 10.00m bgl).	4			
4.00	SPT								
5.00	U								
6.00	D			N=13 (1,2/2,2,4,5)	7.00				
6.00	SPT								
7.00	U								
10.00	D								
Remarks									

				Borehole Log				Borehole No. BH103 Sheet 2 of 3	
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385155E - 398882N		Hole Type BH	
Location: Manchester				Level:		Scale 1:50			
Client: Hill Cannon Consulting Engineers Ltd				Dates: 10/05/2021		Logged By E.Canham			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.00	SPT	N=50 (9,12/12,13,12,13)	13.00			Stiff medium strength brown CLAY. (Becoming very stiff very high strength circa 10.00m bgl).	11 12 13 14 15 16 17 18 19 20
		12.00 12.00	D SPT	50 (25 for 140mm/50 for 225mm)					
		14.00 14.00	D SPT	N=50 (6,10/12,12,11,15)					
		16.00	SPT	50 (7,9/50 for 230mm)					
		18.00 18.00	D SPT	50 (5,8/50 for 245mm)					
		19.50							
		20.00	D						
Remarks									

					Borehole Log			Borehole No. BH103 Sheet 3 of 3		
Project Name: Ancoats MSCP					Project No. 14868		Co-ords: 385155E - 398882N		Hole Type BH	
Location: Manchester					Level:			Scale 1:50		
Client: Hill Cannon Consulting Engineers Ltd					Dates: 10/05/2021			Logged By E.Canham		
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		20.00	SPT	50 (10,14/50 for 210mm)				Very stiff high strength brown CLAY.	21	
		22.00 22.00	D SPT	50 (8,11/50 for 250mm)	22.00			Medium dense brown SAND.	22	
		24.00	SPT	50 (25 for 140mm/50 for 200mm)	24.50				24	
		26.00 26.00	D SPT	50 (25 for 90mm/50 for 200mm)				Very stiff high strength reddish brown CLAY with bands of mudstone.	25	
		28.00 28.00	D SPT	50 (25 for 75mm/50 for 140mm)					26	
		29.00 29.00	D SPT	50 (25 for 140mm/50 for 10mm)	29.00				27	
									28	
									29	
									30	
Remarks										



				Borehole Log				Borehole No. BH104 Sheet 2 of 3	
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385145E - 398900N		Hole Type BH	
Location: Manchester				Level:				Scale 1:50	
Client: Hill Cannon Consulting Engineers Ltd				Dates: 12/05/2021				Logged By E.Canham	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		12.00 12.00	D SPT	49 (9,11/49 for 225mm)	12.00		 Stiff very high strength brown CLAY. (Becoming stiff medium strength clay between 3.00-8.00m bgl).	11	
		14.00 14.00	D SPT	N=50 (10,13/13,15,15,7)	14.00		 Very stiff very high strength brown CLAY	12	
		16.00 16.00	D SPT	50 (10,13/50 for 240mm)			 Dense brown clayey gravel with bands of dense brown SAND. Gravel is fine subangular to sunrounded of sandstone and mudstone.	13	
		18.00 18.00	D SPT	50 (11,13/50 for 200mm)				14	
		20.00	D		20.00			15	
								16	
								17	
								18	
								19	
								20	
Remarks									

				Borehole Log				Borehole No. BH104 Sheet 3 of 3	
Project Name: Ancoats MSCP				Project No. 14868		Co-ords: 385145E - 398900N		Hole Type BH	
Location: Manchester				Level:				Scale 1:50	
Client: Hill Cannon Consulting Engineers Ltd				Dates: 12/05/2021				Logged By E.Canham	
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		20.00	SPT	50 (25 for 100mm/50 for 155mm)				Very Stiff high strength brown CLAY.	21
		22.00 22.00	D SPT	50 (25 for 90mm/50 for 150mm)					22
		24.00 24.00	D SPT	50 (25 for 75mm/50 for 140mm)	24.00				23
		26.00 26.00	B SPT	50 (25 for 60mm/50 for 90mm)	26.00			Grey MUDSTONE.	24
									25
									26
		29.00	B						27
									28
									29
									30
Remarks									

APPENDIX VI

CHEMICAL TESTING

RESULTS

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Analytical Report Number : 21-73552

Project / Site name:	Poland st	Samples received on:	07/05/2021
Your job number:	14868	Samples instructed on/ Analysis started on:	07/05/2021
Your order number:	14868-GC-J	Analysis completed by:	14/05/2021
Report Issue Number:	1	Report issued on:	14/05/2021
Samples Analysed:	2 water samples		

Izabela Wójcik

Signed:

Izabela Wójcik
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.1	7.3
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	15	22
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	5.30	7.88

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0
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Heavy Metals / Metalloids

Calcium (dissolved)	mg/l	0.012	ISO 17025	140	71
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0

Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.07	2.30
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	2.7	2.2
Copper (dissolved)	µg/l	0.5	ISO 17025	4.1	2.4
Lead (dissolved)	µg/l	0.2	ISO 17025	0.5	0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	480	230
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	6.5	2.2
Selenium (dissolved)	µg/l	0.6	ISO 17025	31	11
Zinc (dissolved)	µg/l	0.5	ISO 17025	10	9.6

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	810	1100
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TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10

TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	100	150
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	710	940
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	810	1100



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	0.56	1.1
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	0.51	0.66
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	0.21	1.1
Acenaphthene	µg/l	0.01	ISO 17025	1.2	1.3
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	0.47	0.58
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	0.96	1.5
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	10	12
Anthracene	µg/l	0.01	ISO 17025	2.8	3.2
Carbazole	µg/l	0.05	NONE	1.5	0.93
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	16	22
Pyrene	µg/l	0.01	ISO 17025	18	25
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	12	14
Chrysene	µg/l	0.01	ISO 17025	11	13
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	13	16
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	5.4	7.1
Benzo(a)pyrene	µg/l	0.01	ISO 17025	14	17



Analytical Report Number: 21-73552

Project / Site name: Poland st

Your Order No: 14868-GC-J

Lab Sample Number				1863231	1863232
Sample Reference				WS102	WS104
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				06/05/2021	06/05/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	5.9	7.6
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	1.8	2.7
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	7.9	10
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10

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



Analytical Report Number : 21-73552

Project / Site name: Poland st

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

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

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

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

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

Sample Deviation Report



Analytical Report Number : 21-73552

Project / Site name: Poland st

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS102	None Supplied	W	1863231	c	pH at 20oC in water (automated)	L099-PL	c
WS104	None Supplied	W	1863232	c	pH at 20oC in water (automated)	L099-PL	c

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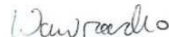
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Preliminary Report Number : 21-73786

Project / Site name:	Ancoats	Samples received on:	07/05/2021
Your job number:	14-868	Samples instructed on/ Analysis started on:	10/05/2021
Your order number:	14868-MI-K	Analysis completed by:	Not completed
Report Issue Number:	0	Report issued on:	17/05/2021
Samples Analysed:	4 soil samples		

Signed: 

Joanna Wawrzeczek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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Preliminary reports provided at the request of the client should be considered as incomplete and have not been through the complete quality control procedure.

Results contained in preliminary reports may be subject to change and therefore should not be used as a basis for decision making, except at the risk of the client.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.

Application of uncertainty of measurement would provide a range within which the true result lies.

An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-73786

Project / Site name: Ancoats

Your Order No: 14868-MI-K

Lab Sample Number				1864448	1864449	1864450	1864451
Sample Reference				BH102	BH102	BH102	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				06/05/2021	06/05/2021	06/05/2021	06/05/2021
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	8.0	14	15	5.4
Total mass of sample received	kg	0.001	NONE	0.50	0.40	0.50	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.4	8.9	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	9.6	< 1.0	1.7
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1100	750	720	1700
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.20	0.070	0.14	0.32
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	400	140	270	640
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	199	69.8	135	318
Sulphide	mg/kg	1	MCERTS	55	1.6	24	43
Total Sulphur	mg/kg	50	MCERTS	1700	530	920	1300
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.0	1.0	0.7	0.9

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	1.0	1.4	0.88	2.4
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.20	0.73	< 0.05	0.67
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.46	< 0.05	0.55
Phenanthrene	mg/kg	0.05	MCERTS	0.91	4.8	0.33	5.4
Anthracene	mg/kg	0.05	MCERTS	0.23	0.95	< 0.05	1.3
Fluoranthene	mg/kg	0.05	MCERTS	1.1	4.5	0.46	6.5
Pyrene	mg/kg	0.05	MCERTS	1.1	4.8	0.57	6.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.60	2.6	0.34	3.1
Chrysene	mg/kg	0.05	MCERTS	0.66	2.5	0.34	2.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.62	2.6	0.30	2.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.32	1.3	0.21	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.59	2.4	0.29	2.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.28	1.2	< 0.05	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.37	< 0.05	0.32
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.39	1.6	< 0.05	1.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	7.97	32.3	3.72	37.9
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Analytical Report Number: 21-73786

Project / Site name: Ancoats

Your Order No: 14868-MI-K

Lab Sample Number				1864448	1864449	1864450	1864451
Sample Reference				BH102	BH102	BH102	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				06/05/2021	06/05/2021	06/05/2021	06/05/2021
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	18	20	13	19
Barium (aqua regia extractable)	mg/kg	1	MCERTS	130	120	140	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2	1.1	1.2	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.5	1.0	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	22	36	35
Copper (aqua regia extractable)	mg/kg	1	MCERTS	63	48	30	43
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	170	29	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	27	33	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	33	31	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	82	62	68

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

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

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

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

Analytical Report Number : 21-73786

Project / Site name: Ancoats

* 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 *
1864448	BH102	None Supplied	0.75	Brown sand with gravel.
1864449	BH102	None Supplied	1.5	Brown sand with gravel.
1864450	BH102	None Supplied	2.25	Brown clay.
1864451	BH102	None Supplied	3	Brown clay.

Analytical Report Number : 21-73786

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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 SO ₄ 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
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
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 soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 21-73786

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

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Analytical Report Number : 21-73786

Project / Site name:	Ancoats	Samples received on:	07/05/2021
Your job number:	14-868	Samples instructed on/ Analysis started on:	10/05/2021
Your order number:	14868-MI-K	Analysis completed by:	18/05/2021
Report Issue Number:	1	Report issued on:	18/05/2021
Samples Analysed:	4 soil samples		

Signed:

Izabela Wójcik

Izabela Wójcik
Technical Reviewer (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: 21-73786

Project / Site name: Ancoats

Your Order No: 14868-MI-K

Lab Sample Number				1864448	1864449	1864450	1864451
Sample Reference				BH102	BH102	BH102	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				06/05/2021	06/05/2021	06/05/2021	06/05/2021
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	8.0	14	15	5.4
Total mass of sample received	kg	0.001	NONE	0.50	0.40	0.50	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.4	8.9	8.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	9.6	< 1.0	1.7
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1100	750	720	1700
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.20	0.070	0.14	0.32
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	400	140	270	640
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	199	69.8	135	318
Sulphide	mg/kg	1	MCERTS	55	1.6	24	43
Total Sulphur	mg/kg	50	MCERTS	1700	530	920	1300
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.0	1.0	0.7	0.9

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	1.0	1.4	0.88	2.4
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.20	0.73	< 0.05	0.67
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.46	< 0.05	0.55
Phenanthrene	mg/kg	0.05	MCERTS	0.91	4.8	0.33	5.4
Anthracene	mg/kg	0.05	MCERTS	0.23	0.95	< 0.05	1.3
Fluoranthene	mg/kg	0.05	MCERTS	1.1	4.5	0.46	6.5
Pyrene	mg/kg	0.05	MCERTS	1.1	4.8	0.57	6.0
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.60	2.6	0.34	3.1
Chrysene	mg/kg	0.05	MCERTS	0.66	2.5	0.34	2.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.62	2.6	0.30	2.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.32	1.3	0.21	1.2
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.59	2.4	0.29	2.5
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.28	1.2	< 0.05	1.2
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.37	< 0.05	0.32
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.39	1.6	< 0.05	1.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	7.97	32.3	3.72	37.9
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Analytical Report Number: 21-73786

Project / Site name: Ancoats

Your Order No: 14868-MI-K

Lab Sample Number				1864448	1864449	1864450	1864451
Sample Reference				BH102	BH102	BH102	BH102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				06/05/2021	06/05/2021	06/05/2021	06/05/2021
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	18	20	13	19
Barium (aqua regia extractable)	mg/kg	1	MCERTS	130	120	140	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2	1.1	1.2	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	0.5	1.0	1.0
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	31	22	36	35
Copper (aqua regia extractable)	mg/kg	1	MCERTS	63	48	30	43
Lead (aqua regia extractable)	mg/kg	1	MCERTS	110	170	29	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	32	27	33	34
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	33	31	38
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	82	62	68

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	4.8
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	36
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	37
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	25
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	100

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	3.0	< 2.0	8.7
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	14	< 10	25
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	19	< 10	16
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	36	< 10	50

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

Analytical Report Number : 21-73786

Project / Site name: Ancoats

* 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 *
1864448	BH102	None Supplied	0.75	Brown sand with gravel.
1864449	BH102	None Supplied	1.5	Brown sand with gravel.
1864450	BH102	None Supplied	2.25	Brown clay.
1864451	BH102	None Supplied	3	Brown clay.

Analytical Report Number : 21-73786

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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 SO ₄ 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
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
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 soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 21-73786

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

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Analytical Report Number : 21-75426

Replaces Analytical Report Number: 21-75426, issue no. 1
Client references/information amended.

Project / Site name:	Ancoats	Samples received on:	13/05/2021
Your job number:	14 868	Samples instructed on/ Analysis started on:	18/05/2021
Your order number:	14868 MJ N	Analysis completed by:	20/07/2021
Report Issue Number:	2	Report issued on:	20/07/2021
Samples Analysed:	4 soil samples		

Signed: *Karolina Marek*

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

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

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

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

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

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

Analytical Report Number: 21-75426

Project / Site name: Ancoats

Your Order No: 14868 MJ N

Lab Sample Number				1873454	1873455	1873456	1873457
Sample Reference				BH104	BH104	BH104	BH104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				27/04/2021	27/04/2021	27/04/2021	27/04/2021
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	9.7	18	14	15
Total mass of sample received	kg	0.001	NONE	0.50	0.40	0.50	0.50

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	7.4	7.9	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1100	3600	650	610
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.16	1.6	0.13	0.12
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	320	3300	260	230
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	162	1640	128	116
Sulphide	mg/kg	1	MCERTS	12	19	20	14
Total Sulphur	mg/kg	50	MCERTS	520	2400	570	360
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.2	5.6	0.9	0.9

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	1.4	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.31	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	2.1	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	1.9	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	14	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	3.8	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	17	0.30	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	17	0.34	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	10	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	8.3	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	12	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	4.0	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	10	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	5.0	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.6	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	5.7	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	114	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 21-75426

Project / Site name: Ancoats

Your Order No: 14868 MJ N

Lab Sample Number				1873454	1873455	1873456	1873457
Sample Reference				BH104	BH104	BH104	BH104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00
Date Sampled				27/04/2021	27/04/2021	27/04/2021	27/04/2021
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	10	18	11	12
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	140	150	190
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.79	1.4	1.3	1.5
Boron (water soluble)	mg/kg	0.2	MCERTS	2.7	4.3	0.5	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	26	32	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	46	52	32	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	170	99	24	16
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	28	38	39
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	20	39	38	41
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	81	71	68	62

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	22	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	29	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.6	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	17	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	57	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	140	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	210	< 10	< 10	< 10

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

Analytical Report Number : 21-75426

Project / Site name: Ancoats

* 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 *
1873454	BH104	None Supplied	0.75	Brown loam and gravel.
1873455	BH104	None Supplied	1.5	Brown clay and loam with gravel.
1873456	BH104	None Supplied	2.25	Brown clay.
1873457	BH104	None Supplied	3	Brown clay.

Analytical Report Number : 21-75426

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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 SO ₄ 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
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
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 soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

Analytical Report Number : 21-75426

Project / Site name: Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

Sample Deviation Report



Analytical Report Number : 21-75426

Project / Site name: Ancoats

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH104	None Supplied	S	1873454	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
BH104	None Supplied	S	1873454	c	Sulphide in soil	L010-PL	c
BH104	None Supplied	S	1873454	c	Total cyanide in soil	L080-PL	c
BH104	None Supplied	S	1873455	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
BH104	None Supplied	S	1873455	c	Sulphide in soil	L010-PL	c
BH104	None Supplied	S	1873455	c	Total cyanide in soil	L080-PL	c
BH104	None Supplied	S	1873456	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
BH104	None Supplied	S	1873456	c	Sulphide in soil	L010-PL	c
BH104	None Supplied	S	1873456	c	Total cyanide in soil	L080-PL	c
BH104	None Supplied	S	1873457	c	BTEX and MTBE in soil (Monoaromatics)	L073B-PL	c
BH104	None Supplied	S	1873457	c	Sulphide in soil	L010-PL	c
BH104	None Supplied	S	1873457	c	Total cyanide in soil	L080-PL	c



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Analytical Report Number : 21-71426

Project / Site name:	Poland Street Ancoats	Samples received on:	27/04/2021
Your job number:	14868	Samples instructed on/ Analysis started on:	27/04/2021
Your order number:	14868GCF	Analysis completed by:	06/05/2021
Report Issue Number:	1	Report issued on:	06/05/2021
Samples Analysed:	2 leachate samples - 16 soil samples		

Izabela Wójcik

Signed:

Izabela Wójcik
Technical Reviewer (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: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852186	1852187	1852188	1852189	1852190
Sample Reference				WS101	WS101	WS101	WS101	WS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00	0.75
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	19	18	29	23	27
Total mass of sample received	kg	0.001	NONE	0.40	0.50	0.40	0.50	0.70

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.8	7.9	7.9	7.3
Total Cyanide	mg/kg	1	MCERTS	2.4	3.3	2.5	1.7	210
Total Sulphate as SO ₄	mg/kg	50	MCERTS	840	710	910	1200	1100
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.19	0.10	0.078	0.22	0.082
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	380	210	160	430	160
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	191	104	77.7	215	81.8
Sulphide	mg/kg	1	MCERTS	12	18	60	78	3.2
Total Sulphur	mg/kg	50	MCERTS	1200	780	1500	2400	940
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.8	2.5	2.0	2.3	2.6

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	3.9	3.3	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.85	0.42	2.8	0.44	0.52
Acenaphthylene	mg/kg	0.05	MCERTS	0.68	< 0.05	1.5	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.67	0.79	5.8	0.33	1.2
Fluorene	mg/kg	0.05	MCERTS	1.0	0.63	4.9	0.39	0.89
Phenanthrene	mg/kg	0.05	MCERTS	8.9	6.4	37	2.7	10
Anthracene	mg/kg	0.05	MCERTS	2.1	1.4	10	0.76	3.0
Fluoranthene	mg/kg	0.05	MCERTS	10	9.9	51	4.6	17
Pyrene	mg/kg	0.05	MCERTS	12	11	59	5.8	21
Benzo(a)anthracene	mg/kg	0.05	MCERTS	7.5	5.2	30	3.4	17
Chrysene	mg/kg	0.05	MCERTS	6.3	5.3	31	3.1	14
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	9.8	6.4	30	4.7	21
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.0	2.3	17	2.1	11
Benzo(a)pyrene	mg/kg	0.05	MCERTS	10	5.6	36	4.7	25
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	5.4	2.5	16	2.5	11
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.41	1.3	5.8	1.2	2.7
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	7.0	3.4	22	3.3	14

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	85.8	62.7	361	39.9	171
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Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852186	1852187	1852188	1852189	1852190
Sample Reference				WS101	WS101	WS101	WS101	WS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.75	1.50	2.25	3.00	0.75
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	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	22	21	23	37
Barium (aqua regia extractable)	mg/kg	1	MCERTS	280	190	150	320	160
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	2.1	1.8	1.3	1.8	3.1
Boron (water soluble)	mg/kg	0.2	MCERTS	0.8	1.6	1.4	2.1	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	29	47	46	300	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	95	87	72	72	200
Lead (aqua regia extractable)	mg/kg	1	MCERTS	280	250	190	140	650
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.9	1.0	0.7
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	50	36	32	45	58
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	45	39	60	48
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	82	71	110	150

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	1.6	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	9.1	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	11	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	23	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	45	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.4	3.1	2.2	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	13	11	24	7.2	4.4
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	35	42	170	46	52
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	52	74	190	120	170
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	100	130	380	170	230

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

Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852191	1852192	1852193	1852194	1852195
Sample Reference				WS102	WS102	WS102	WS103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	2.25	3.00	0.75	1.50
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	16	17	9.9	20
Total mass of sample received	kg	0.001	NONE	0.40	0.40	0.40	0.40	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	7.7	7.9	7.6	7.6
Total Cyanide	mg/kg	1	MCERTS	18	< 1.0	< 1.0	28	3.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	730	300	430	660	1200
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.045	0.030	0.067	0.10	0.13
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	91	59	130	200	260
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	45.3	29.5	67.1	99.7	129
Sulphide	mg/kg	1	MCERTS	9.5	3.0	16	21	5.5
Total Sulphur	mg/kg	50	MCERTS	880	190	380	840	1100
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.3	0.8	0.7	2.0	3.3

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	2.6	2.9
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.76	0.75
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	7.6	7.3
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	5.4	6.0
Phenanthrene	mg/kg	0.05	MCERTS	0.23	< 0.05	0.38	43	41
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	12	10
Fluoranthene	mg/kg	0.05	MCERTS	0.30	< 0.05	0.46	56	40
Pyrene	mg/kg	0.05	MCERTS	0.39	< 0.05	0.59	57	38
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.26	< 0.05	0.31	37	19
Chrysene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.34	31	18
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.28	< 0.05	0.31	46	20
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.19	16	5.0
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	< 0.05	0.28	48	17
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	22	8.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	5.9	2.8
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	31	10

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1.93	< 0.80	2.86	420	246
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Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852191	1852192	1852193	1852194	1852195
Sample Reference				WS102	WS102	WS102	WS103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	2.25	3.00	0.75	1.50
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	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	18	8.0	5.9	15	38
Barium (aqua regia extractable)	mg/kg	1	MCERTS	170	190	83	400	210
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.8	1.2	0.76	6.3	1.9
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.6	0.8	0.5	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	30	27	19	38	25
Copper (aqua regia extractable)	mg/kg	1	MCERTS	61	19	21	200	140
Lead (aqua regia extractable)	mg/kg	1	MCERTS	180	16	33	590	400
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.8	< 0.3	< 0.3	< 0.3	2.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	36	16	76	46
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.7	1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	30	20	95	50
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	70	48	36	160	120

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	3.4	2.5
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	15	11
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	11	28
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	32	55
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	62	96

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	3.9	5.9
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	50	38
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	270	200
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	18	510	320
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	26	830	570

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

Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852196	1852197	1852198	1852199	1852200
Sample Reference				WS103	WS103	WS104	WS104	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.25	3.00	0.75	1.50	2.25
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	26	17	24	18
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.40	0.50	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.8	7.4	7.9	7.8
Total Cyanide	mg/kg	1	MCERTS	3.5	< 1.0	3.7	1.1	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	690	670	730	2100	400
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.053	0.049	0.053	0.25	0.048
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	110	99	110	500	96
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	52.6	49.3	52.8	252	48.0
Sulphide	mg/kg	1	MCERTS	8.7	5.5	6.7	140	< 1.0
Total Sulphur	mg/kg	50	MCERTS	910	1300	1700	4200	210
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.3	2.3	3.3	1.9	0.6

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	3.6	1.2	1.9	0.95	0.30
Acenaphthylene	mg/kg	0.05	MCERTS	0.27	< 0.05	1.2	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	6.5	0.91	2.6	1.4	0.41
Fluorene	mg/kg	0.05	MCERTS	5.4	0.70	2.6	1.2	0.31
Phenanthrene	mg/kg	0.05	MCERTS	33	3.9	24	7.2	1.9
Anthracene	mg/kg	0.05	MCERTS	8.3	0.99	7.0	1.7	0.43
Fluoranthene	mg/kg	0.05	MCERTS	27	3.4	34	5.3	1.6
Pyrene	mg/kg	0.05	MCERTS	28	3.5	37	5.8	1.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	13	1.6	24	2.7	0.79
Chrysene	mg/kg	0.05	MCERTS	13	1.5	23	3.0	0.73
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	11	1.7	26	2.6	0.73
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	5.4	0.43	13	0.97	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	12	1.5	28	2.3	0.59
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	4.9	0.69	13	0.99	0.28
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.57	0.25	5.2	0.38	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	6.0	0.86	16	1.3	0.39

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	179	23.2	260	37.8	10.1
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Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852196	1852197	1852198	1852199	1852200
Sample Reference				WS103	WS103	WS104	WS104	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.25	3.00	0.75	1.50	2.25
Date Sampled				26/04/2021	26/04/2021	26/04/2021	26/04/2021	26/04/2021
Time Taken				None Supplied	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	24	22	37	33	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	220	220	150	110	310
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.7	1.5	2.6	1.2	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	1.3	0.9	0.5	0.9	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	170	360	22	12	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	70	69	250	190	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	170	150	710	180	24
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	1.4	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	50	49	55	23	50
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	50	56	32	39
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	100	98	160	46	68

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	13	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	9.9	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	14	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	37	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	5.2	1.5	3.7	2.2	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	32	5.7	20	8.6	7.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	110	14	110	21	12
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	130	27	250	33	11
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	280	48	390	65	31

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

Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852201
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				3.00
Date Sampled				26/04/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	19
Total mass of sample received	kg	0.001	NONE	0.40

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	350
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.063
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	130
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	63.1
Sulphide	mg/kg	1	MCERTS	1.9
Total Sulphur	mg/kg	50	MCERTS	230
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.2

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.45
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.64
Fluorene	mg/kg	0.05	MCERTS	0.56
Phenanthrene	mg/kg	0.05	MCERTS	3.0
Anthracene	mg/kg	0.05	MCERTS	0.61
Fluoranthene	mg/kg	0.05	MCERTS	2.4
Pyrene	mg/kg	0.05	MCERTS	2.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.3
Chrysene	mg/kg	0.05	MCERTS	1.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.39
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.44
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.61

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	16.6
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Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats
Your Order No: 14868GCF

Lab Sample Number				1852201
Sample Reference				WS104
Sample Number				None Supplied
Depth (m)				3.00
Date Sampled				26/04/2021
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.5
Barium (aqua regia extractable)	mg/kg	1	MCERTS	170
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	33
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	43
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	70

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0

Petroleum Hydrocarbons

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

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	2.3
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	9.4
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	16
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	21
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	49

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



Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats

Your Order No: 14868GCF

Lab Sample Number				1852202	1852203
Sample Reference				WS103	WS103
Sample Number				None Supplied	None Supplied
Depth (m)				0.75	1.50
Date Sampled				26/04/2021	26/04/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.7	8.1
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	340	95

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	5.7	10
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Speciated PAHs

Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	2.8	< 0.01
Fluorene	µg/l	0.01	ISO 17025	1.1	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	1.1	< 0.01
Anthracene	µg/l	0.01	ISO 17025	0.30	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	5.2	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	7.0
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	18	24
Lead (dissolved)	µg/l	1	ISO 17025	4.8	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.0	2.6
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	8.3	13

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10



Analytical Report Number: 21-71426
Project / Site name: Poland Street Ancoats

Your Order No: 14868GCF

Lab Sample Number				1852202	1852203
Sample Reference				WS103	WS103
Sample Number				None Supplied	None Supplied
Depth (m)				0.75	1.50
Date Sampled				26/04/2021	26/04/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10
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TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10

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

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

Analytical Report Number : 21-71426

Project / Site name: Poland Street Ancoats

* 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 *
1852186	WS101	None Supplied	0.75	Brown loam with gravel.
1852187	WS101	None Supplied	1.5	Brown clay and loam.
1852188	WS101	None Supplied	2.25	Brown loam with gravel.
1852189	WS101	None Supplied	3	Brown clay and loam with gravel.
1852190	WS102	None Supplied	0.75	Brown loam and clay with gravel.
1852191	WS102	None Supplied	1.5	Brown loam with gravel.
1852192	WS102	None Supplied	2.25	Brown clay and loam.
1852193	WS102	None Supplied	3	Brown loam and clay with gravel.
1852194	WS103	None Supplied	0.75	Brown loam and clay with gravel.
1852195	WS103	None Supplied	1.5	Brown loam and clay with gravel.
1852196	WS103	None Supplied	2.25	Brown loam and clay with gravel.
1852197	WS103	None Supplied	3	Brown loam and clay with gravel.
1852198	WS104	None Supplied	0.75	Brown sandy loam with gravel.
1852199	WS104	None Supplied	1.5	Brown sandy loam with gravel.
1852200	WS104	None Supplied	2.25	Brown clay.
1852201	WS104	None Supplied	3	Brown clay.

Analytical Report Number : 21-71426
Project / Site name: Poland Street Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
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 disperion 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
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in 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	NONE
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	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	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

Analytical Report Number : 21-71426
Project / Site name: Poland Street Ancoats

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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
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	NONE
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 soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
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
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
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' analysis have been carried out in our laboratory in the United Kingdom.

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

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

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

APPENDIX VII

ORIGIN OF TIER I 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



LABORATORY REPORT



4043

Contract Number: PSL21/4858

Report Date: 05 July 2021

Client's Reference: 14-868

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Olivia Jackson

Contract Title: Poland Street, Ancoats

Date Received: 15/6/2021

Date Commenced: 15/6/2021

Date Completed: 5/7/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

M Fennell
(Senior Technician)

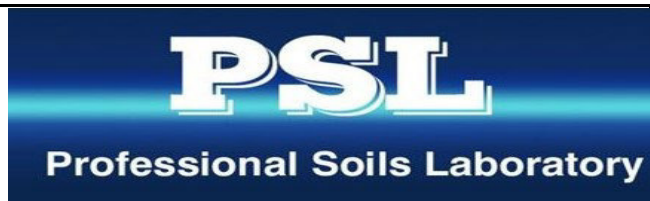
5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043



Poland Street, Ancoats

Contract No:

PSL21/4858

Client Ref:

14-868

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



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Professional Soils Laboratory

Poland Street, Ancoats

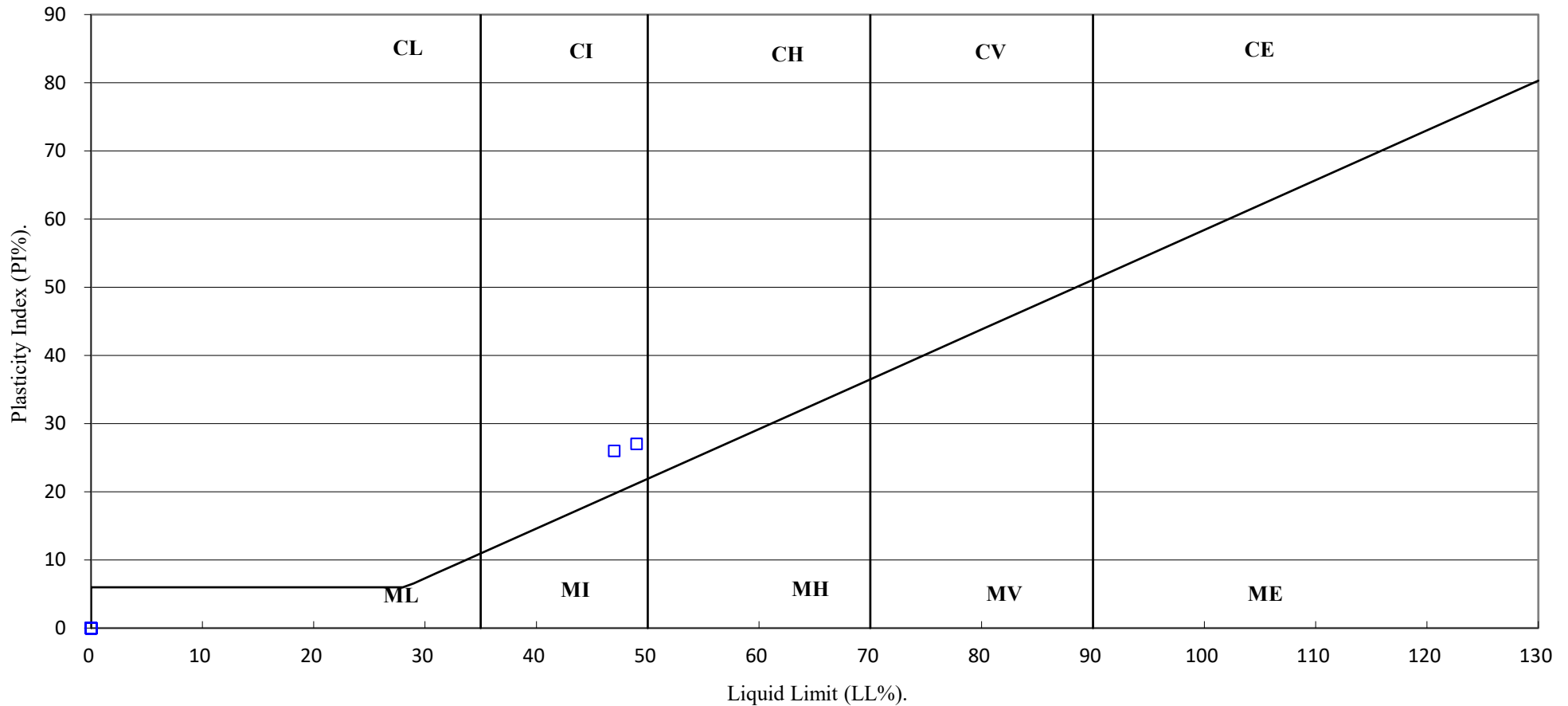
Contract No:

PSL21/4858

Client Ref:

14-868

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Poland Street, Ancoats

Contract No:

PSL21/4858

Client Ref:

14-868



LABORATORY REPORT



4043

Contract Number: PSL21/4859

Report Date: 16 July 2021

Client's Reference: 14-868

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Olivia Jackson/Matt Jackson

Contract Title: Poland Street, Ancoats

Date Received: 15/6/2021

Date Commenced: 15/6/2021

Date Completed: 16/7/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins
(Director)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

L Knight
(Assistant Laboratory Manager)

S Eyre
(Senior Technician)

T Watkins
(Senior Technician)

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

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

4043

PSL
Professional Soils Laboratory

Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



4043

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Professional Soils Laboratory

Poland Street, Ancoats

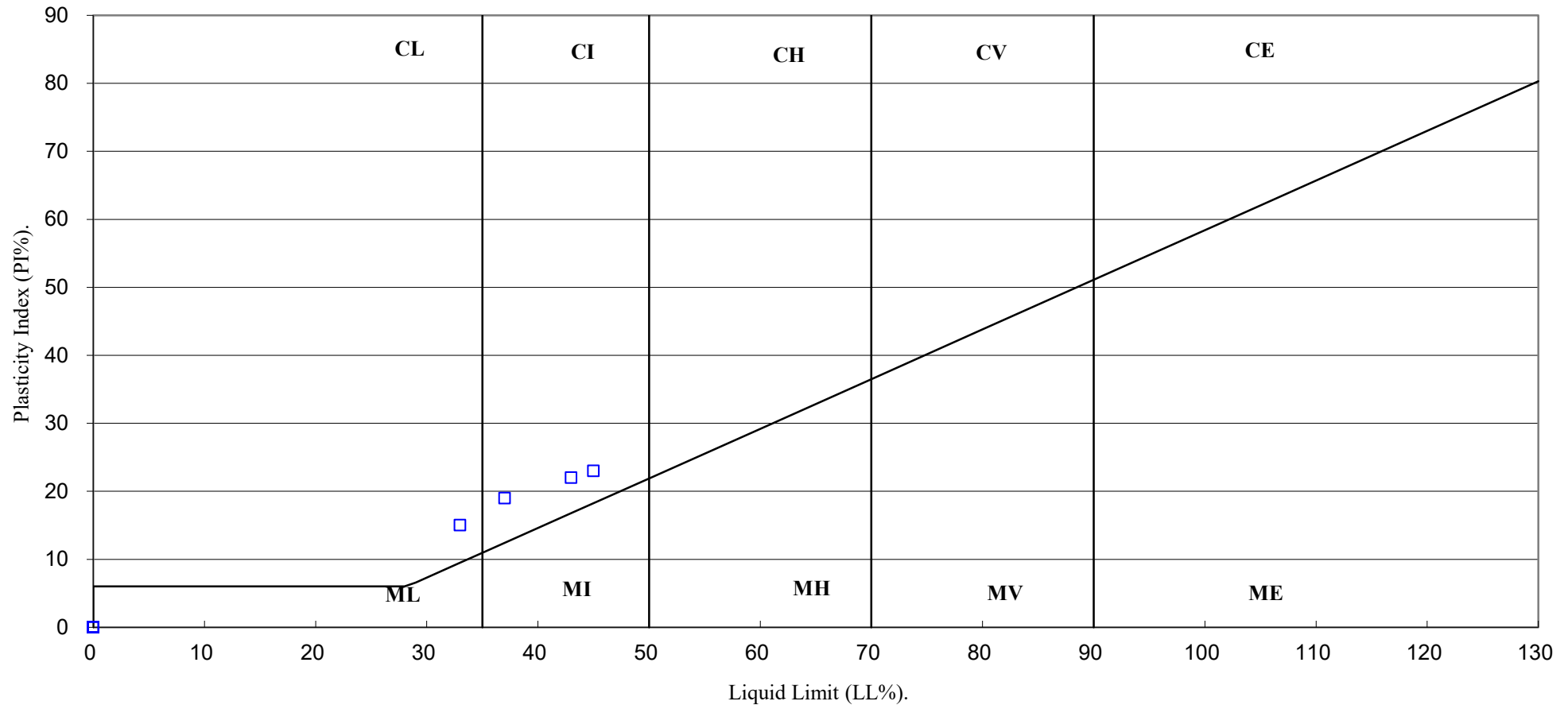
Contract No:

PSL21/4859

Client Ref:

14-868-OJ-N

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

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Contract No:

PSL21/4859

Client Ref:

14-868-OJ-N

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

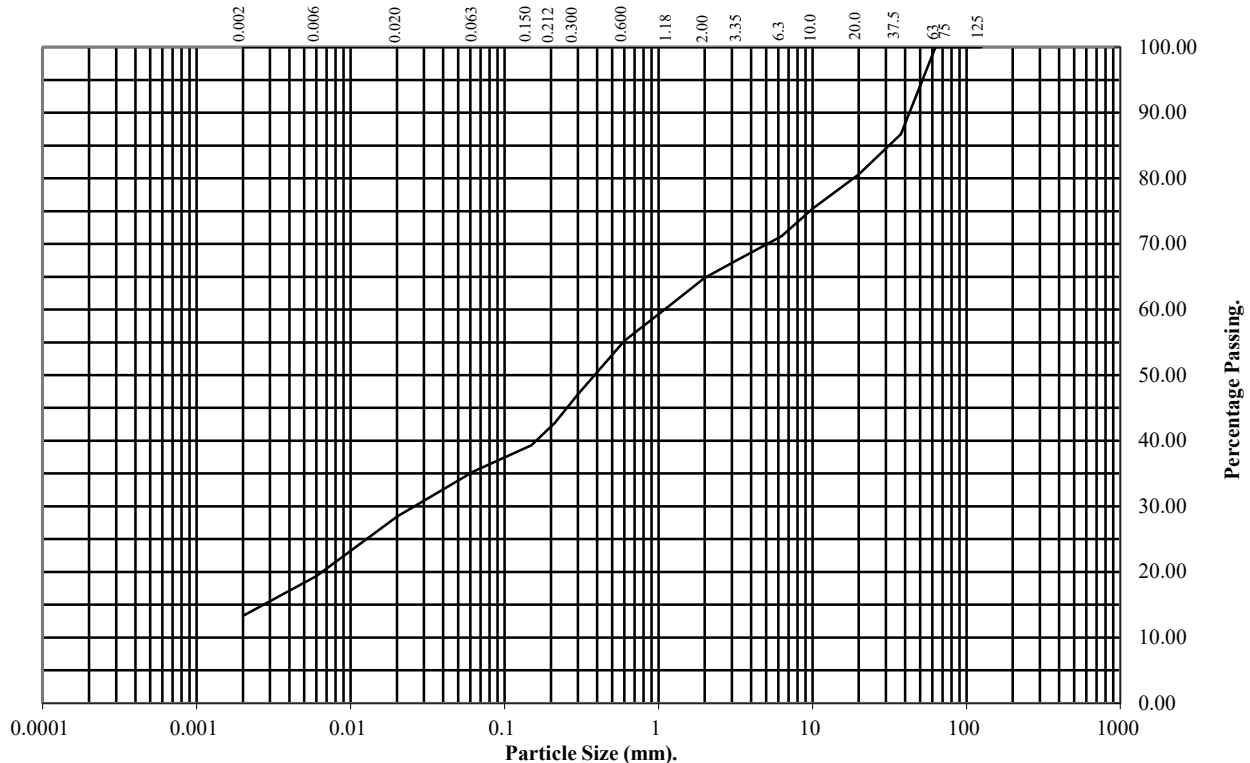
Hole Number: CP104

Top Depth (m): 1.00

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	81
10	75
6.3	71
3.35	68
2	65
1.18	61
0.6	55
0.3	47
0.212	43
0.15	39
0.063	35

Particle Diameter	Percentage Passing
0.02	28
0.006	19
0.002	13

Soil Fraction	Total Percentage
Cobbles	0
Gravel	35
Sand	30
Silt	22
Clay	13

Remarks:

See Summary of Soil Descriptions



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Professional Soils Laboratory

Poland Street, Ancoats

Contract No:
PSL21/4859
Client Ref:
14-868

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

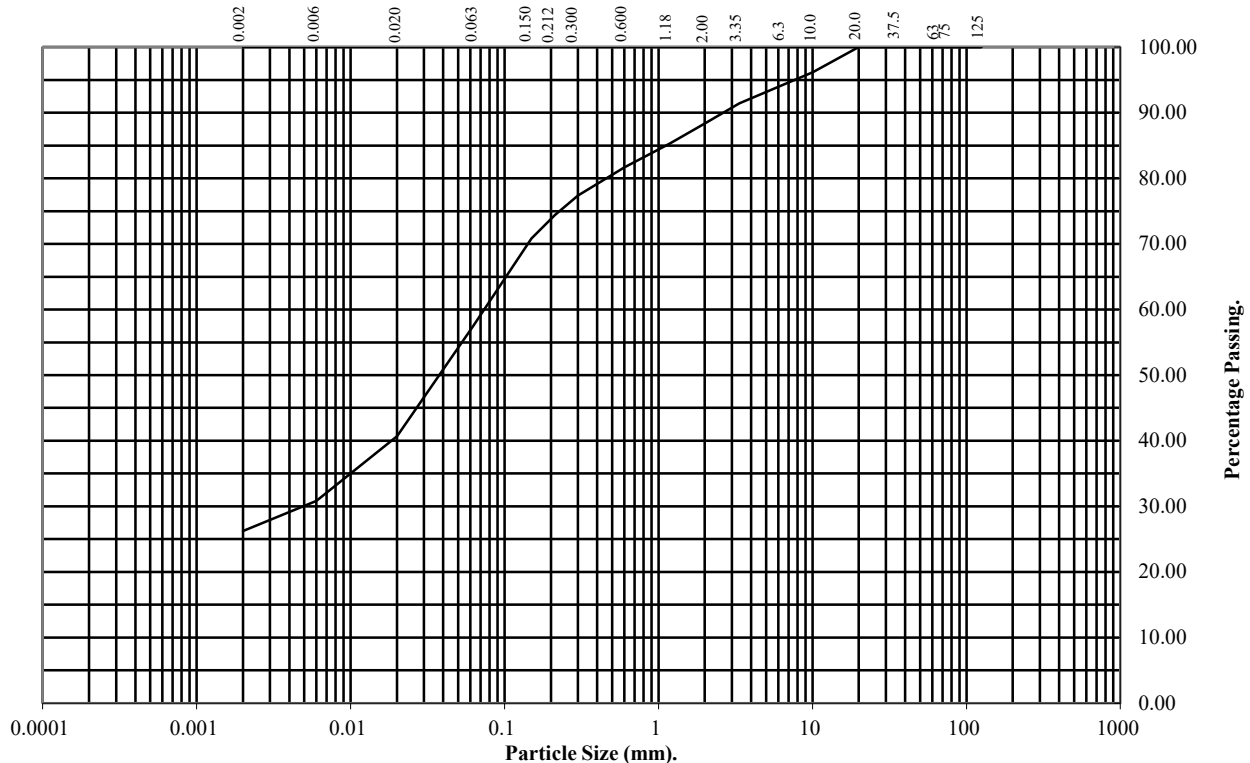
Hole Number: CP104

Top Depth (m): 5.00

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	96
6.3	94
3.35	91
2	88
1.18	85
0.6	82
0.3	77
0.212	74
0.15	71
0.063	58

Particle Diameter	Percentage Passing
0.02	41
0.006	31
0.002	26

Soil Fraction	Total Percentage
Cobbles	0
Gravel	12
Sand	30
Silt	32
Clay	26

Remarks:

See Summary of Soil Descriptions



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Contract No:
PSL21/4859
Client Ref:
14-868

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.5 : 1990

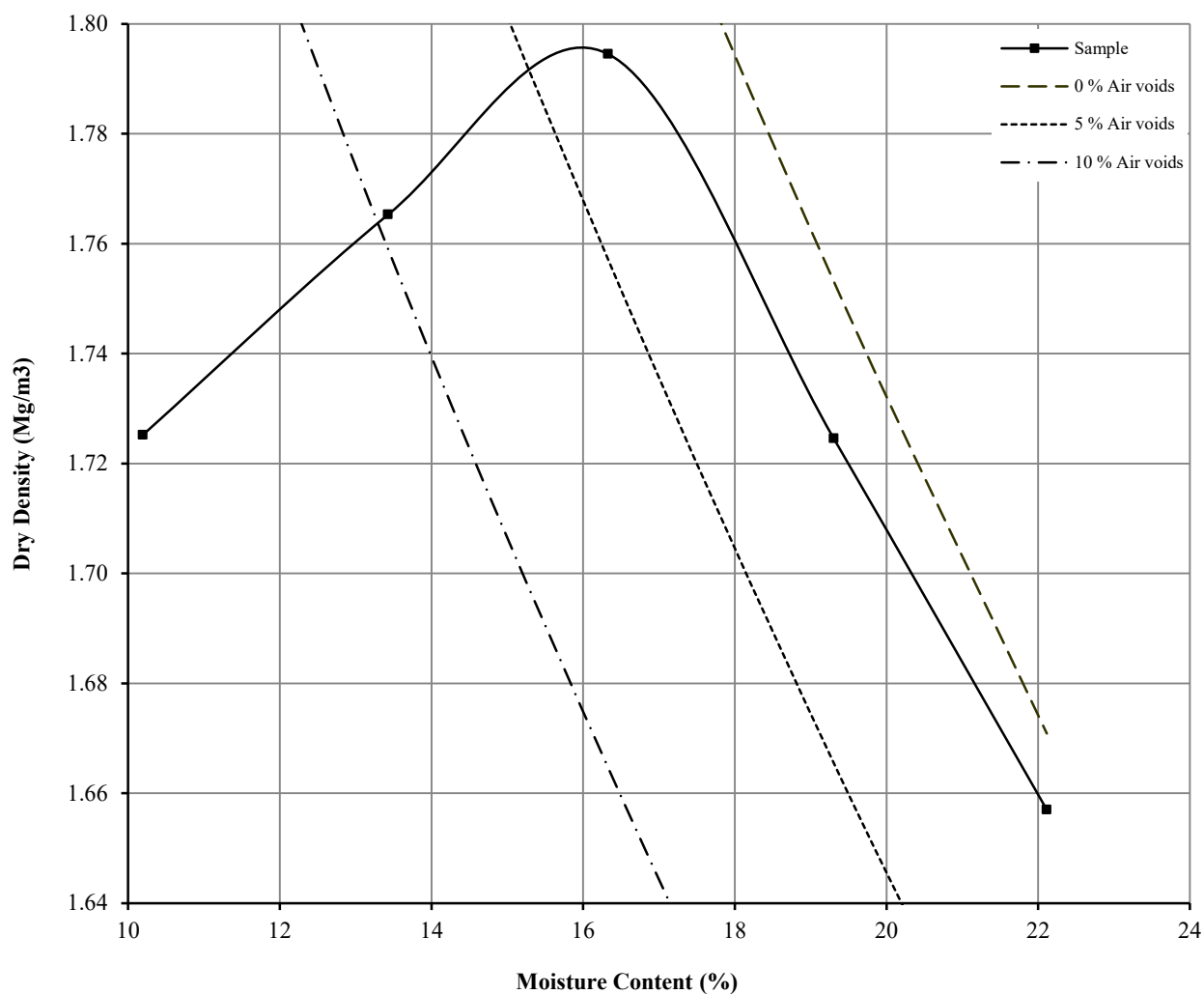
Hole Number: CP104

Top Depth (m) : 5.00

Sample Number:

Base Depth (m) :

Sample Type: B



Initial Moisture Content:	19	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m ³):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m ³):	1.79		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	16			
Remarks See summary of soil descriptions				



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Client Ref
14-868-OJ-N

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

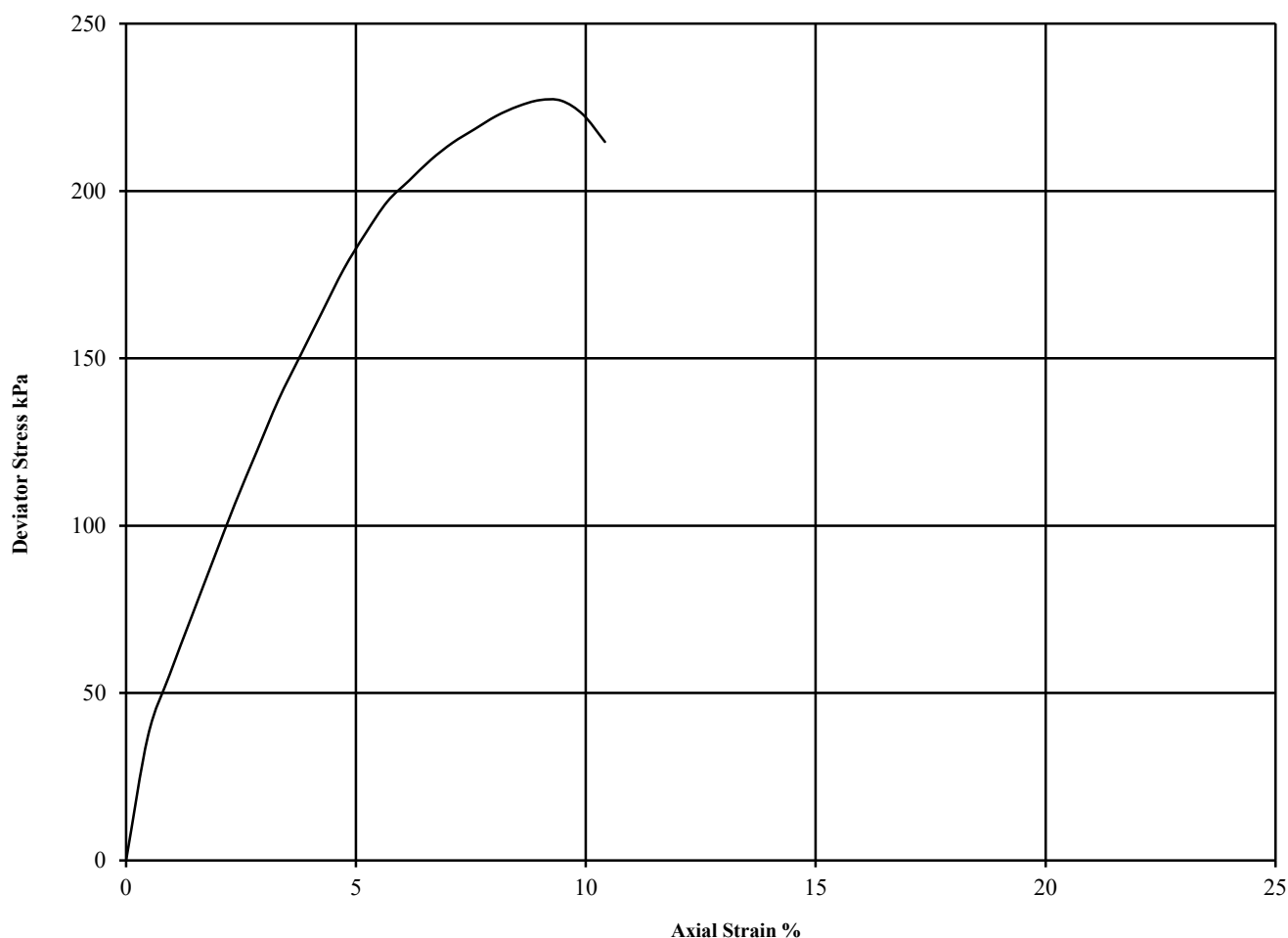
Hole Number: CP101

Top Depth (m): 2.00

Sample Number:

Base Depth (m): 2.50

Sample Type U



Diameter (mm):		98		Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.37 See summary of soil descriptions	
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	21	2.04	1.69	45	227	114	9.0	Brittle		



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Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

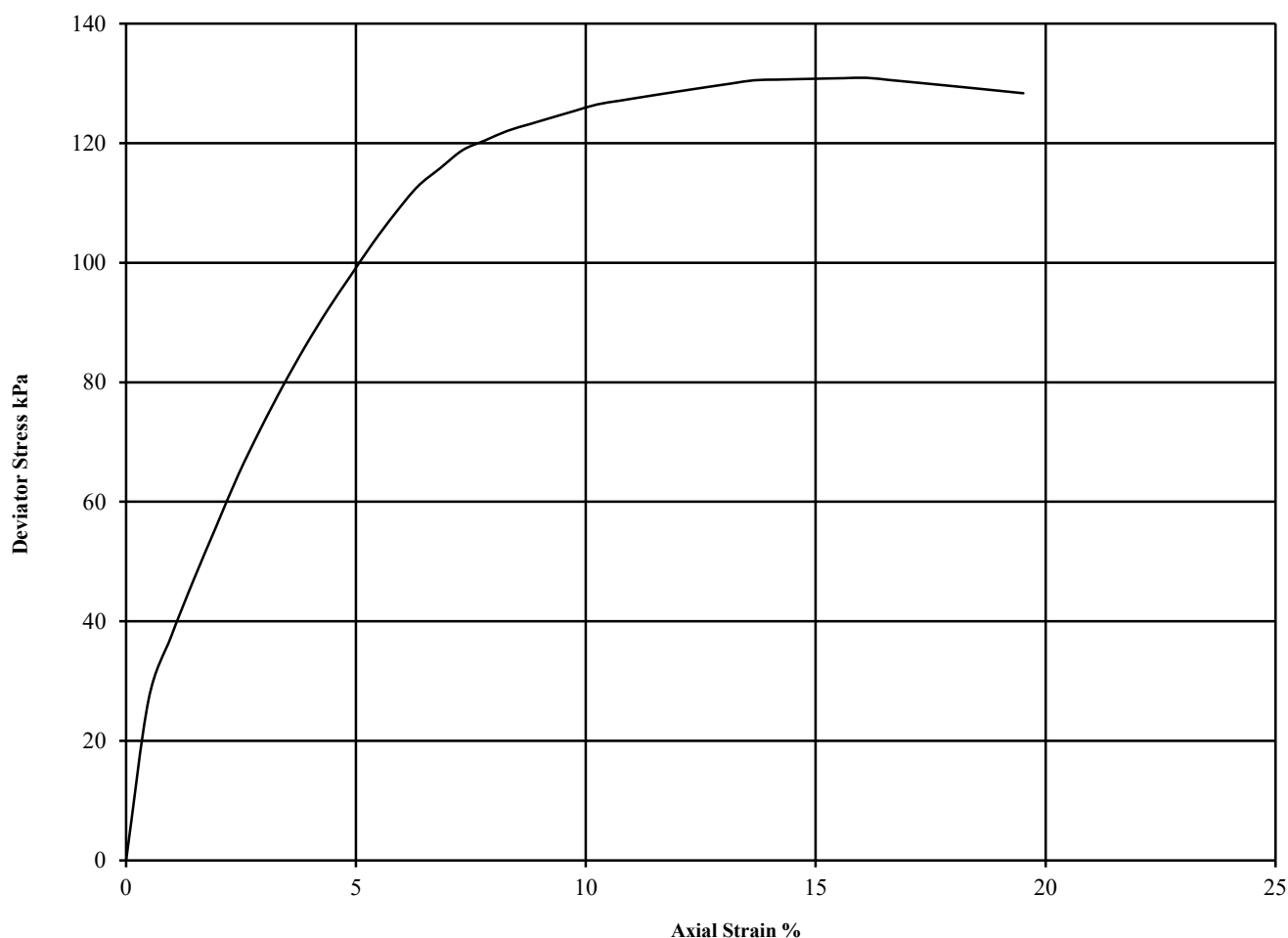
Hole Number: CP101

Top Depth (m): 7.50

Sample Number:

Base Depth (m): 8.00

Sample Type U



Diameter (mm):		101	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	19	2.06	1.74	155	131	65	16.1	Plastic	



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Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

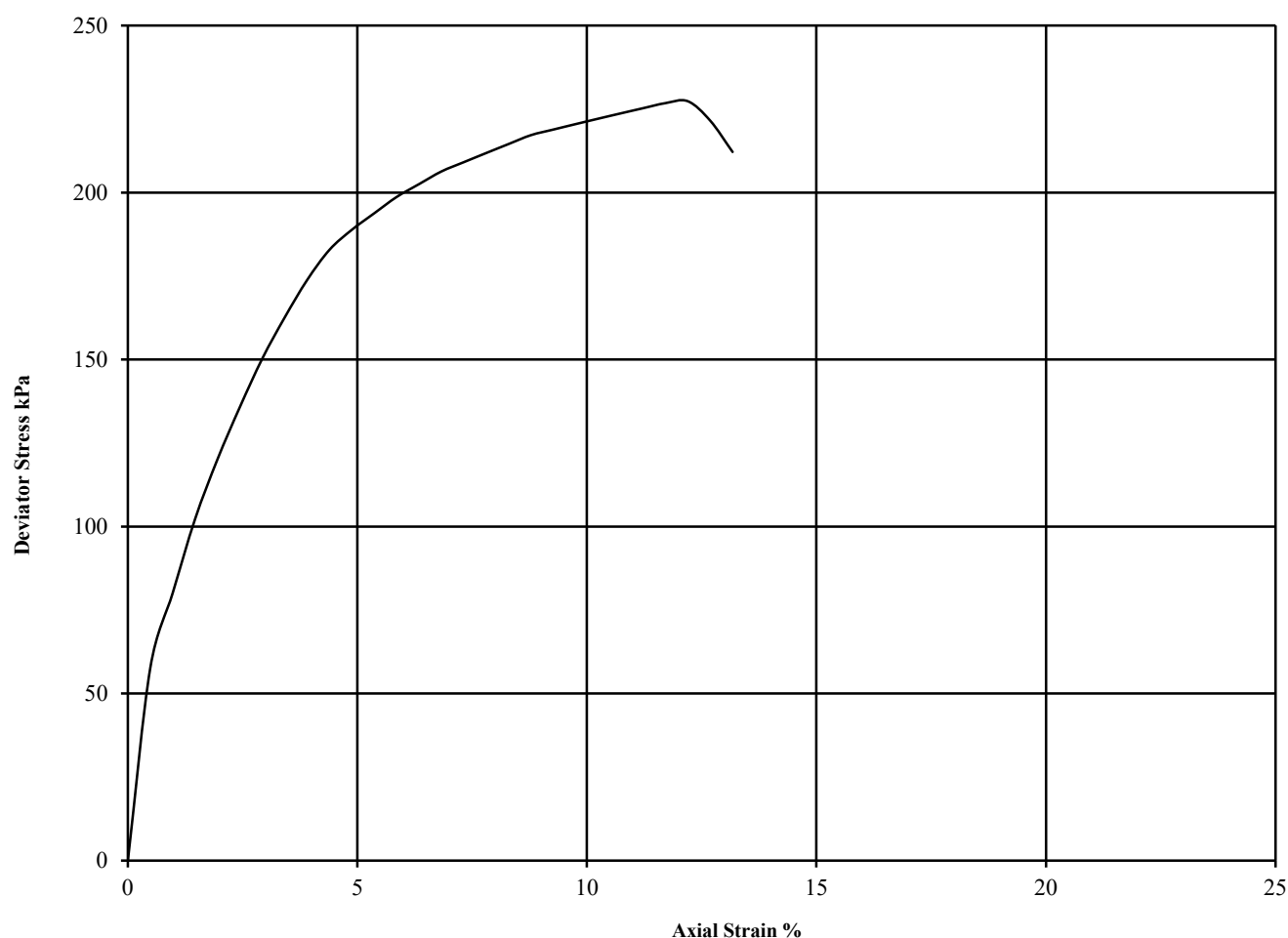
Hole Number: CP103

Top Depth (m): 5.00

Sample Number:

Base Depth (m): 5.50

Sample Type U



Diameter (mm):		101		Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)		Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.35 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	26	1.96	1.55	105	227	114		12.2	Brittle	



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Professional Soils Laboratory

Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

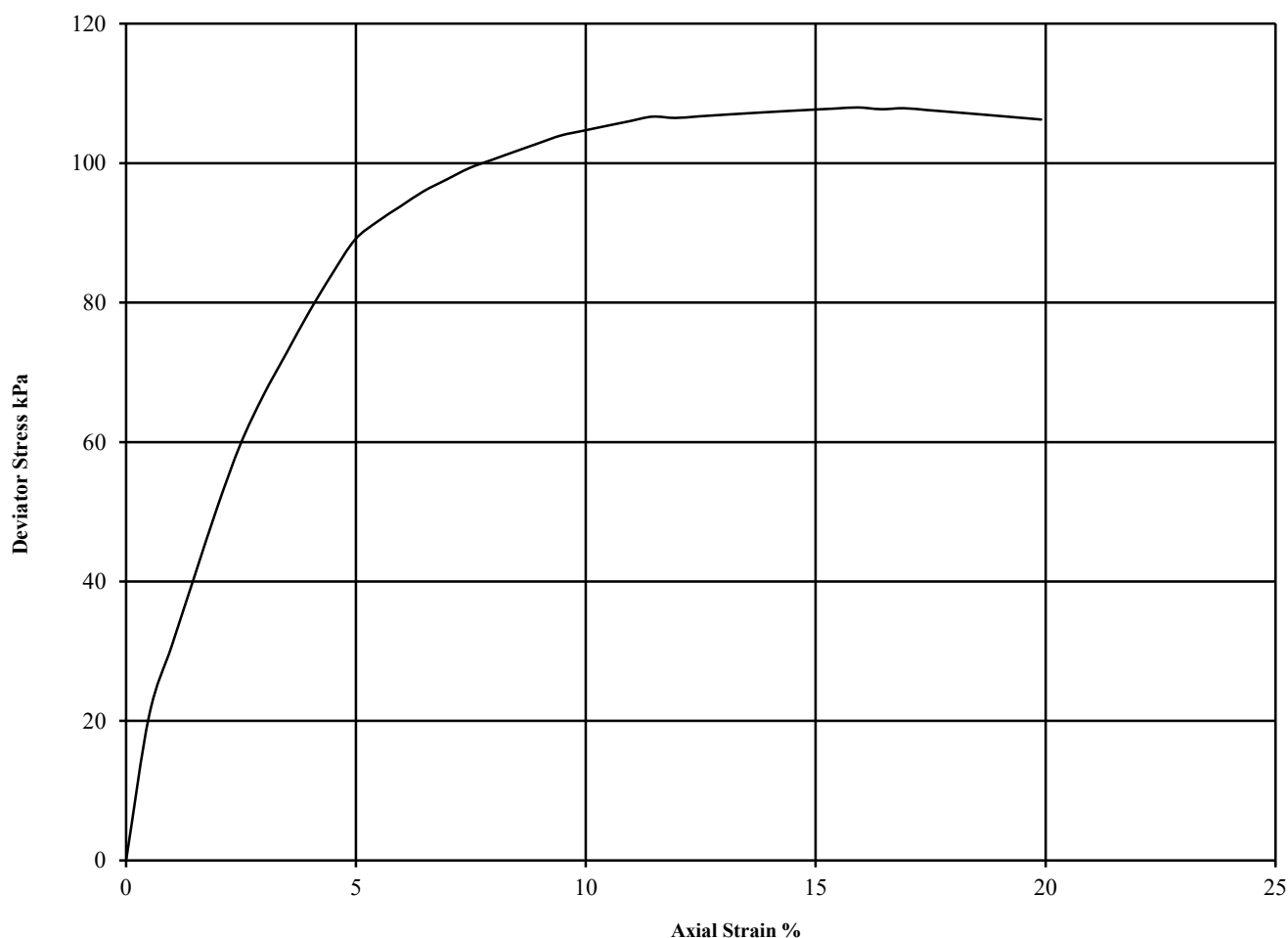
Hole Number: CP104

Top Depth (m): 10.00

Sample Number:

Base Depth (m): 10.50

Sample Type U



Diameter (mm):		103	Height (mm):		207	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	17	2.18	1.86	205	108	54	15.9	Plastic	



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Professional Soils Laboratory

Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: CP101

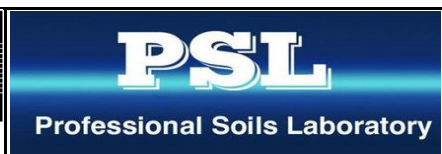
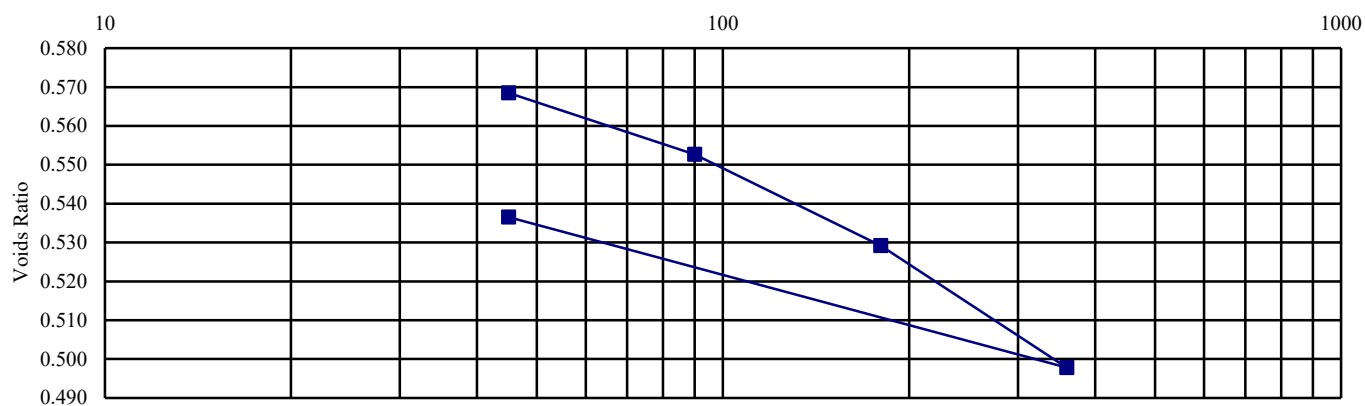
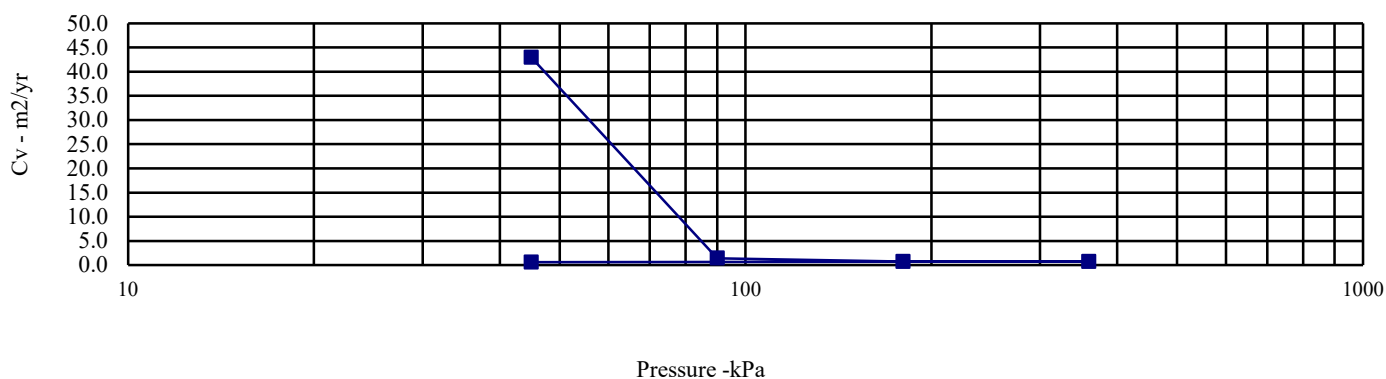
Top Depth (m): 2.00

Sample Number:

Base Depth (m) : 2.50

Sample Type: U

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	23	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.05	0	45	0.294	42.938	Method used to	
Dry Density (Mg/m3):	1.67	45	90	0.224	1.433	determine CV:	T90
Voids Ratio:	0.590	90	180	0.168	0.767	Nominal temperature	
Degree of saturation:	102.5	180	360	0.114	0.724	during test ' C:	20
Height (mm):	20.084	360	45	0.082	0.640	Remarks:	
Diameter (mm)	75.06					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: CP103

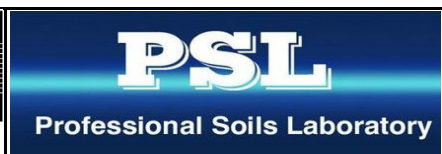
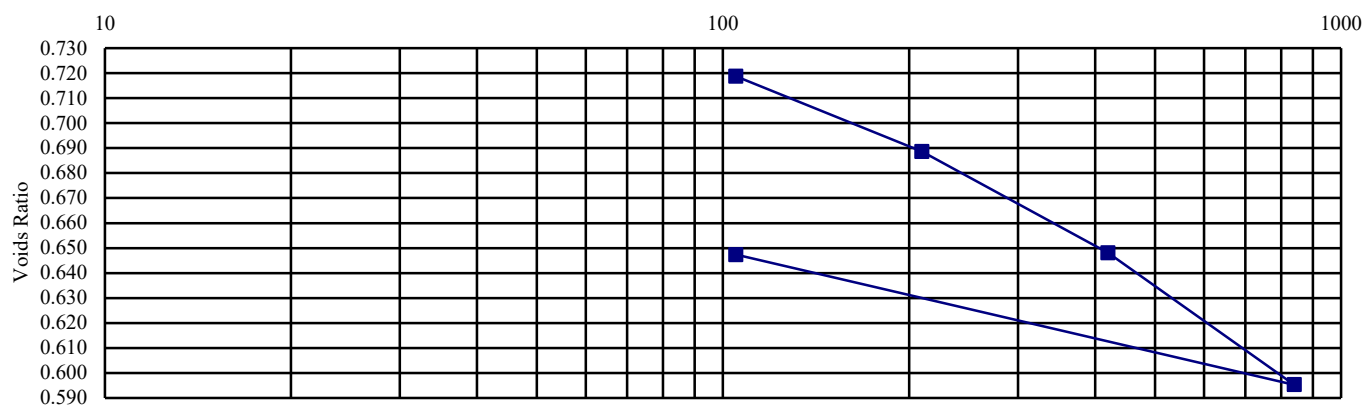
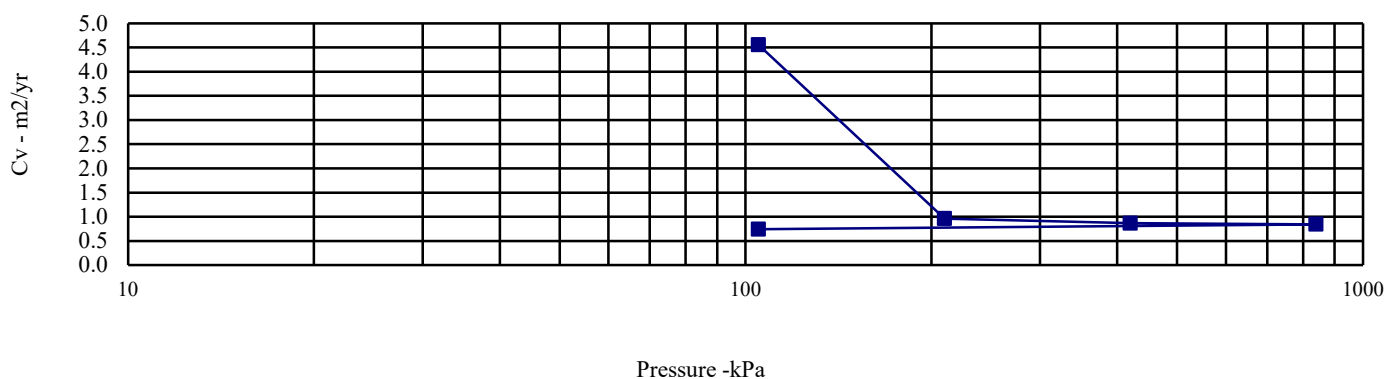
Top Depth (m): 5.00

Sample Number:

Base Depth (m) : 5.50

Sample Type: U

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	27	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	1.93	0	105	0.177	4.552	Method used to	
Dry Density (Mg/m3):	1.51	105	210	0.167	0.964	determine CV:	T90
Voids Ratio:	0.751	210	420	0.114	0.866	Nominal temperature	
Degree of saturation:	96.5	420	840	0.076	0.843	during test ' C:	20
Height (mm):	20.108	840	105	0.044	0.744	Remarks:	
Diameter (mm)	75.085					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

14-868

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: CP104

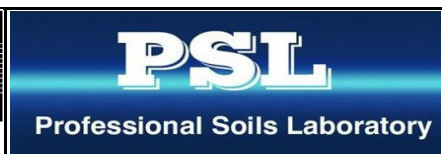
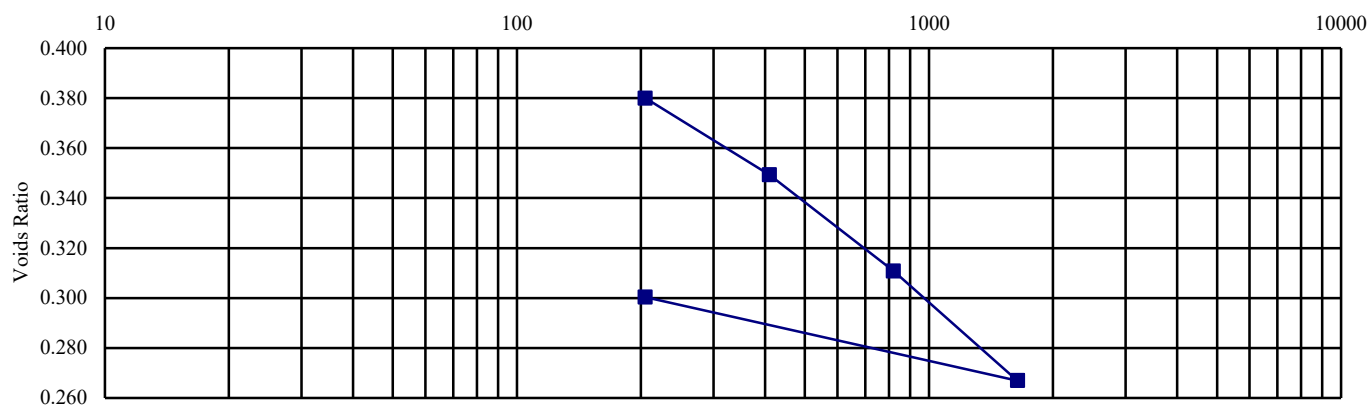
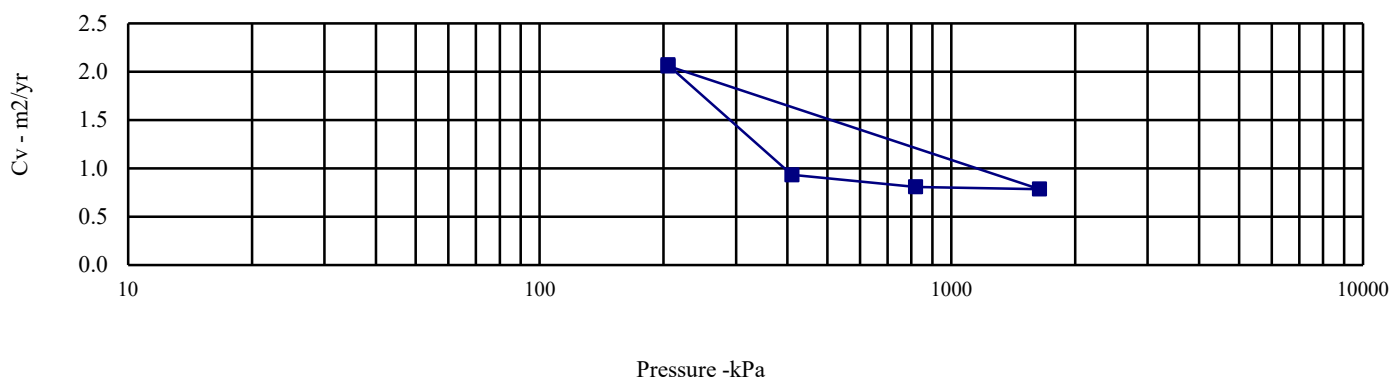
Top Depth (m): 10.00

Sample Number:

Base Depth (m) : 10.50

Sample Type: U

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	17	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.14	0	205	0.234	2.069	Method used to	
Dry Density (Mg/m3):	1.83	205	410	0.108	0.933	determine CV:	T90
Voids Ratio:	0.450	410	820	0.070	0.809	Nominal temperature	
Degree of saturation:	101.3	820	1640	0.041	0.786	during test ' C:	20
Height (mm):	20.028	1640	205	0.018	2.057	Remarks:	See summary of soil descriptions
Diameter (mm)	75.04						
Particle Density (Mg/m3):	2.65						
Assumed							



Poland Street, Ancoats

Contract No:

PSL21/4859

Client Ref:

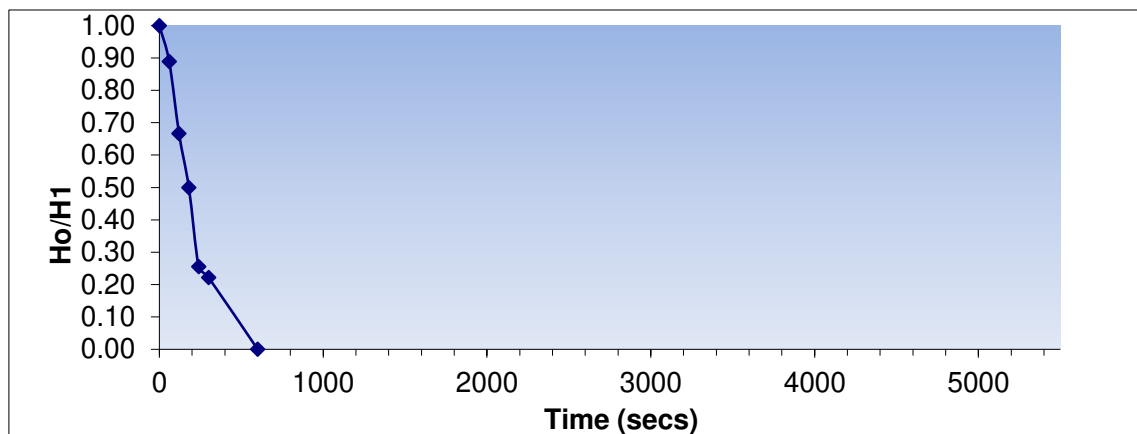
14-868

APPENDIX IX FALLING HEAD PERMEABILITY TEST CERTIFICATES

Falling Head Test**Borehole:** **WS101** **Test No:** **1**

Contract No:	14-868	Casing Diameter: (m)	0.05
Contract Title:	Poland Street	Height of Casing:	0
Date of Test:	02/07/2021	Depth of Borehole: (m)	0.90

Recorded Time			Total Time (secs)	Depth (m)		H/Ho
Hours	Minutes	Seconds				
0	0		0	0	0	1.0000
0	1		60	0.1	60	0.8889
0	2		120	0.3	120	0.6667
0	3		180	0.45	180	0.5000
0	4		240	0.67	240	0.2556
0	5		300	0.7	300	0.2222
0	10		600	0.9	600	0.0000



General Approach

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

$$H_1 = 0.1$$

$$H_2 = 0.7$$

$$A = 0.00196349 \text{ m}^2$$

k = permeability of soil

F = Intake Factor (figures 6 & 7, BS5930:1999)

H₁ = variable head measured at time t₁ after commencement of testH₂ = variable head measured at time t₂ after commencement of test

A = Cross sectional area of borehole casing or standpipe as appropriate.

$$t_1 = 60$$

$$t_2 = 300$$

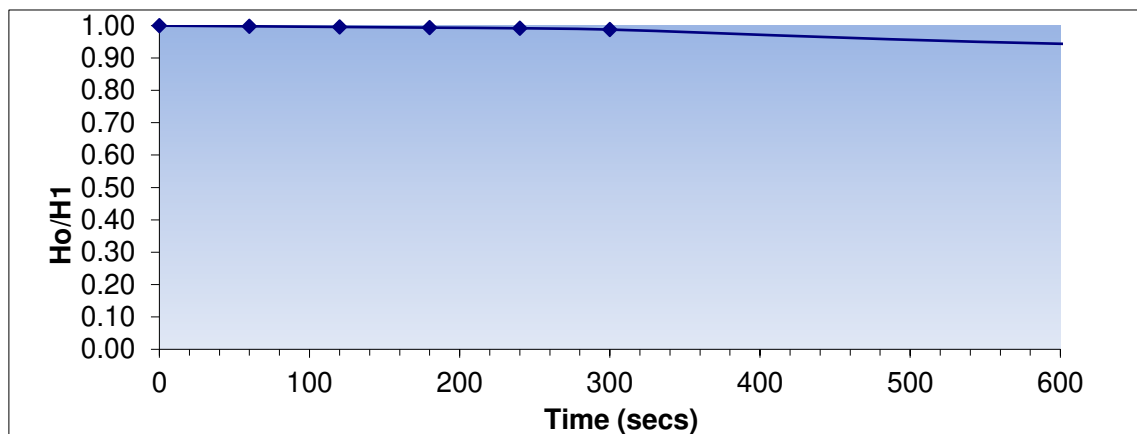
$$F = 1.05$$

Coefficient of Permeability, k = 3.03E-06 m/s

Falling Head Test**Borehole: WS102 Test No: 1**

Contract No:	14-868	Casing Diameter: (m)	0.05
Contract Title:	Poland Street	Height of Casing:	0
Date of Test:	02/07/2021	Depth of Borehole: (m)	4.90

Recorded Time			Total Time (secs)	Depth (m)		H/Ho
Hours	Minutes	Seconds				
0	0		0	0	0	1.0000
0	1		60	0.01	60	0.9980
0	2		120	0.02	120	0.9959
0	3		180	0.03	180	0.9939
0	4		240	0.04	240	0.9918
0	5		300	0.06	300	0.9878
0	12		720	0.32	720	0.9347
0	27		1620	0.4	1620	0.9184
0	50		3000	0.49	3000	0.9000
2	30		9000	0.6	9000	0.8776
3	30		12600	0.66	12600	0.8653



General Approach

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

$$H_1 = 0.01$$

$$H_2 = 0.6$$

$$A = 0.00196349 \text{ m}^2$$

k = permeability of soil

F = Intake Factor (figures 6 & 7, BS5930:1999)

H₁ = variable head measured at time t₁ after commencement of testH₂ = variable head measured at time t₂ after commencement of test

A = Cross sectional area of borehole casing or standpipe as appropriate.

$$t_1 = 60$$

$$t_2 = 9000$$

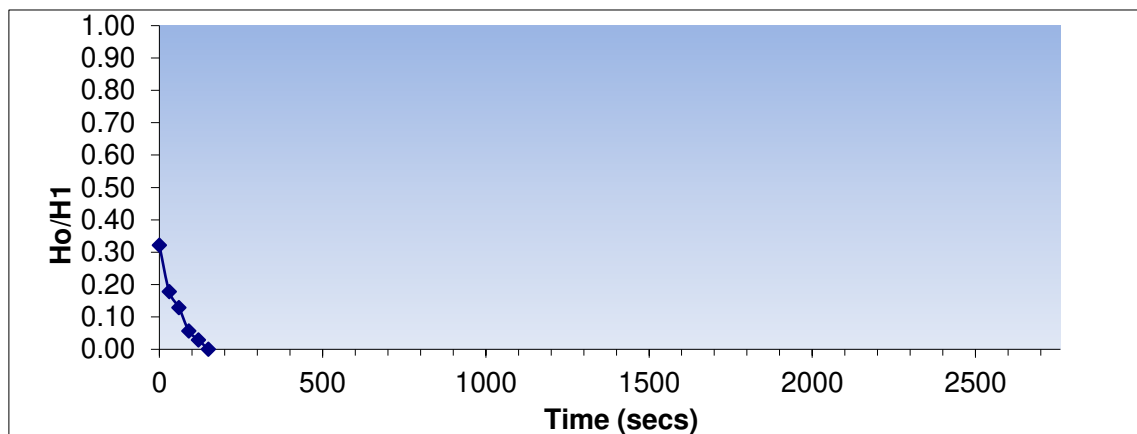
$$F = 3.93$$

Coefficient of Permeability, k = 2.53E-09 m/s

Falling Head Test**Borehole:** **WS103** **Test No:** **1**

Contract No:	14-868	Casing Diameter: (m)	0.05
Contract Title:	Poland Street	Height of Casing:	0
Date of Test:	02/07/2021	Depth of Borehole: (m)	1.40

Recorded Time			Total Time (secs)	Depth (m)		H/Ho
Hours	Minutes	Seconds				
0	0		0	0.95	0	0.3214
0	0	30	30	1.15	30	0.1786
0	1		60	1.22	60	0.1286
0	1	30	90	1.32	90	0.0571
0	2		120	1.36	120	0.0286
0	2	30	150	1.4	150	0.0000



General Approach

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

$$H_1 = 1.15$$

$$H_2 = 1.36$$

$$A = 0.00196349 \text{ m}^2$$

k = permeability of soil

F = Intake Factor (figures 6 & 7, BS5930:1999)

H₁ = variable head measured at time t₁ after commencement of testH₂ = variable head measured at time t₂ after commencement of test

A = Cross sectional area of borehole casing or standpipe as appropriate.

$$t_1 = 30$$

$$t_2 = 120$$

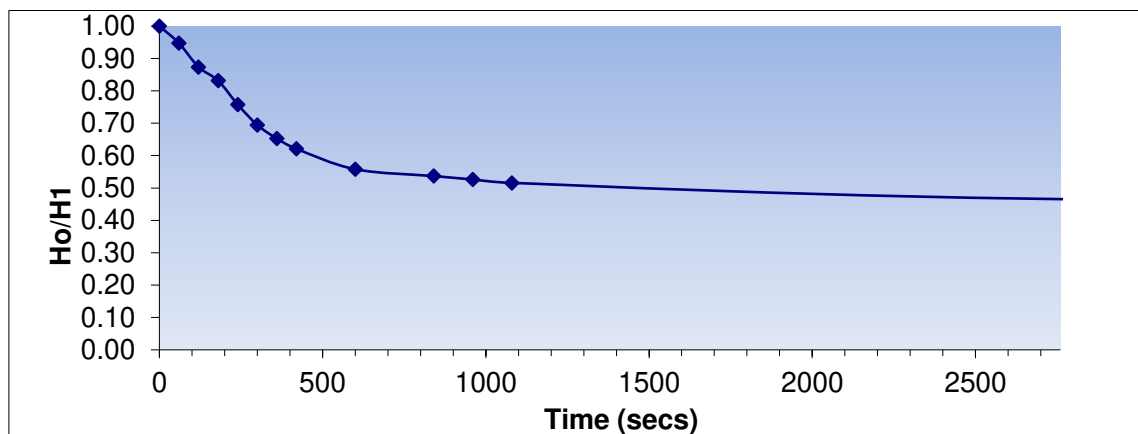
$$F = 1.28$$

Coefficient of Permeability, k = 3.92E-05 m/s

Falling Head Test**Borehole:** **WS104** **Test No:** **1**

Contract No:	14-868	Casing Diameter: (m)	0.05
Contract Title:	Poland Street	Height of Casing:	0
Date of Test:	02/07/2021	Depth of Borehole: (m)	1.90

Recorded Time			Total Time (secs)	Depth (m)		H/Ho
Hours	Minutes	Seconds				
0	0		0	0	0	1.0000
0	1		60	0.1	60	0.9474
0	2		120	0.24	120	0.8737
0	3		180	0.32	180	0.8316
0	4		240	0.46	240	0.7579
0	5		300	0.58	300	0.6947
0	6		360	0.66	360	0.6526
0	7		420	0.72	420	0.6211
0	10		600	0.84	600	0.5579
0	14		840	0.88	840	0.5368
0	16		960	0.9	960	0.5263
0	18		1080	0.92	1080	0.5158
0	50		3000	1.02	3000	0.4632
2	130		15000	1.1	15000	0.4211
2	170		17400	1.15	17400	0.3947



General Approach

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

$$H_1 = 0.1$$

$$H_2 = 1.1$$

k = permeability of soil

F = Intake Factor (figures 6 & 7, BS5930:1999)

H₁ = variable head measured at time t₁ after commencement of testH₂ = variable head measured at time t₂ after commencement of test

A = Cross sectional area of borehole casing or standpipe as appropriate.

$$t_1 = 60$$

$$t_2 = 15000$$

$$F = 1.28$$

$$A = 0.00196349 \text{ m}^2$$

Coefficient of Permeability, k = 2.54E-08 m/s



e3p

Phase II Geoenvironmental Site Assessment
Ancoats Mobility Hub

Reference: 15-849-R1-1
Date: August 2022



PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Ancoats Mobility Hub
Poland Street
Manchester
M4 6AZ

Prepared for:



Report Ref: 15-849-R1-1
Date Issued: 31/08/2022

Ancoats Mobility Hub

Phase II Geoenvironmental Site Assessment

August 2022

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Registered in England
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QUALITY ASSURANCE

PROJECT NUMBER	15-849		
VERSION	Version 1		
REMARKS	Final		
DATE	31 August 2022		
PREPARED BY	M. Jackson		
QUALIFICATIONS	BSc (Hons), MSc, FGS, GMICE		
CHECKED BY	O. Jackson		
QUALIFICATIONS	BSc (Hons), FGS, AMIEnvSci		
AUTHORISED BY	D Cox		
QUALIFICATIONS	BSc, FGS, MIEnvSci CEnv, PIEMA		

EXECUTIVE SUMMARY

Site Address	Ancoats Mobility Hub, Poland Street, Manchester, M4 6AZ	
Grid Reference	E385170, N398900.	
Site Area	0.33Ha.	
Proposed Development	It is understood that the client intends to deliver a mobility hub development of up to 8 storeys, including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit, and a delivery hub.	
Current Site Use	The subject site is a rectangular-shaped parcel of land located to the northeast of Manchester city centre, and the Site is currently occupied by low-rise, multi-tenanted industrial estate units and hardstanding. The site can be accessed by pedestrians and vehicles via Poland Street. Security fencing runs along the eastern boundary where the site meets Ancoats Green.	
Site History	The site was formerly occupied by terraced housing prior to 1891, when then redeveloped into Street Main Gas Department. The site then underwent numerous alterations and extensions and was relabelled as Corporation Yard. In 1980, the site was cleared and replaced by the Poland Street Industrial Estate, which has remained present to date.	
Environmental Setting	Drift Geology	Glacial Till – Sand, Gravel and Clay.
	Bedrock Geology	Manchester Marls Formation – Mudstone.
	Faults	Two unnamed faults are recorded ca 50 m to the east and ca 50 m to the west.
	Hydrogeology	Secondary undifferentiated aquifer (drift) overlying secondary B bedrock aquifer. No groundwater abstractions were recorded in the vicinity of the site.
	Hydrology	The Rochdale Canal is recorded as approximately 250 m south of the site.
	Flood Risk	Unaffected by flooding from rivers.
Previous Reports	The following previous reports have been completed for the Site:  E3P Phase I Geoenvironmental Site Assessment (Ref: 14-868-R1-1, dated April 2021)  E3P Phase II Geoenvironmental Site Assessment (Ref: 14-868-R2-1, dated July 2021)	
Utility Locations	A formal drainage survey has been completed by Hill Cannon (ref: 20-050/DR/AMSCP Flood Risk Assessment and Drainage Strategy (Rev B), dated April 2021. Electricity cables were identified in the south, west and northern boundaries feeding into the back of the current structures on site. Surface water drainage is present across the centre of the Site. BT enters the site in the southwest from the road and splits along the central facing front of both sets of buildings currently present on site. Two gas lines are present on Site, entering the site from the road in the southwest and running in line with the central facing sides of the buildings present on site.	
Landfill Sites and Ground Gases	No landfill sites (current or historical) are recorded within 500 m of the site.	



Landfill Sites and Ground Gases – continued	The site and surrounding land have undergone several phases of development, including the infilling of a former canal adjacent to the north of the site. Made Ground associated with the historical development may produce hazardous ground gases such as methane and carbon dioxide.
Radon	The Envirocheck report indicates the site is situated in an area where less than 1% of homes are above the “Action Level” and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.
Coal Mining/Land Stability	E3P has concluded that the subject site is classified as low risk from potential shallow coal mining risks and is not located within a development high-risk area.
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.
Initial Conceptual Site Model	Contaminant Sources - Made Ground (historical on-site and adjacent industrial land uses including a corporation yard) – Heavy metals, polycyclic aromatic hydrocarbons, total petroleum hydrocarbons, asbestos containing materials and hazardous ground gases Pathways - Direct contact and ingestion - Volatilisation/indoor explosion - Vapour inhalation - Dust inhalation Receptors - Future site users (proposed commercial end-users and construction workers) - Buildings

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: 5 x mechanically excavated trial pits 6 x window sample boreholes 4 x environmental monitoring installations - Groundwater sampling - Ground gas monitoring
Ground Conditions	MADE GROUND – 0.00 m bgl to 2.60 m bgl Made Ground deposits were encountered within all exploratory hole locations to depths between ground level and 2.60 m bgl (WS202). Made Ground was typically encountered to depths of 2.00 m bgl. Surface cover comprised of asphalt proven to a depth of 0.20m bgl in general, overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded within TP203, TP205, WS204 and WS205.



Ground Conditions – continued	MADE GROUND (continued)– 0.00 m bgl to 2.60 m bgl Made Ground deposits largely comprised of loose black, slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic. Cohesive Made Ground deposits were encountered beneath the granular deposits within TP201, TP204, WS201–WS205. The reworked clay deposits had frequent brick, clinker, coal, mudstone and sandstone gravels as part of their matrix.
	DRIFT – 1.50 m bgl to 5.45 m bgl Drift deposits were encountered within nine of the eleven exploratory hole locations. Within TP205 and WS205 the full depth of the Made Ground Could not be proven due to the presence of redundant services and concrete obstructions circa 0.70 m bgl. Drift deposits typically comprise firm to very stiff brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and mudstone. Very soft to soft dark grey, slightly sandy CLAY has been identified between 2.00 m bgl and 3.70 m bgl within WS201 and WS204.
	SOLID – 24.00-40.00 m bgl Solid geology was not encountered as part of this investigation. However, E3P identified solid geology circa 24.00 m bgl in the east of the Site within the previous cable and rotary boreholes advanced in July 2021.
	GROUNDWATER Perched groundwater was encountered during the ground investigation at 2.00 m bgl within TP202 and WS201 in the eastern sector of the Site. Both water strikes were noted between the base of the Made Ground and the natural CLAY deposits.

CONTAMINATED LAND ASSESSMENT

Human Health	As part of the previous E3P Phase II Geoenvironmental Site Assessment (Ref: 14-868-R2-1, dated July 2021) elevated naphthalene and mercury were identified when comparing testing results to residential without plant uptake. Therefore, at the time, it was recommended that a more detailed risk assessment and supplementary site investigation was required. An updated Tier I human health risk assessment has been prepared in using the chemical analysis results of the soils from both the July 2021 and June 2022 investigations and compared to the relevant Tier I criteria for commercial end use. The target values for such are therefore less stringent than the initial assessment. This updated assessment which has included both data sets has identified the presence of elevated benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene only in Made Ground samples obtained from WS201, WS203 and WS204 from July 2021 samples and in TP202 and TP205 from June 2022 samples.
---------------------	---



	Coal tar testing on the selected Made Ground samples did not identify any coal tar.
Human Health – continued	No asbestos was identified in the samples selected for testing. WAC analysis on selected Made Ground sampling identified soils to be stable non-reactive hazardous status due to elevated sulphate, TOC, pH and PAH levels. The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion, soil ingestion and consumption of homegrown produce. These exceedances can be mitigated by the installation of a 300 mm chemically suitable cover system within all landscaped areas. Further investigation may be required within the footprint of the existing building to confirm the assessment on completion of the demolition activities.
Controlled Waters	Due to the lack of viable surface water receptors within influencing distance of the Site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such, the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground to drinking water standards (DWS). No exceedances have been noted within the samples submitted for leachate analysis. Groundwater samples have identified exceedances in WS201 (June 2022) for total cyanide, Aromatic TPH fractions C12-C35. Selenium and Aromatic TPH Fraction C16-C35 were elevated in groundwater samples obtained from WS102 and WS104 in June 2021. The Site is underlain by low permeability clay, which reduces potential vertical and lateral migration of contaminants, and there is no potable abstraction points within influencing distance from the Site. This reduces the sensitivity of the aquifer further. As such, there is considered to be no likely complete pollutant linkage to the critical receptor and therefore no unacceptable risk to controlled waters.
Ground Gas	Ground gas monitoring previously suggested CS2 due to elevated levels of methane in the Made Ground. Should this made ground be removed from beneath the proposed building, protective measures are unlikely to be necessary. Updated gas monitoring from wells in the same area suggest that the site can be classified as CS1, and in these areas it is considered that gas protection measures will not be required.
Potable Water Infrastructure	Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development. 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	Concrete obstructions were noted within WS206 in the centre of the Site. No further obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots. All 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 clay drift deposits have been assessed as being stiff to very stiff with a net allowable bearing pressure (ABP) in the order of 114 kN/m² at circa 1 m bgl increasing to 127–434 kN/m² at circa 3.00 – 5.00 m bgl. Very soft to soft, extremely low to very low strength CLAY drift deposits were identified between 2.00 – 4.00m bgl within WS201 and WS204 with ABP of 28 kN/m² and 8.9 kN/m² respectively. Hand shear vane testing in the advanced trial pits identified shear strengths of less than 32 kPa at TP201, TP202 and TP203 between 1.60 m and 2.50 m bgl as such an ABP of less than 74kN/m². In these areas, the clay is classed as very soft to soft, very low to low strength.
Foundation Options	The previous E3P Phase II Geoenvironmental Site Assessment (Ref: 14-868-R2-1, dated July 2021) investigated the deeper drift stratum and the bedrock geology. Geotechnical results are pending and as such, the foundation options are based on the previous findings. MUDSTONE bedrock of the Manchester Marl Formation was encountered at 28.00m bgl within BH102 in the north west of the Site and BH104 in the east of the Site at 24.00m bgl. The bedrock was not encountered within BH103 which was taken to 29.00m bgl. During a phase of enabling works to create a developable platform, all Made Ground will require processing to ensure the material is suitable for reuse in the future development to enable the construction of proposed plots. Based on the proposed redevelopment to an 8-storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended. Given the proposed development, a programme of enabling works will be required to reengineer the loose and variable Made Ground to an agreed compaction specification to provide a suitable platform for development in addition to reengineering for external and internal ground bearing slabs (if proposed). However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the Site to provide suitable development platform levels.



Building Floor Slabs	Following enabling works, the Site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement. Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding. A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to reengineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation. Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.
Heave Precautions	Given that the underlying clay is of medium volume change potential, heave precautions will be required to the internal face of a foundation less than 1.5 m in depth. Heave precautions will be required to the underside of floor slabs (where there is no 200 mm void) and pile ground beams are required within the modelled influencing distance of trees.
Soakaway Drainage	Findings taken from E3P Phase II Geoenvironmental Site Assessment, (Ref: 14-868-R2-1, dated July 2021) indicate that soakaway drainage is unlikely to be feasible. Falling head tests were undertaken in natural drift deposits, where an infiltration rate of 2.53E-05 m/s to 2.53E-09 was recorded. However, the application of soakaway drainage will ultimately be dependent on the specific requirements of the development. Should soakaways be used in the development, all soakaways should be designed in accordance with BRE Special Digest 365 – Soakaway Design.
Sulphate Assessment	Majority of the Site falls under concrete classification DS1 AC1s, with elevated sulphate levels being identified within TP203 at 0.90 m bgl complying with DS2-AC1s. An isolated area of DS3-AC3s has been identified within E3P previous site investigation (Ref: 14-868-R2-1) within BH104 at 1.50m bgl.
CBR Design %	Granular soils can be reengineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods; however, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Cut/Fill	Development levels unknown at this time; however, an element of cut-and-fill works will likely be required to prepare the development platform.



Civil Engineering Excavations	Site observations indicated that excavations should be feasible in the near surface with normal plant equipment. Excavations were generally stable, with a minor instability noted within Made Ground in TP204. No significant obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed foundations. Due to the depth and variability of the Made Ground and the likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with the 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.
Waste Characterisation	Any material that is to be disposed of off-site should undergo assessment using Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste. An initial Waste Acceptance Criteria (WAC) test has been carried on several samples taken across the Site within the Made Ground between 0.30 m bgl and 1.30m bgl. The materials tested fall under stable non-reactive hazardous waste.

RECOMMENDATIONS

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

-  Further investigation of inaccessible areas.
-  Pile design foundation schedule (upon receipt of the final development levels).
-  Arboriculture survey.
-  Geotechnical earthworks strategy (infrastructure).
-  Remediation and enabling works strategy.



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DRAWING LIST

15-849-001 - Site Location Plan
15-849-002 - Proposed Development Plan
15-849-003 - Historical Features Plan
15-849-004 - Site Features Plan
15-849-005 - Exploratory Hole Location Plan
15-849-006 - Depth of Made Ground Plan
15-849-010 - Conceptual Site Model
15-849-018 – Contamination Exceedance Plan

CROSS SECTION LIST

Cross Sections 1 and 2



1. INTRODUCTION

1.1. BACKGROUND

E3P has been appointed by Bowmer & Kirkland to complete a supplementary site investigation at Ancoats Mobility Hub, Poland Street Manchester in order to delineate areas of the Site, which previously identified elevated concentrations of contaminants.

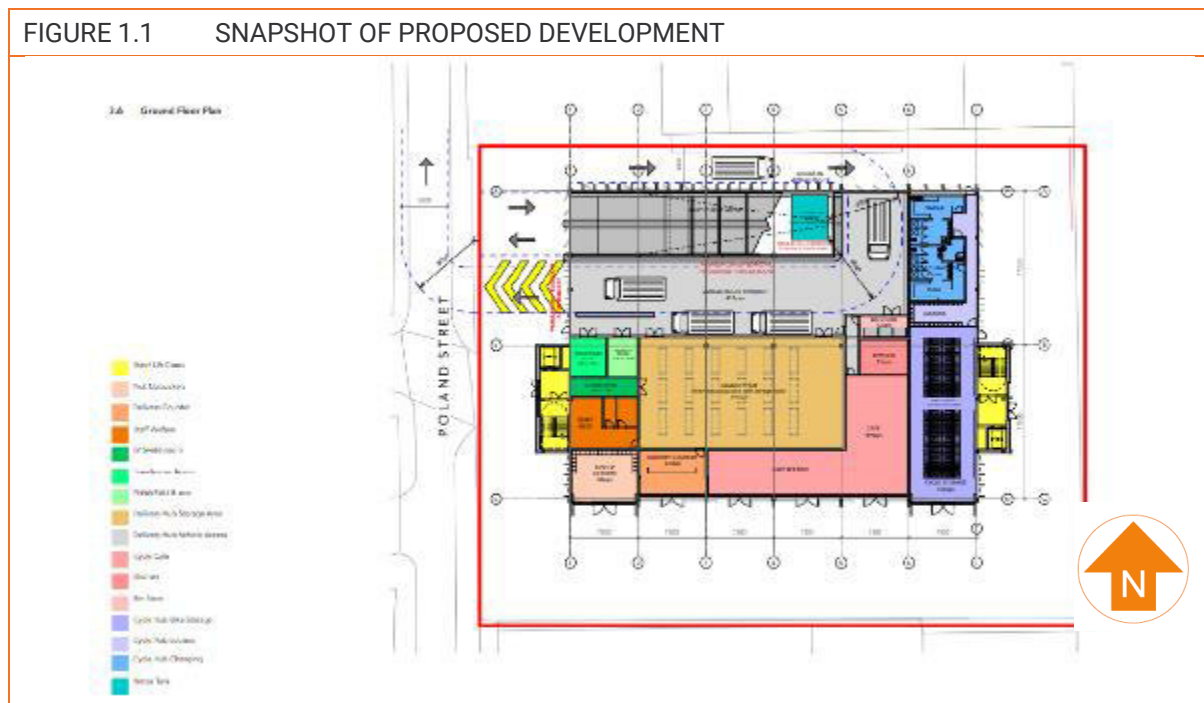
This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed low-rise residential development.

1.2. PROPOSED DEVELOPMENT

E3P understands that the proposed development will comprise a mobility hub development of up to 8 storeys including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit and a delivery hub.

The proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



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) (2019)*.
- ✦ 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:

- ✦ Design of suitable intrusive ground investigation to investigate and delineate previously identified contamination;
- ✦ Window sample probeholes with, and construction of, environmental monitoring installations;
- ✦ 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 SITE INVESTIGATIONS

E3P has previously completed a Phase I report (ref 14-868-R1-1) dated April 2021 and a Phase II site investigation report (ref 14-868-R2) dated July 2021. The findings from the Phase I and II reports have been summarised below:

SITE USE

The site is currently occupied by 12 units within an industrial estate. Site tenants include a Community Equipment Store, H2O Ltd, Zenobia Media Production and House of Ethnic Foods Ltd. Externally to the units, the site is surfaced with associated hardstanding where three storage containers and two skips were observed.

HISTORICAL SITE USE

Historical mapping from 1848 indicates the site was formerly occupied by terraced housing prior to 1891, when then redeveloped into Street Main Gas Department. The site then underwent numerous alterations and extensions and was relabelled as Corporation Yard. In 1980, the site was cleared and replaced by the Poland Street Industrial Estate which has remained present to date.

GEOLOGY

Made Ground – 0.0m to 2.60m bgl depths

Made Ground deposits were encountered within all exploratory hole locations to depths of between ground level and 2.60 m bgl. Made ground was typically encountered to depths of 2.00m bgl.

At ground level locations comprised of asphalt to 0.20m bgl overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded to be present in the north of the site within BH102 and BH104.

Made Ground deposits largely comprised of loose black slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic. Granular Made Ground was encountered across the centre and south east areas of the site at depths from 0.20m – 2.60m bgl. Additionally, areas of cohesive made ground was encountered in the northern areas of the site between 0.20m – 2.00m bgl comprising firm dark grey slightly silty gravelly reworked clay. Gravel is medium to coarse angular to subrounded of brick, ceramic, clinker and calcareous deposits.

DRIFT – 1.4mbgl - 29.00m bgl

Drift deposits were encountered within all locations underlying the Made Ground between 1.40m – 29.00m bgl (unproven).

Shallow drift deposits (<12.00m bgl) typically comprised stiff medium strength to very stiff high strength dark brown slightly silty slightly gravelly CLAY. Gravel is fine to medium angular to subrounded of sandstone and mudstone.

At greater depth granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone.

SOLID – Encountered from 24.00m bgl

The solid bedrock geology of the Manchester Marl Formation was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl.



GROUNDWATER

Perched groundwater was encountered during the site investigation at depths between 1.50m bgl and 4.00 m bgl. A deeper groundwater strike was recorded at 12.00m bgl in BH102.

HUMAN HEALTH

A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria. This assessment has identified the presence of elevated lead, naphthalene, mercury, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene across the site.

The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion. Where hardstanding is present these exceedances will be mitigated. If any soft landscaping is to be incorporated into the design these exceedances can be mitigated through the installation of a 300 mm chemically suitable cover system within all landscaped areas.

With regards to the elevated naphthalene and mercury, these present a potential volatilisation to indoor air risk and have been identified throughout the site. Therefore, it is recommended to undertake a more detailed quantitative risk assessment (DQRA) and supplementary site investigation.

This would include:

- ✳ Completing speciation of elevated mercury samples to understand if this poses a theoretical vapour risk.
- ✳ Installation of dedicated Vapour Monitoring Wells with specialist Carbon Sorption Tubes;
- ✳ DQRA assessment of sorption tube analysis to assess the actual risk to the proposed dwellings; and,
- ✳ Further investigation may be required within the footprint of the existing buildings.

CONTROLLED WATERS

Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS).

Elevated total cyanide was identified from leachate analysis undertaken in Made Ground soils in WS103 at 0.75m and 1.50m bgl, following the receipt of supplementary groundwater samples showing no elevated concentration when compared to DWS was identified. Therefore, the cyanide is not considered to be a significant site contaminant source at WS103.

Exceedances of heavy metals (selenium and total cyanide), TPH (C16-C35 - aromatic) and PAH (benzo[b]fluoranthene, benzo(a)pyrene, fluoranthene) were recorded within groundwater samples from WS102 and WS104. The presence of low permeability drift deposits up to 12.00m bgl and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway.

Elevated TPH C16-C21 exceedances (710 - 940 µg/l) have been recorded within both groundwater samples. However, no TPH C16-C21 exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis of the Made Ground within WS103.



A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits in BH101 and BH103. However, this was identified within exploratory holes located in the southern and eastern areas of the site away from where water samples were taken; due to the low permeability strata it is unlikely a pathway is present that would allow TPH from this source to migrate vertically into the groundwater. Therefore, is unlikely that the visual and olfactory hydrocarbons identified within BH101 and BH10 is related to the TPH impact recorded within the groundwater. As such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters due to no viable migration pathway. However, further works are necessary to assess the risk and potential on-site source associated with TPH impact recorded within groundwater samples as this may pose a human health risk.

2.2. GENERAL OVERVIEW

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

Exploratory fieldwork was completed between 27th June 2022 and 28th June 2022. The works are summarised in Table 2.1.

2.3. SCOPE OF INVESTIGATION

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions Including the Presence/Nature of Obstructions	TP201	Mechanically Excavated Trial Pit	2.90	N/A
	TP202		3.35	N/A
	TP203		3.50	N/A
	TP204		1.90	N/A
	TP205		0.70	N/A
	WS201	Window Sample Probehole	5.45	0.50-2.50
	WS202		5.45	0.50-1.50
	WS203		4.40	N/A
	WS204		5.45	1.00-2.00
	WS205		5.45	2.00-4.00

Mechanically excavated trial pits were advanced to investigate ground conditions and to retrieve environmental samples, spatially distributed to offer the maximum site coverage whilst also being advanced to target specific contaminant sources.

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



The sampling locations are illustrated in Drawing 15-849-005 (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. In addition, selected wells were purged and samples of groundwater were recovered for chemical analysis.

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 3.6 and discussed in Section 6.

2.5. LABORATORY ANALYSIS

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

- ✦ Metals.
- ✦ pH, total sulphate, water-soluble sulphate (2:1 extract).
- ✦ Sulphide.
- ✦ Cyanide.
- ✦ Phenols.
- ✦ Total and speciated polycyclic aromatic hydrocarbons (PAHs).
- ✦ Semi Volatile Organic Compounds (SVOC).
- ✦ Volatile Organic Compounds (VOC).
- ✦ Asbestos identification and quantification.
- ✦ Coal tar testing.
- ✦ Speciated and banded total petroleum hydrocarbon (TPH).
- ✦ 2:1 Waste Acceptance Criteria Leachate Testing (WAC).

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 PSL Laboratory where the following geotechnical tests were undertaken:

- ✦ Atterberg limits determinations;
- ✦ Particle Size Distribution (PSD);
- ✦ 2.5 kg OMC/DD;
- ✦ Consolidation Testing; and
- ✦ Single-stage triaxial tests.



Laboratory analysis sheets are included in Appendix X and are summarised in Section 5.



3. GROUND AND GROUNDWATER CONDITIONS

3.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and is in agreement with previous E3P reports which should be read as a precursor to this report. Table 3.1 identifies the strata identified within all phases of investigation.

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)						
	MADE GROUND HARDSTANDING	MADE GROUND	VERY SOFT TO SOFT CLAY	STIFF CLAY	VERY STIFF CLAY	DENSE SAND	BEDROCK
TP201	0.00-0.40	0.40-2.20	–	2.20- 2.90	–	–	–
TP202	0.00-0.45	0.45-1.90	–	1.90- 2.80	2.80-3.35	–	–
TP203	0.00-0.45	0.45-1.70	–	1.70- 3.50	–	–	–
TP204	0.00-0.30	0.30-1.60	–	1.60- 1.90	–	1.90 – 3.00	1.90 – 3.00
TP205	0.00-0.30	0.30-0.70	–	–	–	–	–
WS201	0.00-0.40	0.40-2.00	2.00-3.00	5.00- 5.45	3.00-5.00	2.00 – 2.40	2.00 – 2.40
WS202	0.00-0.40	0.40-2.60	–	–	2.60-5.45	–	–
WS203	0.00-0.30	0.30-1.50	–	1.50- 3.00	3.00-4.40	–	–
WS204	0.00-0.20	0.20-2.50	2.50-3.70	3.70- 5.45		-	-
WS205	0.00-0.15	0.15-1.65	–	1.65- 4.00	4.00-5.45	–	–
WS206	–	0.00-0.70	–	–	–	–	–
WS101	–	0.00 – 2.60	–	–	2.60 – 5.45*	–	–
WS102	–	0.00 – 1.40	–	–	1.40 – 5.45*	1.90 – 3.00	1.90 – 3.00
WS103	1.90 – 3.00	0.00 – 1.90	1.90 – 3.00	–	3.00 – 5.45*	–	–
WS104	–	0.00 – 1.50	–	–	1.50 – 5.45*	2.00 – 2.40	2.00 – 2.40
BH101	2.00 – 2.40	0.00 – 2.00	2.00 – 2.40	–	2.40 – 12.20 12.50 – 15.00 15.60 – 16.20	12.20 – 12.50 15.00 – 15.60 16.20 – 16.50	–



HOLE	DEPTH TO STRATUM (m bgl)						
	MADE GROUND HARDSTANDING	MADE GROUND	VERY SOFT TO SOFT CLAY	STIFF CLAY	VERY STIFF CLAY	DENSE SAND	BEDROCK
					16.50 – 17.80 18.20 – 19.50 19.80 – 20.00 21.50 – 24.00 24.90 – 25.00*	17.80 – 18.20 19.50 – 19.80 20.00 – 21.50 24.00 – 24.90	
BH102	–	0.00 – 2.00	–	–	2.00 – 12.00 19.70 – 28.00	12.00 – 19.70	28.00 – 29.00*
BH103	–	0.00 – 1.50	–	–	1.50 – 13.00 14.00 – 16.00 19.50 – 22.00 24.50 – 29.00*	13.00 – 14.00 16.00 – 19.50 22.00 – 24.50	–
BH104	–	0.00 – 2.00	–	1.90 – 3.00	2.00 – 14.00 20.00 – 24.00	14.00 – 20.00	24.00 – 26.00*

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths between ground level and 2.60 m bgl (WS202). Made Ground was typically encountered to depths of 2.00 m bgl.

Surface cover comprised of asphalt proven to a depth of 0.20m bgl in general, overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded within TP203, TP205, WS204 and WS205. No concrete was recorded to be present in the north of the site within BH102 and BH104 in previous investigations.

Made Ground deposits largely comprised of loose black, slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic.

Cohesive Made Ground deposits were encountered beneath the granular deposits within TP201, TP204, WS201–WS205. The reworked clay deposits had frequent brick, clinker, coal, mudstone and sandstone gravels as part of their matrix.

A Depth of Made Ground Plan is presented as Drawing 15-849-006 in Appendix III.



3.3. DRIFT DEPOSITS

Drift deposits were encountered within nine of the eleven exploratory hole locations. Within TP205 and WS205 the full depth of the Made Ground Could not be proven due to the presence of redundant services and concrete obstructions circa 0.70 m bgl.

Drift deposits typically comprise firm to very stiff brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.

Very soft to soft dark grey, slightly sandy CLAY has been identified between 2.00 m bgl and 3.70 m bgl within WS201 and WS204.

At greater depth in cable percussive boreholes, granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone

3.4. SOLID GEOLOGY

Solid geology was not encountered as part of this investigation.

However, E3P identified solid geology circa 24.00 m bgl in the east of the Site within the previous cable and rotary boreholes advanced in July 2021 (Report Ref: 14-868-R2-1). The solid bedrock geology of the Manchester Marls Formation (Mudstone) was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl. The bedrock was encountered as Grey Mudstone at both locations.

3.5. GROUNDWATER

Groundwater strikes were encountered as seepages. The depth of the seepages are shown on the exploratory hole records in Appendix V and are summarised in Table 3.2.

TABLE 3.2 SUMMARY GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
TP202	2.00	Perched water
WS201	2.00	Perched water
WS101	3.00	Perched within cohesive stratum
	3.80	
WS102	4.00	Perched within cohesive stratum
WS103	1.50	Seepage within Made Ground, perched above cohesive stratum
	3.50	Perched within cohesive stratum
WS104	4.00	Perched within cohesive stratum
BH101	1.60	Seepage within Made Ground, perched above cohesive stratum
BH102	12.00	Encountered within Granular Strata



3.6. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has been identified during the site investigation and these are summarised in Table 3.3.

TABLE 3.3 SUMMARY VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
TP201	0.60-1.30	Made Ground	Slight hydrocarbon odour
	0.40-2.20		Ash and clinker
TP202	0.45-1.90	Made Ground	Ash and clinker & slight hydrocarbon odour
TP203	0.45-1.70	Made Ground	Clinker
TP204	0.30-1.00	Made Ground	Ash and clinker
TP205	0.30-0.70	Made Ground	Ash and clinker
WS201	0.40-2.00	Made Ground	Clinker
WS202	0.80-1.40	Made Ground	Slight hydrocarbon odour
	0.40-2.60		Ash and clinker
WS203	0.30-1.50	Made Ground	Ash and clinker
	1.30-1.50		Black staining with slight hydrocarbon odour
WS204	0.20-1.40	Made Ground	Clinker
WS205	0.15-1.30	Made Ground	Ash and clinker
WS101	0.40 – 1.50	Made Ground	Ash
	0.40 – 2.60	Made Ground	Clinker
WS102	0.30 – 1.40	Made Ground	Clinker
WS103	0.30 – 1.90	Made Ground	Clinker & Ash
WS104	0.30 – 1.50	Made Ground	Clinker
BH101	0.40 – 1.20	Made Ground	Hydrocarbon Odour Hydrocarbon Staining Ash
BH103	0.20 – 1.00	Made Ground	Hydrocarbon Odour

3.7. SOIL CONSISTENCY

Undrained shear strength values were measured using both field hand shear vane tests and laboratory undrained triaxial tests. Results of the tests are presented in Table 3.4 and Table 3.5, which indicate the clay soils generally vary between firm and very stiff. Soft deposits have been identified within WS104, TP201, TP202, TP203, as can be seen in Table 3.4 and Table 3.5. Strength test data is generally consistent with the field descriptions of the aforementioned soils.



TABLE 3.4 SUMMARY OF HAND SHEAR VANE TESTS

LOCATION	DEPTH	SHEAR STRENGTH (kPA)	CALCULATED ALLOWABLE BEARING PRESSURE (kN/m ²)
TP201	1.60	24	56.4
TP201	2.50	100	235
TP202	2.00	20	47
TP202	2.50	22	51.7
TP202	3.20	110	258.5
TP203	1.80	20	47
TP203	2.50	32	72.85
TP203	3.30	116	272.6
TP204	1.20	74	173.9
TP204	1.80	106	249.1

Notes

ABP Calculated using Stroud and Butler et al 1974.

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 3.6.

TABLE 3.5 SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m ²)	CONSISTENCY
WS201	3.50-4.00	Very stiff brown sandy CLAY.	180	Very stiff
WS202	3.50-4.00	Very stiff brown sandy CLAY.	269	Very stiff
WS203	1.50-2.00	Firm brown slightly sandy CLAY.	60	Firm
WS204	2.50-3.00	Soft brown slightly sandy CLAY with some organic material.	22	Soft
WS205	2.50-3.00	Very stiff brown sandy CLAY.	167	Very stiff
CP101	2.00 – 2.50	Stiff brown sandy CLAY.	114	Stiff
CP101	7.50 – 8.00	Firm brown slightly gravelly sandy CLAY.	65	Firm
CP103	5.00 – 5.50	Stiff brown slightly sandy CLAY.	114	Stiff
CP104	10.00 – 10.50	Firm brown slightly gravelly very sandy CLAY.	54	Firm



3.8. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations appeared to be generally stable during excavation, with a minor failure being noted with TP204 caused by gravel backfill.

The hardstanding across the site tending to consist of asphalt overlaying reinforced concrete, as such a mechanically excavator was used to break out all locations, roughly taking 10 minutes per location to remove the hardstanding. The presence of brick, concrete and sandstone cobbles within the Made Ground deposits meant that in certain places, excavation was slow through the Made Ground. The natural strata were excavated with relative ease.



TABLE 3.6 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)*
WS201	1	MADE GROUND: Black slightly clayey sandy gravel.	4	4.03	Loose	N/A	N/A	N/A	40.33
WS201	2	Very soft slightly sandy dark grey CLAY	3	2.74	N/A	Soft	Very low strength	13.70	28.17
WS201	3	Brown mottled grey slightly gravelly CLAY.	19	16.52	N/A	Very Stiff	High strength	82.62	169.86
WS201	4	Brown mottled grey slightly gravelly CLAY.	23	19.43	N/A	Very Stiff	High strength	97.16	199.76
WS201	5	Brown mottled grey slightly gravelly CLAY.	15	12.44	N/A	Stiff	Medium strength	62.22	127.93
WS202	1	MADE GROUND: Blackish brown slightly sandy gravel.	6	6.05	Loose	N/A	N/A	N/A	60.49
WS202	2	MADE GROUND: Brown slightly sandy very gravelly CLAY.	10	9.14	Loose	N/A	N/A	N/A	91.35



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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)*
WS202	3	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY.	29	25.22	N/A	Very Stiff	High strength	126.10	259.26
WS202	4	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY.	22	18.59	N/A	Very Stiff	High strength	92.93	191.07
WS202	5	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY.	19	15.76	N/A	Very Stiff	High strength	78.81	162.04
WS203	1	MADE GROUND: Dark brown sandy gravel.	11	11.09	Medium Dense	N/A	N/A	N/A	110.90
WS203	2	Brown mottled grey slightly gravelly CLAY.	14	12.79	N/A	Stiff	Medium strength	63.95	131.48
WS203	3	Brown mottled grey slightly gravelly CLAY.	33	28.70	N/A	Very Stiff	High strength	143.49	295.02



Ancoats Mobility Hub

Phase II Geoenvironmental Site Assessment

August 2022

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)*
WS203	4	Brown mottled grey slightly gravelly CLAY.	50	42.24	N/A	Very Stiff	Very high strength	211.21	434.25
WS204	1	MADE GROUND: Brown sandy gravel.	2	2.02	Very Loose	N/A	N/A	N/A	20.16
WS204	2	MADE GROUND: Brown slightly gravelly sandy slightly clay.	4	3.65	Very Loose	N/A	N/A	N/A	36.54
WS204	3	Soft grey CLAY.	1	0.87	N/A	Very Soft	Extremely low strength	4.35	8.94
WS204	4	Stiff slightly gravelly CLAY.	33	27.88	N/A	Very Stiff	High strength	139.40	286.61
WS204	5	Stiff slightly gravelly CLAY.	25	20.74	N/A	Very Stiff	High strength	103.70	213.21
WS205	1	Brown sandy clay	11	11.09	N/A	Stiff	Medium strength	55.45	114.00
WS205	2	Brown mottled light grey slightly sandy slightly gravelly CLAY.	16	14.62	N/A	Stiff	Medium strength	73.08	150.26



Ancoats Mobility Hub

Phase II Geoenvironmental Site Assessment

August 2022

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)*
WS205	3	Brown mottled light grey slightly sandy slightly gravelly CLAY.	21	18.26	N/A	Very Stiff	High strength	91.31	187.74
WS205	4	Brown mottled light grey slightly sandy slightly gravelly CLAY.	38	32.10	N/A	Very Stiff	Very high strength	160.52	330.03
WS205	5	Brown mottled light grey slightly sandy slightly gravelly CLAY.	46	38.16	N/A	Very Stiff	Very high strength	190.81	392.31

NOTES

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

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

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



3.9. CONSOLIDATION

Two undisturbed samples of Glacial Till were submitted for oedometer analysis. The results are provided in Table 3.7.

TABLE 3.7 OEDOMETER CONSOLIDATION RESULTS

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	M _v (m ² /MN)	C _v (m ² /year)
WS202	3.50-4.00	U100	18	0-75	Swelling	Swelling
				75-150	0.130	17.709
				150-300	0.100	12.427
				300-600	0.069	5.020
				600-75	0.030	18.614
WS203	1.50-2.00	U100	27	0-35	0.752	2.092
				35-70	0.532	2.572
				70-140	0.305	2.203
				140-280	0.177	2.309
				280-35	0.015	2.315
WS204	2.50-3.00	U100	56	0-55	1.390	1.652
				55-110	0.959	1.083
				110-220	0.603	0.858
				220-440	0.344	0.633
				440-55	0.079	1.914
WS205	2.50-3.00	U100	19	0-55	Swelling	Swelling
				55-110	0.040	13.748
				110-220	0.050	8.763
				220-440	0.040	5.288
				440-55	0.024	1.720
CP101	2.00-2.50	U100	23	0-45	0.294	42.938
				45-90	0.224	1.433
				90-180	0.168	0.767
				180-360	0.114	0.724
				360-45	0.082	0.640
CP103	5.00-5.50	U100	27	0-105	0.177	4.552
				105-210	0.167	0.964
				210-420	0.114	0.866
				420-840	0.076	0.843
				840-105	0.044	0.744



CP104	10.00-10.50	U100	17	0-205	0.234	2.069
				205-410	0.108	0.933
				410-820	0.070	0.809
				820-1640	0.041	0.786
				1640-205	0.018	2.057

When considered at over-burden pressure with an additional load of 110 kPa the coefficient of volume compressibility (M_v) ranged from 0.018 m^2/MN up to 0.414 m^2/MN . The material is considered to be low to medium compressibility.

The rate at which settlement is likely to occur is determined by the coefficient of consolidation (C_v). As shown in Table 3.7, the coefficient ranges from 0.858 m^2/yr to 42.938 m^2/yr . The rate at which settlement will occur is increased by the presence of sand within the Glacial Till and it is likely that settlement will occur over a period of months to years.

3.10. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of granular material via wet sieve to obtain information on the soil fractions. The results are included in Table 3.8. The full results can be found in Appendix X.

TABLE 3.8 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
TP201	1.00 (Made Ground)	0	42	36	22
TP203	0.80 (Made Ground)	0	40	36	24
BH104	1.00 (Made Ground)	0	35	30	35
BH104	5.00 (Drift)	0	12	30	58

3.11. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising both a 2.5kg and 4.5kg. The results of the tests has been summarised in Table 3.9. The full test results can be found in Appendix X.

TABLE 3.9 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 (%)
TP202	Brown slightly gravelly sandy CLAY.	2.60	2.5 kg	19	19	0	1.70	0



TP202	Brown gravelly sandy very silty CLAY with some organic material.	3.00	2.5 kg	51	28	2	1.36	4
TP204	Grey slightly gravelly sandy CLAY.	1.70	2.5 kg	20	20	0	1.67	0
BH104	Brown gravelly very sandy CLAY.	5.00	4.5kg	19	16	0	1.79	0

The compaction tests have indicated that the materials on site are variable with the material in TP202 being wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

Engineering of this type of material will need to be completed during dry weather periods only.



3.12. SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 3.10, show the clay to be of low to medium plasticity clay.

TABLE 3.10 SUMMARY OF PLASTICITY INDEX TEST RESULTS

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS201	4.00	22	24	50	26	100	26	Medium
WS202	3.00	18	22	46	24	98	23.52	Medium
WS203	3.00	19	23	48	25	96	24	Medium
WS204	2.00	49	24	50	26	98	25.48	Medium
WS205	2.00	19	24	52	28	100	28	Medium
WS102	3.00	17	21	47	26	100	26	Medium
WS104	2.00	21	22	49	27	98	26.46	Medium
BH101	3.00	23	21	43	22	97	21.34	Medium
BH102	2.00	21	18	37	19	95	18.05	Low
BH103	1.00	26	22	45	23	80	18.40	Low
BH104	1.00	21	18	33	15	62	9.30	Low

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

3.13. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 3.13), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

Elevated sulphate concentrations meeting Class DS-2, AC-1s were noted within the Made Ground deposits in TP203 at 0.90 m bgl.

TABLE 3.13 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP201	0.70	0.26	7.9	DS-1, AC-1s
TP202	0.30	0.38	10.2	DS-1, AC-1s



LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP203	0.90	0.81	7.5	DS-2, AC-1s
TP204	0.40	0.025	8.5	DS-1, AC-1s
TP204	1.80	0.052	7.1	DS-1, AC-1s
TP205	0.35	0.24	10.2	DS-1, AC-1s
WS202	0.60	0.22	8	DS-1, AC-1s
WS203	1.30	0.29	7.5	DS-1, AC-1s
WS203	2.40	0.044	8	DS-1, AC-1s
WS101	0.75	191	7.5	DS-1, AC-1s
	1.50	104	7.8	DS-1, AC-1s
	2.25	77.7	7.9	DS-1, AC-1s
	3.00	215	7.9	DS-1, AC-1s
WS102	0.75	81.8	7.3	DS-1, AC-1s
	1.50	45.3	8.1	DS-1, AC-1s
	2.25	29.5	7.7	DS-1, AC-1s
	3.00	67.1	7.9	DS-1, AC-1s
WS103	0.75	99.7	7.6	DS-1, AC-1s
	1.50	129	7.6	DS-1, AC-1s
	2.25	52.6	7.7	DS-1, AC-1s
	3.00	49.3	7.8	DS-1, AC-1s
WS104	0.75	52.8	7.4	DS-1, AC-1s
	1.50	252	7.9	DS-1, AC-1s
	2.25	48.0	7.8	DS-1, AC-1s
	3.00	63.1	8.00	DS-1, AC-1s
BH102	0.75	199	8.4	DS-1, AC-1s
	1.50	69.8	8.4	DS-1, AC-1s
	2.25	135	8.9	DS-1, AC-1s
	3.00	318	8.1	DS-1, AC-1s
BH104	0.75	162	8.8	DS-1, AC-1s
	1.50	1640	7.4	DS-3, AC-2s
	2.25	128	7.9	DS-1, AC-1s
	3.00	116	7.8	DS-1, AC-1s



4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 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.

As part of the previous E3P Phase II Geoenvironmental Site Assessment (Ref: 14-868-R2-1, dated July 2021) elevated naphthalene and mercury were identified when comparing testing results to residential without plant uptake. Therefore, at the time, it was recommended that a more detailed risk assessment and supplementary site investigation was required to delineate the features and provide an updated data set.

An updated Tier I human health risk assessment has been prepared in using the chemical analysis results of the soils from both the July 2021 and June 2022 investigations and compared to the relevant Tier I criteria for commercial end use. The target values for such are therefore less stringent than the initial assessment.

This updated assessment which has included both data sets.

4.1. DEVIATING SAMPLES

Deviating samples were to be avoided during the ground investigation by using best practice sampling procedures including use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis undertaken.

As such no samples have been noted to deviate.

4.2. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 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 1 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 COMMERCIAL END USE

DETERMINANT	UNITS	GAC	N	MC	LOC. OF EX	PAT HW AY	ASSESSMENT
Arsenic	mg/kg	640	39	47	N/A	1	No Further Action
Cadmium	mg/kg	190	39	0.8	N/A	1	No Further Action
Chromium (VI)	mg/kg	33	39	1.8	N/A	1	No Further Action
Lead	mg/kg	2300	39	710	N/A	1	No Further Action
Mercury	mg/kg	58	39	2.1	N/A	4	No Further Action
Nickel	mg/kg	980	39	76	N/A	1	No Further Action
Selenium	mg/kg	12000	39	1	N/A	1	No Further Action
Copper	mg/kg	68000	39	250	N/A	1	No Further Action
Zinc	mg/kg	730000	39	190	N/A	1	No Further Action
Cyanide - Total	mg/kg	791	39	210	N/A	1	No Further Action
Phenols - Total.	mg/kg	440	33	3.9	N/A	1	No Further Action
Asbestos	Fibres	NFD	34	ND	N/A	3	No Further Action
Naphthalene	mg/kg	190	39	25	N/A	4	No Further Action
Acenaphthylene	mg/kg	83000	39	3.4	N/A	2	No Further Action
Acenaphthene	mg/kg	84000	39	27	N/A	1	No Further Action
Fluorene	mg/kg	63000	39	21	N/A	1	No Further Action
Phenanthrene	mg/kg	22000	39	140	N/A	2	No Further Action
Anthracene	mg/kg	520000	39	46	N/A	2	No Further Action
Fluoranthene	mg/kg	23000	39	140	N/A	2	No Further Action
Pyrene	mg/kg	54000	39	140	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	170	39	94	N/A	2	No Further Action
Chrysene	mg/kg	350	39	73	N/A	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	44	39	82 46	TP202 0.30 m WS103 0.75m	2	Further Action
Benzo(k)Fluoranthene	mg/kg	1200	39	39	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	35	39	79 48 36	TP202 0.30 m WS103 0.75m WS101 2.25m	2	Further Action
Indeno(123-cd)Pyrene	mg/kg	500	39	39	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	3.5	39	12 3.7 5.9 5.8 5.2	TP202 0.30 m TP205 0.35 m WS103 0.75m WS101 2.25m WS104 0.75m	2	Further Action
Benzo(ghi)Perylene	mg/kg	3900	39	44	N/A	2	No Further Action
TPH C5-C6 (aliphatic)	mg/kg	3200	12	1	N/A	4	No Further Action
TPH C6-C8 (aliphatic)	mg/kg	7800	12	0.1	N/A	4	No Further Action
TPH C8-C10 (aliphatic)	mg/kg	2000	12	0.1	N/A	4	No Further Action
TPH C10-C12 (aliphatic)	mg/kg	9700	13	52	N/A	4	No Further Action
TPH C12-C16 (aliphatic)	mg/kg	59000	14	130	N/A	1	No Further Action
TPH C16-C35 (aliphatic)	mg/kg	160000 0	15	520	N/A	1	No Further Action
TPH C5-C7 (aromatic)	mg/kg	26000	15	1300	N/A	1	No Further Action
TPH C7-C8 (aromatic)	mg/kg	56000	15	47	N/A	4	No Further Action
TPH C8-C10 (aromatic)	mg/kg	3500	15	0.8	N/A	4	No Further Action
TPH C10-C12 (aromatic)	mg/kg	16000	15	1.8	N/A	4	No Further Action
TPH C12-C16 (aromatic)	mg/kg	36000	15	620	N/A	4	No Further Action
TPH C16-C21 (aromatic)	mg/kg	28000	15	1.1	N/A	1	No Further Action
TPH C21-C35 (aromatic)	mg/kg	28000	15	76	N/A	1	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	3200	39	1	N/A	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	7800	39	230	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	2000	39	190	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	16000	39	26	N/A	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	36000	39	1	N/A	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	28000	39	270	N/A	1	No Further Action



TPH C21-C35 (aromatic)*	mg/kg	28000	39	510	N/A	1	No Further Action
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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.

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

- ✳ Benzo(b)Fluoranthene;
- ✳ Benzo(a)Pyrene
- ✳ Dibenzo(a,h)Anthracene.

No significant concentrations VOCs, TPHs or Heavy Metals were identified in the soils submitted for chemical analysis. In addition no asbestos was identified in the samples selected for testing.

Coal tar testing on the selected Made Ground samples did not identify any coal tar.

WAC analysis on selected Made Ground sampling identified soils to be stable non-reactive hazardous status due to elevated sulphate, TOC, pH and PAH levels.

The laboratory analysis confirms that the main constituents of concern were likely to be non-volatile PAHs.

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

- ✳ The main exposure pathways based on the Tier I exceedances are:
 - Soil ingestion;
 - Dermal contact and ingestion; and
 - Consumption of homegrown vegetables.
- ✳ The exceedances for the determinands are associated generally associated with shallow Made Ground deposits.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

This updated assessment which has included both data sets from July 2021 and August 2022 and allowed for an updated end-use of commercial (car park and retail) from residential with plant uptake has identified the presence of elevated benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene only in Made Ground samples obtained from WS101, WS103 and WS104 from July 2021 samples and in TP202 and TP205 from June 2022 samples.

All of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion of soils, and consumption of homegrown vegetables. The risk to chronic human health associated with the elevated concentrations of non-volatile PAH compounds can be mitigated through the installation of a 300 mm chemically suitable cover system within all landscaped areas.

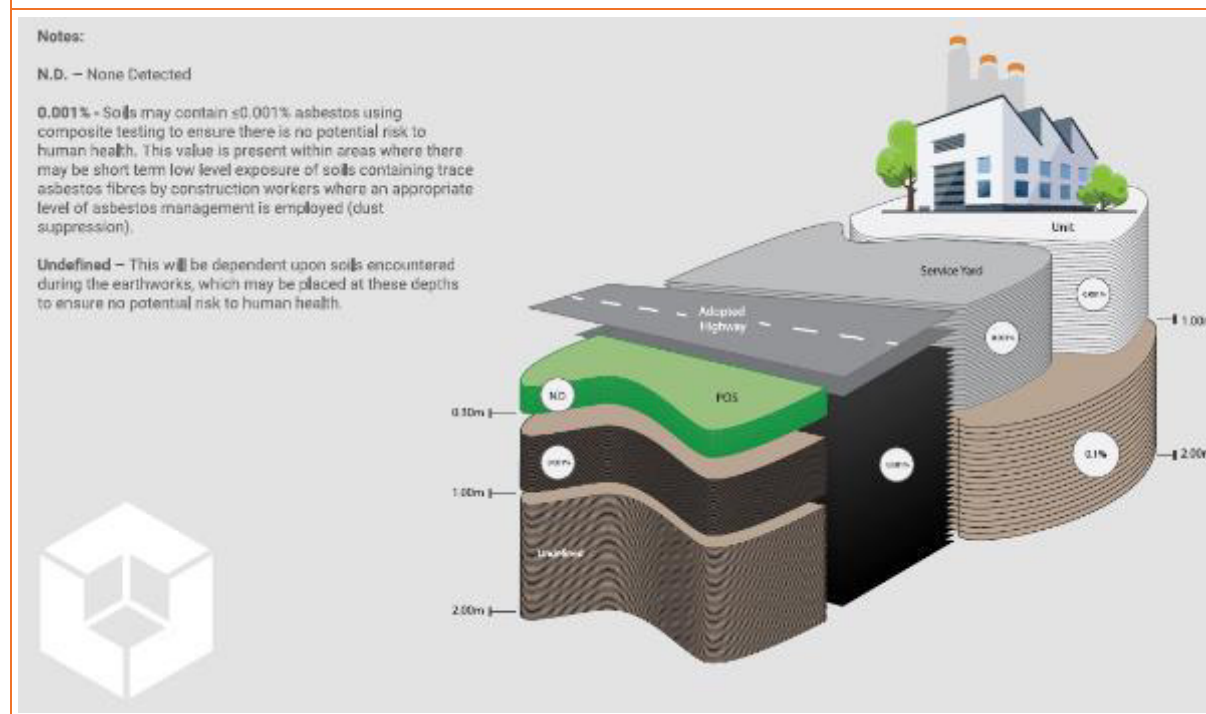
The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.



If asbestos is identified during the remedial works, asbestos quantification should be undertaken to further assess where these soils may be placed. No visual signs of ACM were encountered during the ground investigation. If impacted soils are identified they should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 4.1.

Further confirmation digs will be required in the footprint of existing buildings to confirm the current assessment on a site wide basis.

FIGURE 4.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes

ND None Detect

0.001% Soils may contain $\leq 0.001\%$ asbestos using composite testing to ensure there is no potential risk to human health. This value is present within areas where there may be a short term low level exposure of soils containing trace asbestos fibres by construction workers where an appropriate level of asbestos management is employed (dust suppression)

0.1% Soils at a depth of $>1.00\text{m}$ bgl may contain $<0.1\%$ asbestos using composite testing where they will not be likely to be disturbed in the future and will therefore be in an area of low sensitivity. Risk assessment completed in accordance with Asbestos JIWG risk assessment tools.

Undefined- this will be dependent upon soils encountered during earthworks, which may be placed at these depths to ensure no potential risk to human health.

Chemical analysis of the natural clay drift deposits has identified these soils to be acceptable for use as subsoil within the proposed garden areas; however, further chemical validation samples will be required to confirm this. There are no suitable sources of topsoil available on the site.



4.3. 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 metals, PAH, mercury and naphthalene contamination are present within Made Ground and shallow drift deposits on site.		Medium
Pathway		
Vertical Migration Due to the site being underlain by largely by cohesive drift deposits, vertical migration of contaminants is reduced due to the low permeability of the drift deposits inhibiting vertical migration of contaminants. Additionally, hardstanding across the majority of the site will reduce the vertical migration of contaminants.		Low
Lateral migration Lateral migration of contaminants will be reduced due to the presence of low permeability drift deposits underlying the site.		Low
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated aquifer	Low
Aquifer Classification in Bedrock	Secondary B aquifer	Low
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected	Low
Distance to the Closest Groundwater Abstraction Point	None recorded within 1km of the site	Low
Is the Site Located Within 50 m of a Surface Watercourse?	There are no surface water features located within 50 m of the site.	Low
The ICSM developed within the context of the site setting has viable pollutant pathway, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying bedrock aquifer.		



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
BTEX > 1 mg/kg	No source identified on site and no exceeding levels of volatile TPH.	None
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	SVOC analysis recorded concentrations >1 mg/kg within TP102 at 0.30 m bgl	Further discussion
C5-C10 > 5 mg/kg	Concentrations of C5-C10 have not been recorded above 5 mg/kg on site.	None
C10-C12 > 10 mg/kg	Concentrations of C10-C12 at 13 mg/kg have been recorded within TP204 at 0.70 m bgl within Made Ground Deposits.	Further discussion
C12-C16 > 50 mg/kg	Concentrations of C12-C16 have not been recorded above 50 mg/kg on site.	None
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	Concentrations of naphthalene have been recorded above 2.0 mg/kg at TP202 at 0.30 m bgl.	Further discussion
Total PAH > 10 mg/kg	Concentrations of Total PAH have been recorded above 10 mg/kg across the site with values up to 340 mg/kg recorded (TP205 at 0.35m bgl).	Further discussion
PCB > 1 mg/kg	No potential sources of PCB have been identified	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals above 500 mg/kg have been recorded in TP202 at 0.30m and TP205 at 0.35m (Lead).	Further discussion

Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS). The table below includes site investigation data from E3P from July 2022.

These are presented in Table 4.4 and Table 4.5.



TABLE 4.4 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINANT	UNIT	EQS ^{1,2,3}	DWS ^{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Arsenic	µg/l	50	10	4	8.32	N/A	4	7	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	4	<0.02	N/A	4	<0.08	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	4	–	–	4	<5.0	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	4	2.7	N/A	4	0.7	N/A	No Further Action
Copper	µg/l	1	2000	4	6.1	N/A	4	24	N/A	No Further Action
Total Cyanide	µg/l	1	50	4	53	WS201	4	340 95	WS103 0.75m WS103 1.50m	Further Action
Lead	µg/l	1.2	10	4	0.6	N/A	4	4.8	N/A	No Further Action
Mercury	µg/l	–	1.0	4	<0.05	N/A	4	<0.5	N/A	No Further Action
Nickel	µg/l	4	20	4	9.7	N/A	4	2.6	N/A	No Further Action
Selenium	µg/l	–	10	4	31 11	WS102 WS104	4	6.5	N/A	Further Action
Zinc	µg/l	10.9	–	4	14	WS105	4	16	N/A	Further Action
pH		6–9		4	7.3	N/A	4	8.1	N/A	No Further Action
Naphthalene	µg/l	2	10*	4	1.3	N/A	4	<0.01	N/A	No Further Action
Anthracene	µg/l	0.1	10*	4	3.2	N/A	4	<0.01	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*	10*	4	16 13	WS104 WS102	4	<0.01	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*	10*	4	7.1	N/A	4	<0.01	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*	10*	4	17 14	WS104 WS102	4	<0.01	N/A	No Further Action



DETERMINANT	UNIT	EQS ^{1,2,3}	DWS ^{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	4	7.6	N/A	4	<0.01	N/A	No Further Action
Fluoranthene	µg/l	0.0063	10*	4	22 16	WS104 WS102	4	<0.01	N/A	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4	10*	4	10	N/A	4	<0.01	N/A	No Further Action
Aromatic TPH C5-C6 (benzene)	µg/l	10	1	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C6-C8 (toluene)	µg/l	74	700	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C10-C12 (xylene)	µg/l	30	500	4	20	N/A	4	<10	N/A	No Further Action
TPH C12-C16	µg/l	2	90 ⁵	4	98	WS201	4	<10	N/A	Further Action
TPH C16-C35	µg/l	50#	90 ⁵	4	120 710 940	WS201 WS102 WS104	4	<10	N/A	Further Action
Aliphatic TPH C5-C6	µg/l	–	15000	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C6-C8	µg/l	–	15000	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C8-C10	µg/l	–	300	4	<1.0	N/A	4	<1.0	N/A	No Further Action
TPH C10-C12	µg/l	–	300	4	<10	N/A	4	<10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	4	<10	N/A	4	<10	N/A	No Further Action
TPH C16-C21	µg/l	–	300**	4	<10	N/A	4	<10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	4	<10	N/A	4	<10	N/A	No Further Action
Tetrachloroethylene	µg/l	0.4	10	4	<1.0	N/A	–	–	–	No Further Action
Trichloroethylene	µg/l	10	10	4	<1.0	N/A	–	–	–	No Further Action



DETERMINANT	UNIT	EQS ^{1,2,3}	DWS _{3,4,5}	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
		AA								
Trichlorobenzene	µg/l	0.4	–	4	<1.0	N/A	–	–	–	No Further Action
Trichloromethane	µg/l	2.5	–	4	<1.0	N/A	–	–	–	No Further Action
Dichloromethane	µg/l	20	200	4	<1.0	N/A	–	–	–	No Further Action
Carbon Tetrachloride	µg/l	12	3	4	<1.0	N/A	–	–	–	No Further Action
Vinyl Chloride	µg/l	–	0.3	4	<1.0	N/A	–	–	–	No Further Action

Notes

Solubility <0.01µg/l

AA – Annual Average

MAC- Maximum Admissible Concentration

* 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 Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)



4.3.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

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

- ✿ Total Cyanide;
- ✿ Zinc
- ✿ Selenium
- ✿ TPH C12-C16; and
- ✿ TPH C16-C35

It should be noted that the Tier I assessment criteria provides a conservative view, which may overstate the risk.

The presence of low permeability drift deposits up to 12.00m bgl (July 2021 investigation) and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential. Considering the limited mobility of the identified contaminants and given the lack of nearby abstractions for drinking water, the contaminants exceeding DWS can be discounted, due to no viable pathway.

Elevated TPH C12-C16 identified during the 2022 investigation and elevated C16-C21 exceedances both in the 2021 and 2022 investigations have been recorded within both groundwater samples. However, no TPH exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis across the site.

A possible source for the TPH impact recorded within the groundwater is the localised olfactory and visual hydrocarbon impact recorded within Made Ground deposits. Due to the low permeability strata it is unlikely a pathway is present that would allow TPH from this source to migrate into the groundwater, as such the TPH impact recorded within groundwater samples may be indicative of an unidentified source, further works and assessment are necessary to investigate this risk.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters due to no viable migration pathway. However, further works are necessary to assess the risk and potential on-site source associated with TPH impact recorded within groundwater samples as this may pose a human health risk.

4.4. GROUND GAS

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

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



4.5. GROUND CONDITIONS

MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths between ground level and 2.60 m bgl (WS202). Made Ground was typically encountered to depths of 2.00 m bgl.

Surface cover comprised of asphalt proven to a depth of 0.20m bgl in general, overlying concrete at depths of 0.10m to 0.40m bgl.

Made Ground deposits largely comprised of loose black, slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic.

Cohesive Made Ground deposits were encountered beneath the granular deposits within TP201, TP204, WS201–WS205. The reworked clay deposits had frequent brick, clinker, coal, mudstone and sandstone gravels as part of their matrix.

DRIFT

Drift deposits were encountered within nine of the eleven exploratory hole locations. Within TP205 and WS205 the full depth of the Made Ground Could not be proven due to the presence of redundant services and concrete obstructions circa 0.70 m bgl.

Drift deposits typically comprise firm to very stiff brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.

Very soft to soft dark grey, slightly sandy CLAY has been identified between 2.00 m bgl and 3.70 m bgl within WS201 and WS204.

GROUNDWATER

Perched groundwater was encountered during the ground investigation at 2.00 m bgl within TP202 and WS201 in the eastern sector of the Site. Both water strikes were noted between the base of the Made Ground and the natural CLAY deposits.



4.6. SOURCES AND PATHWAYS OF GROUND GAS (CSM)

The Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

- ✳ Made Ground deposits.
- ✳ Offsite infilled canal.
- ✳ No landfills have been identified within 250 m of the site.
- ✳ The site is not in an area affected by radon.

There is potential for localised ground gas migration in the proximity of the identified sources, albeit reduced by predominantly low permeability strata.

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

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

Therefore within the context of the proposed commercial end-use and ground gas generation potential, the gas assessment requires four visits over one month, with at least two sets of readings at low or falling atmospheric pressure.

4.7. 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.

4.8. MONITORING METHODOLOGY

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

Gas measurements were recorded for a minimum of 500 seconds at each location, at which point the maximum concentration of CH_4 and CO_2 , together with the lowest concentration of O_2 were recorded.

The results of the ground gas monitoring are presented in Table 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. 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)
WS201	Made Ground / Natural	11/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.1	1017	Falling	0.1	0.1	0.50-2.50	2.40	1.20
		20/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1012	Rising	0.1	0.1		2.40	1.25
		01/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1015	Falling	0.1	0.1		2.40	1.30
		05/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Steady	0.1	0.1		2.40	1.15
WS202	Made Ground	11/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.2	1017	Falling	0.1	0.1	0.50-1.50	1.40	Dry
		20/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1012	Rising	0.1	0.1		1.40	Dry
		01/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1015	Falling	0.1	0.1		1.40	Dry
		05/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	998	Steady	0.1	0.1		1.40	Dry
WS204	Made Ground	11/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1017	Falling	0.1	0.1	1.00-2.00	1.55	Dry
		20/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	1012	Rising	0.1	0.1		1.55	Dry
		01/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1014	Falling	0.1	0.1		1.55	Dry
		05/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	999	Steady	0.1	0.1		1.55	Dry
WS205	Natural	11/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	1017	Falling	0.1	0.1	2.00-4.00	3.80	2.40
		20/07/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.3	1012	Rising	0.1	0.1		3.80	2.65
		01/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.4	1013	Falling	0.1	0.1		3.80	2.70
		05/08/2022	0.1	0.1	0.0001	0.1	0.1	0.0001	20.5	999	Steady	0.1	0.1		3.80	3.40

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		



4.9. SUMMARY OF MONITORING RESULTS

4.9.1. GROUNDWATER

During the monitoring visits two of the four wells were noted to be dry throughout the monitoring period. It should be noted that these two wells have been installed into Made Ground deposits.

Within the remaining wells groundwater levels decreased over the monitoring period. The greatest groundwater change occurred within WS205 where the levels decreased by 0.30 m bgl.

4.9.2. GAS FLOW

During the monitoring a positive flow was noted in all window sample locations. The measure of positive flow is considered to be the result of ground gas generation from the made ground identified on site, as gas flows were at the highest during periods of low groundwater levels. However, groundwater fluctuations and flooding of the well causing compression cannot be ruled out.

4.9.3. 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 v (limit of detection of the analyser).

4.10. 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 classify as Characteristic Situation (CS)1 – Very Low Gas Risk.

TABLE 4.7 GAS RISK PROFILE AND LOCATION

WELL	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
WS201	1.20	0.1	0.1	0.0001	0.1	0.0001	CS1
WS202	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS204	Dry	0.1	0.1	0.0001	0.1	0.0001	CS1
WS205	2.40	0.1	0.1	0.0001	0.1	0.0001	CS1
WS101	1.40	5.31	0.10	0.00531	0.70	0.02124	CS2
WS102	0.80	7.81	0.10	0.00781	4.60	0.35926	CS2
WS103	1.40	0.13	0.10	0.00013	14.50	0.1450	CS2
WS104	0.90	10.26	0.10	0.01026	12.20	0.47184	CS2

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



-  Ground gas monitoring previously suggested CS2 due to elevated levels of methane in the Made Ground. Should this made ground be removed from beneath the proposed building, protective measures are unlikely to be necessary. Updated gas monitoring from wells in the same area suggest that the site can be classified as CS1, and in these areas it is considered that gas protection measures will not be required.
-  The site is predominantly underlain by cohesive CLAY drift deposits to a depth of roughly 24 m bgl (Ref: 14-868-R1 July 2021).
-  Made Ground has been encountered across the site to a maximum depth of 2.60 m bgl.
-  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. This will confirm when the gas monitoring is completed.

It is recommended that the full ground gas assessment and recommended protection measures (if applicable) are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.



4.11. 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 Current pipeline depth (mg/kg)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	<1.0
Total SVOCs (Excluding PAH and those substances marked with an *)	2	<1.0
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<0.001
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	13 (TP203 – 0.90 m)
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	66
Phenols (From SVOC Analysis)*	2	<0.3
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	<0.1
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	SVOC max Conc. 14 mg/kg – TP202 at 0.70 m bgl. EC10-EC16 max Conc. 37 mg/kg – TP204 at 0.70 m bgl.	
Is free product present in soil and groundwater?	Visual and olfactory evidence has identified potentially impact within Made Ground deposits within TP201, TP202, WS201 and WS202.	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	No	
Will soils impacted with above determinands likely be utilised elsewhere on site?	No	
Will soils be imported to site as part of any future earth works	Currently unknown, however it is unlikely soils will be required to be imported to site.	

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

Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development.



4.12. 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	Heavy Metals, non-volatile PAH (Made Ground)	Dermal contact.	Future site users.	Likely	Moderate	LOW
PL2		Dermal contact and ingestion.	Off-site receptors.			

Discussion:

This updated assessment which has included both data sets has identified the presence of elevated benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene only in Made Ground samples obtained from WS101, WS103 and WS104 from July 2021 samples and in TP202 and TP205 from June 2022 samples.

No exceedances of heavy metals were identified as part of intrusive works across the site.

Previous assessments stating volatiles risk from mercury and naphthelane are now discounted due to the updated end-use and data set.

Recommendation:

The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion, soil ingestion and consumption of homegrown produce. These exceedances can be mitigated by the installation of a 300 mm chemically suitable cover system within all landscaped areas.

Further investigation may be required within the footprint of the existing building.

Construction works completed with PPE and provision of welfare.



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Low Likelihood	Moderate	LOW

Assessment:

Asbestos has not been identified within the samples analysed. However, the presence of asbestos cannot be discounted in the existing building fabric.

Recommendation:

No further assessment for soils considered necessary. Should any ACM be identified during the enabling works, these should be dealt with in accordance with protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (Asbestos in Soil and Made Ground: A guide to understanding risk).

PL4	Volatile Contaminants such as hydrocarbons, solvents (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Unlikely	Low	LOW
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Assessment:

No elevated volatile contaminants have been noted across the site.

As part of the July 2021 works elevated naphthalene was identified within WS101 at 2.25m bgl in drift deposits and WS103 at 0.75m, 1.50m and 2.25m bgl in drift and made ground deposits and mercury was identified at WS103 and WS104 at 1.50m bgl within drift deposits. As part of the updated 2022 study a reassessment of these soils has taken place and they are not considered to be a pollutant in respect to the proposed redevelopment. As such, the previous assessment is discounted.

Recommendation:

Visual and olfactory evidence of contamination has been identified in a number of locations, therefore a watching brief should be completed during remediation works to monitor the locations where visual or olfactory hydrocarbon impact has been identified during all phases of investigation completed to date.



POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	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: Deep Made Ground has been identified as potential sources of hazardous ground gas. Ground gas migration is a risk to human health due to the inhalation of gases and the risk of asphyxiation. No elevated methane or carbon dioxide concentrations have been recorded in the completed ground gas monitoring. Recommendation: Ground gas monitoring previously suggested CS2 due to elevated levels of methane in the Made Ground. Should this made ground be removed from beneath the proposed building, protective measures are unlikely to be necessary. Updated gas monitoring from wells in the same area suggest that the site can be classified as CS1, and in these areas it is considered that gas protection measures will not be required.						
PL6	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (secondary B aquifer).	Low likelihood	Low	LOW
Assessment: Due to the lack of viable surface water receptors within influencing distance of the site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards (DWS).						



Elevated TPH C12-C16 identified during the 2022 investigation and elevated C16-C21 exceedances both in the 2021 and 2022 investigations have been recorded within both groundwater samples. However, no TPH exceedances have been identified within soil analysis of the underlying deposits or within leachate analysis across the site.

The presence of low permeability drift deposits up to 12.00m bgl (July 2021 investigation) and hardstanding across the site will limit the potential for vertical migration of contaminants and infiltration of rainwater and therefore leaching potential.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to controlled waters. However, further works are necessary to assess the risk and potential on site source associated with TPH impact recorded within groundwater samples.

Recommendation:

Visual and olfactory evidence of contamination has been identified in a number of locations, therefore a watching brief should be completed during remediation works to monitor the locations where visual or olfactory hydrocarbon impact has been identified during all phases of investigation completed to date.

PL7	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/Low	LOW
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Assessment:

The majority of soils at the site meet class DS-1, AC-1s. Elevated sulphate levels have been noted in TP203 circa 0.90 m bgl conforming with DS-2, AC-1s. Soils within BH104, (E3P Report Ref: 14-868-R2-1, dated July 2021) meet class DS-3, AC-2s at 1.50m bgl.

Recommendation:

Concrete should be designed in accordance with the chemical testing results.

PL8	Organic contaminants such as hydrocarbons, solvents (Made Ground and works)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate/Low	LOW
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Assessment:

No elevated concentrations have been identified within the Tier 1 Human Risk assessment. However, when compared to PE pipeline threshold concentrations exceedances aliphatic and aromatic hydrocarbons (C10-C16) were recorded at the proposed pipeline depth (0.75 m – 1.35 m).

Additional elevated concentrations of C10-C16 (TP204) and SVOCs (TP202) were identified.



Recommendation:

Based on the assessment of current site conditions, it is likely that barrier pipe will be required. This will need to be confirmed with a UKWIR risk assessment post remediation.

Main exposure pathways:

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



5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

E3P understands that the proposed development will comprise a mobility hub development of up to 8 storeys including 150 cycle parking spaces, 408 car parking spaces, a ground floor retail unit and a delivery hub. The scheme will involve the demolition of the existing buildings on site.

5.2. SUMMARY OF GROUND CONDITIONS

MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths between ground level and 2.60 m bgl (WS202). Made Ground was typically encountered to depths of 2.00 m bgl.

Surface cover comprised of asphalt proven to a depth of 0.20m bgl in general, overlying concrete at depths of 0.10m to 0.40m bgl. No concrete was recorded within TP203, TP205, WS204 and WS205.

Made Ground deposits largely comprised of loose black, slightly clayey sandy fine gravel. Gravel is fine to medium angular to subrounded of brick, clinker, concrete, sandstone, ash and ceramic.

Cohesive Made Ground deposits were encountered beneath the granular deposits within TP201, TP204, WS201–WS205. The reworked clay deposits had frequent brick, clinker, coal, mudstone and sandstone gravels as part of their matrix.

DRIFT

Drift deposits were encountered within nine of the eleven exploratory hole locations. Within TP205 and WS205 the full depth of the Made Ground Could not be proven due to the presence of redundant services and concrete obstructions circa 0.70 m bgl.

Drift deposits typically comprise firm to very stiff brown mottled grey, slightly sandy, slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone and mudstone.

Very soft to soft dark grey, slightly sandy CLAY has been identified between 2.00 m bgl and 3.70 m bgl within WS201 and WS204.

At greater depth in cable percussive boreholes, granular drift deposits were encountered interbedded with the cohesive clays. Granular drift deposits comprised dense brown clayey gravelly medium to coarse SAND. Gravel is fine subangular to sub rounded of sandstone and mudstone

SOLID

Solid geology was not encountered as part of this investigation.

However, E3P identified solid geology circa 24.00 m bgl in the east of the Site within the previous cable and rotary boreholes advanced in July 2021. Report Ref: 14-868-R2-1). The solid bedrock geology of the Manchester Marls Formation (Mudstone) was encountered within BH102 in the north west of the site at 28.00mbgl and BH104 in the east of the site at 24.00m bgl. The bedrock was encountered as Grey Mudstone at both locations.



GROUNDWATER

Perched groundwater was encountered during the ground investigation at 2.00 m bgl within TP202 and WS201 in the eastern sector of the Site. Both water strikes were noted between the base of the Made Ground and the natural CLAY deposits.

5.3. 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.
- ✚ Demolition of all existing buildings and removal of all concrete hardstanding.
- ✚ Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.
- ✚ Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development footprint with the resulting void backfilled.

5.4. 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

COHESIVE SOILS			
Description	Depth (range m bgl)	Undrained Shear Strength (Cu) (kN/m ²)	Allowable Bearing Pressure (kN/m ²)
Very Soft CLAY (WS103, BH101, WS204)	3.00–4.00	4.35-18	8.94-31
Soft Sandy CLAY (WS201)	2.00–3.00	13.70	28.17
Stiff to Very Stiff Gravelly CLAY	2.00–5.45	62–211	127–434
	5.00 - 10.00	36	75
Stiff Sandy CLAY	1.00–3.00	55–73	114–150
	2.00 - 5.00	82 - 217	169 - 447
	5.00 - 10.00	97 - 207	199 - 426



COHESIVE SOILS			
	10.00 - 15.00	173 - 201	356 - 413
	15.00 - 20.00	143 - 173	294 - 356

Based on the proposed redevelopment to an 8 storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended. Identified during July 2021 investigation.

Given the existing buildings present on site a programme of remediation and enabling works will be required to remove the extensive buried obstructions and to reengineer the loose and variable Made Ground to an approved specification.

However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

Therefore, upon completion of these enabling works, the Made Ground is likely to be present at varying depths and as such it is likely that the most cost effective option for the site would be to construct the structure utilising a piled foundation.

Consideration should be given for ground improvement should a ground bearing slab be adopted.

Differential settlement should be considered between structural loadings, ground bearing floor slabs and external areas when utilising a piled foundation option. Compaction of the Made Ground for the lightly loaded floor slab would be required.

Based on our extensive experience of similar sites, we would anticipate that the final foundation solution would be a combination of the following:

- ✳ Piled foundation for structures into bedrock geology; and
- ✳ Re-engineer the Made Ground to support the ground bearing slab subject to loadings.

5.5. GROUND FLOOR SLABS

Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement.

Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding.

A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.



Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Where it is necessary to undertake cut-and-fill works utilising site-derived cohesive soils, careful consideration must be given to seasonal climatic conditions, which will have a significant impact of moisture conditions and the ability to compact clay soils in the wetter winter months. It may be necessary to undertake an element of stabilisation works through the addition of lime to ensure the soils can be engineered to the required performance standards.

It would be possible to utilise soil stabilisation techniques that incorporate the addition of lime and OPC to construct a stiffened soil horizon with a CBR > 15% to constitute a sub-base replacement layer that could then be capped with Type 1 MOT. The use of soil stabilisation could be extended within the conjectured zone of tree influence to modify the structure of clay soils and negate the potential for volumetric instability.

5.6. HEAVE PRECAUTIONS

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

As the clay is deemed to be medium volume change, heave precautions are not required to the internal face of the external load-bearing walls (outside or within tree influence).

If a ground beam is to be constructed within the zone of tree influence, heave precautions are required to the underside of this and edge beams.

If the ground floor slab is to be constructed with a beam and block floor, a minimum subfloor void of 200 mm is required within any structures located in the zone of conjectured tree influence.

If the ground floor slab is constructed with a cast in-situ suspended floor slab, then heave precautions that can tolerate 50 mm of clay swelling are required within any part of the floor slab to be located within the zone of influence of a tree.

A summary of heave precautions is presented in Table 5.2.

TABLE 5.2 SUMMARY OF HEAVE PRECAUTIONS

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRECAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	Required Foundation Depth (m)	Thickness of Void Former Against Side of Foundation or Ground Beam (mm)	Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)	Void Dimension (mm)
	> 2.5	Engineer Design		Engineer Design



High Plasticity (> 40)	2.0–2.5	35	150	300
	1.5–2.0	25	75	
Moderate Plasticity (20–40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	25	100	250
	1.5–2.0	25	50	
Low Plasticity (< 20)	2.0–2.5	N/A	50	200
	> 2.0	No Special Precautions		

5.7. 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.

5.8. 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.

Furthermore, the site is predominantly underlain by likely low-permeability gravelly CLAY. Therefore, the use of soakaway drainage will be limited, and as the lateral continuity of the Made Ground cannot be assured, it is not recommended that soakaways are utilised for disposal of surface water runoff.

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

5.9. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that much of the site 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). Elevated sulphate levels being identified within TP203 at 0.90 m bgl complying with DS2-AC1s.

An isolated area of DS3-AC3s has been identified within E3P previous site investigation (Ref: 14-868-R2-1) within BH104 at 1.50m bgl.

5.10. EXCAVATIONS

Trial pits were generally stable in both granular Made Ground and natural strata; as such, it is considered that near-surface excavations will be feasible



Site observations indicated that excavations should be feasible in the near surface with normal plant; however, obstructions were identified in the near surface. Obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Due to the depth and variability of the Made Ground and 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 5.3 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	No	Bedrock has been encountered at depth above 24.00m bgl.

5.11. CONSTRUCTION ACTIVITY AND INSPECTION

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

- ✚ Excavation and grubbing out any obstructions below the current structure on site.
- ✚ 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 with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
- ✚ Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- ✚ The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).



5.12. GEOTECHNICAL RISK REGISTER

POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils		Onsite	100%	PAH exceedances have been noted on site. These can be mitigated through the placement of hardstanding or the installation of a cover system within all landscaped areas.
Bedrock		N/A	0	Bedrock encountered at depths of 24.00m bgl - 28.00m bgl (July 2021 site investigation findings).
Cohesive Stratum overlying shallow Bedrock (<3.00m)		N/A	0	Cohesive deposits located site wide to depths >10.00m bgl. No shallow bedrock present.
Obstructions		TBC	TBC	Concrete obstructions were noted within WS206 in the centre of the Site. No further obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints. During a phase of cut fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots. All below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Artificially levelled and filled platforms		Onsite	100%	The site is generally level, this is likely as a result of the historical development and artificially levelling of the site.
Retaining walls		N/A	0	No retaining walls were recorded on site.
Trench collapse		N/A	0	Trial pits appeared to be generally stable across site, with a minor failure being noted with TP204 caused by gravel backfill.



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POTENTIAL CONSTRAINT	ABNORMAL	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Mature trees		Periphery	10%	Sporadic peripheral semi-mature and mature trees are located on the eastern and western site boundaries.
Volume change potential clay		Onsite	100%	The site is likely to be underlain by cohesive that have been assessed as having a medium volume potential. As such heave precautions will be required at the site.
Running sands		N/A	N/A	Data searches indicate very low risk.
Ground dissolution		N/A	N/A	Data searches indicate no hazard.
Concrete design		Onsite	100%	Majority of the Site falls under concrete classification DS1 AC1s, with elevated sulphate levels being identified within TP203 at 0.90 m bgl complying with DS2-AC1s. An isolated area of DS3-AC3s has been identified within E3P previous site investigation (Ref: 14-868-R2-1) within BH104 at 1.50m bgl.
Low-permeability ground		Onsite	100%	The use of soakaway drainage is not likely due to cohesive drift, additionally the lateral continuity of the Made Ground cannot be assured, as such it is not recommended that soakaways are utilised for disposal of surface water runoff.
Services/sensitive structures		Onsite	25%	Electricity cables were identified in the south, west and northern boundaries feeding into the back of the current structures on site. Surface water drainage is present across the centre of the site. BT enters the site in the north west from the road and splits along the front of both sets of buildings currently present on site. Two gas lines are present on site, entering the site from the road in the south west and running in line with the central facing sides of the buildings present on site.
Abnormal foundation solutions		Onsite	100%	Due to the proposed development comprising an 8 storey building a piled foundation solution is recommended.
Areas not investigated		Onsite	30%	Beneath existing structures.



5.13. FURTHER WORKS

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

-  Further investigation of inaccessible areas - beneath the existing building.
-  Pile Design Specification.
-  Arboriculture survey.
-  Geotechnical earthworks strategy (infrastructure).
-  Remediation and enabling works strategy.



6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	As part of the previous E3P Phase II Geoenvironmental Site Assessment (Ref: 14-868-R2-1, dated July 2021) elevated naphthalene and mercury were identified when comparing testing results to residential without plant uptake. Therefore, at the time, it was recommended that a more detailed risk assessment and supplementary site investigation was required. An updated Tier I human health risk assessment has been prepared in using the chemical analysis results of the soils from both the July 2021 and June 2022 investigations and compared to the relevant Tier I criteria for commercial end use. The target values for such are therefore less stringent than the initial assessment. This updated assessment which has included both data sets has identified the presence of elevated benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene only in Made Ground samples obtained from WS101, WS103 and WS104 from July 2021 samples and in TP202 and TP205 from June 2022 samples. Coal tar testing on the selected Made Ground samples did not identify any coal tar. No asbestos was identified in the samples selected for testing. WAC analysis on selected Made Ground sampling identified soils to achieve stable non-reactive hazardous status due to elevated sulphate, TOC, pH and PAH levels. The majority of the identified elevated concentrations have primary exposure pathways related to dermal contact and ingestion, soil ingestion and consumption of homegrown produce. These exceedances can be mitigated by the installation of a 300 mm chemically suitable cover system within all landscaped areas. Further investigation may be required within the footprint of the existing building.
Controlled Waters	Due to the lack of viable surface water receptors within influencing distance of the Site the primary receptor has been identified as the underlying secondary B bedrock aquifer through vertical migration of contaminants. As such, the Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground to drinking water standards (DWS). No exceedances have been noted within the samples submitted for leachate analysis. Groundwater samples have identified exceedances in WS201 (June 2022) for total cyanide, Aromatic TPH fractions C12-C35. Selenium and Aromatic TPH Fraction C16-C35 were elevated in groundwater samples obtained from WS102 and WS104 in June 2021.



	The Site is underlain by low permeability clay, which reduces potential vertical and lateral migration of contaminants, and there is no potable abstraction points within influencing distance from the Site. This reduces the sensitivity of the aquifer further. As such, there is considered to be no likely complete pollutant linkage to the critical receptor and therefore no unacceptable risk to the receptors.
Ground Gas	Ground gas monitoring previously suggested CS2 due to elevated levels of methane in the Made Ground. Should this made ground be removed from beneath the proposed building, protective measures are unlikely to be necessary. Updated gas monitoring from wells in the same area suggest that the site can be classified as CS1, and in these areas it is considered that gas protection measures will not be required.
Potable Water	Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development. 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.



6.2. GEOTECHNICAL ASSESSMENT

No significant obstructions have not been encountered during the E3P ground investigation. However, obstructions are likely to be present below the current building footprints

The underlying natural clay drift deposits have been assessed as being stiff to very stiff with a net allowable bearing pressure (ABP) in the order of 100 kN/m² at circa 1 m bgl increasing to 127–420 kN/m² at circa 2.00 – 5.00 m bgl.

Very soft to soft, extremely low to very low strength CLAY drift deposits were identified between 2.00 – 3.00m bgl within WS201 and WS204 with ABP of 28 kN/m² and 8.9 kN/m² respectively.

Based on the proposed redevelopment to an 8 storey building, a piled foundation solution with the suitable target founding stratum identified as the underlying MUDSTONE of the Manchester Marl Formation is recommended. However, prior to the detailed design of suitable foundations solutions, a programme of remediation and enabling works will be required to remove the extensive buried obstructions and cut/fill the site to provide suitable development platform levels.

Upon completion of these enabling works, the Made Ground is likely to be present at varying depths and as such it is likely that the most cost effective option for the site would be to construct the structure on a driven piled foundation and to re-engineer the Made Ground to support the ground bearing slab.

Differential settlement should be considered between structural loadings, ground bearing floor slabs and external areas when utilising a piled foundation option. Compaction of the Made Ground for the lightly loaded floor slab would be required.

A traditional solution which comprises the excavation of the upper stratum of Made Ground prior to reengineering and compaction as a structural upfill could be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.

Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Designs should be made considering a medium plasticity clay underlying the site.

Concrete classification will be DS1 AC1s. Isolated area of DS2-AC-1s within TP203 DS3-AC3s within BH104.

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



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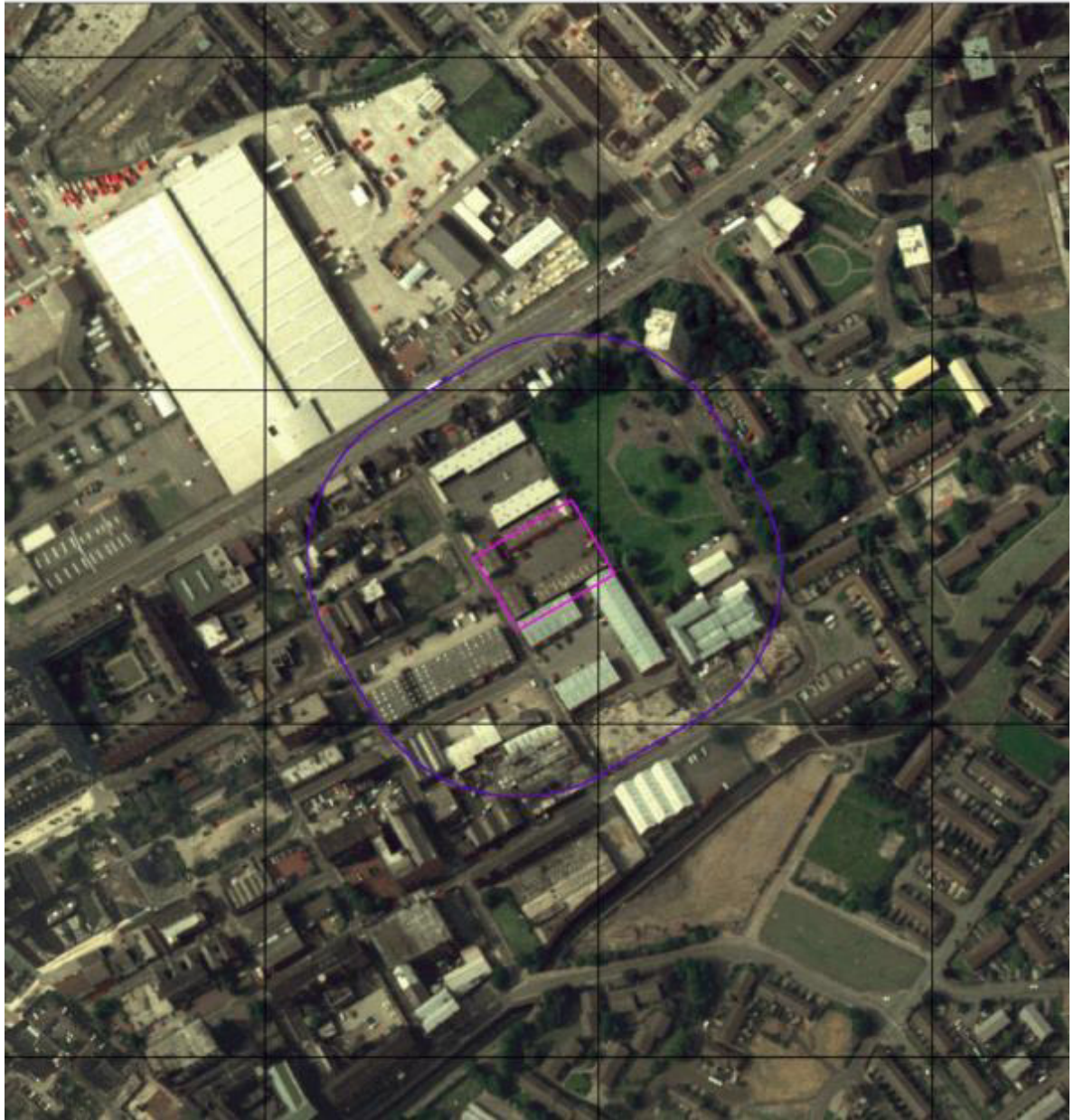
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance 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 18-849-001 – SITE LOCATION PLAN

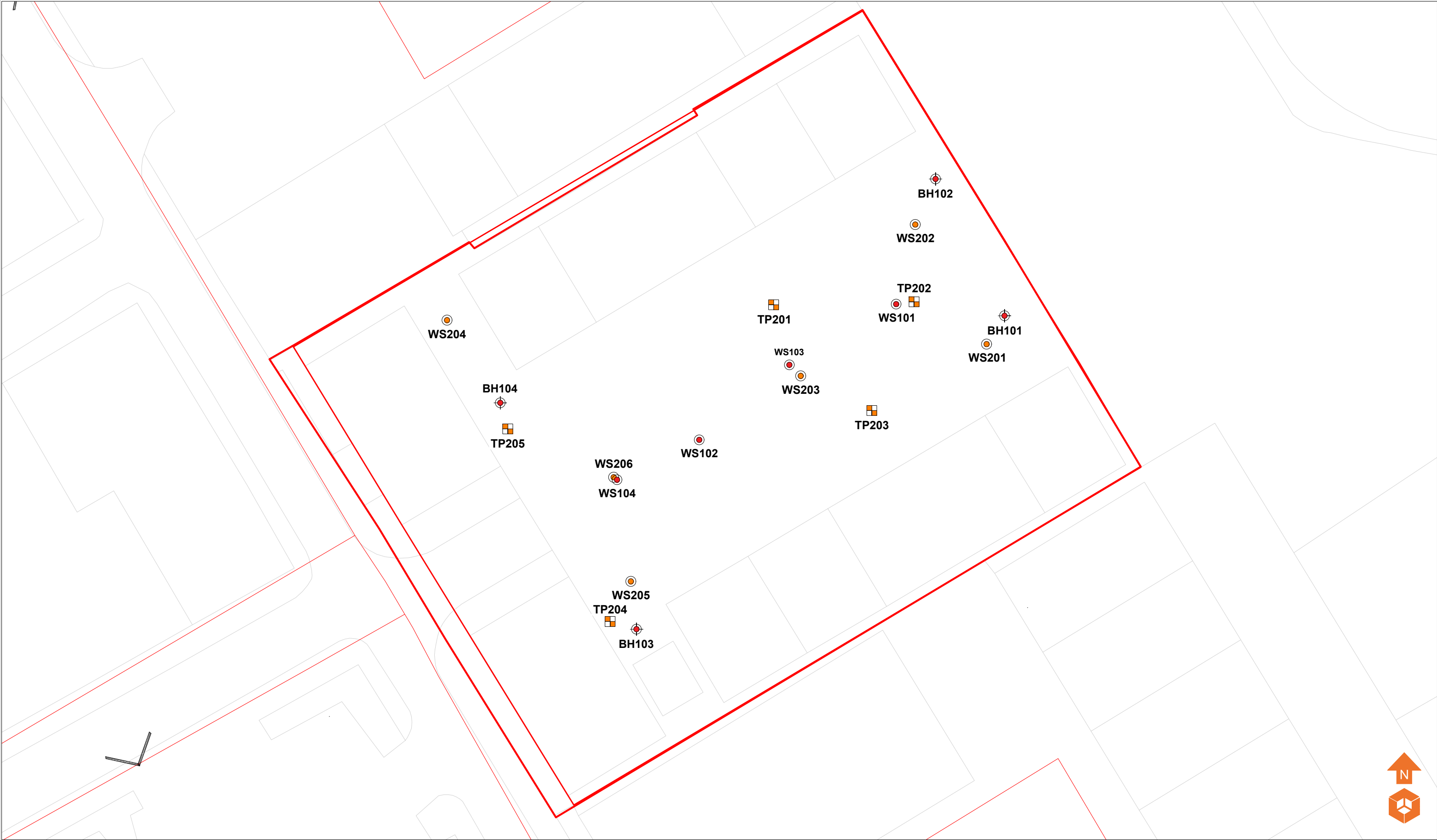




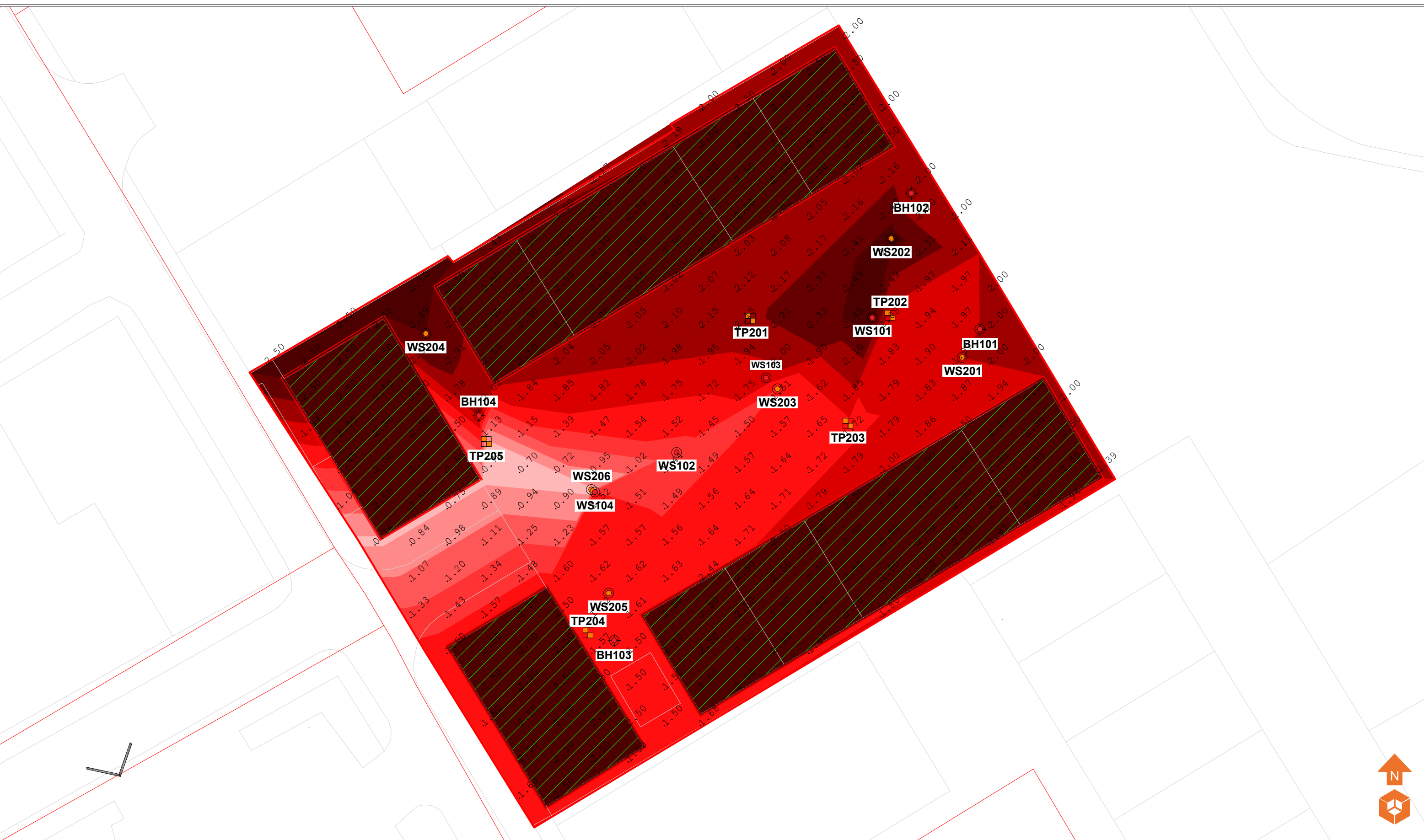
Historical Features Former Buildings Former Buildings Current Buildings Corporation Yard	Notes:	Client: Bowmer and Kirkland	Job No: 15-849	Date: 31.08.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: www.e3p.co.uk
P1 REVA 31.08.2022 LM MJ Phase Issue Date Drawn Checked	Job Title: Ancoats Mobility Hub	Drawing No: 003	Scale: 1:1000 @ A3	Drawing Title: Historical Features Plan	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 Buildings Soft Landscaping and trees Storage Containers Skip Hardstanding	Notes:					Client:	Bowmer and Kirkland	Job No:	15-849	Date:	31.08.2022	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:	004	Scale:	1:1000 @ A3		
								Job Title:		Ancoats Mobility Hub	Drawing Title:		Site Features Plan
					P1	REVA	31.08.2022	LM	MJ				
					Phase	Issue	Date	Drawn	Checked				



Location Symbols WS101 Approximate Window Sample Probehole Location TP101 Approximate Trial Pit Location WS101 Approximate Window Sample Probehole Location (2021) BH101 Approximate Cable Percussive Borehole Location (2021)



Location Symbols

WS101

Approximate Window Sample Probehole Location

TP201

Approximate Trial Pit Location

BS101

Approximate Window Sample Probehole Location (2021)

BS101

Approximate Cable Percussive Borehole Location (2021)

Made Ground Depth (m)

0.50 - 0.74m

Depth of Made Ground 0.50 - 0.74m

0.75 - 0.99m

Depth of Made Ground 0.75 - 0.99m

1.00 - 1.24m

Depth of Made Ground 1.00 - 1.24m

1.25 - 1.49m

Depth of Made Ground 1.25 - 1.49m

1.50 - 1.74m

Depth of Made Ground 1.50 - 1.74m

1.75 - 1.99m

Depth of Made Ground 1.75 - 1.99m

2.00 - 2.24m

Depth of Made Ground 2.00 - 2.24m

>2.25m

Depth of Made Ground >2.25m

Depth inferred to be >2.50

Notes:

P1

REVA

31.08.2022

LM

MJ

Phase

Issue

Date

Drawn

Checked

Client:

Bowmer and Kirkland

Job Title:

Ancoats Mobility Hub

Job No:

15-849

Drawing No:

006

Date:

31.08.2022

Scale:

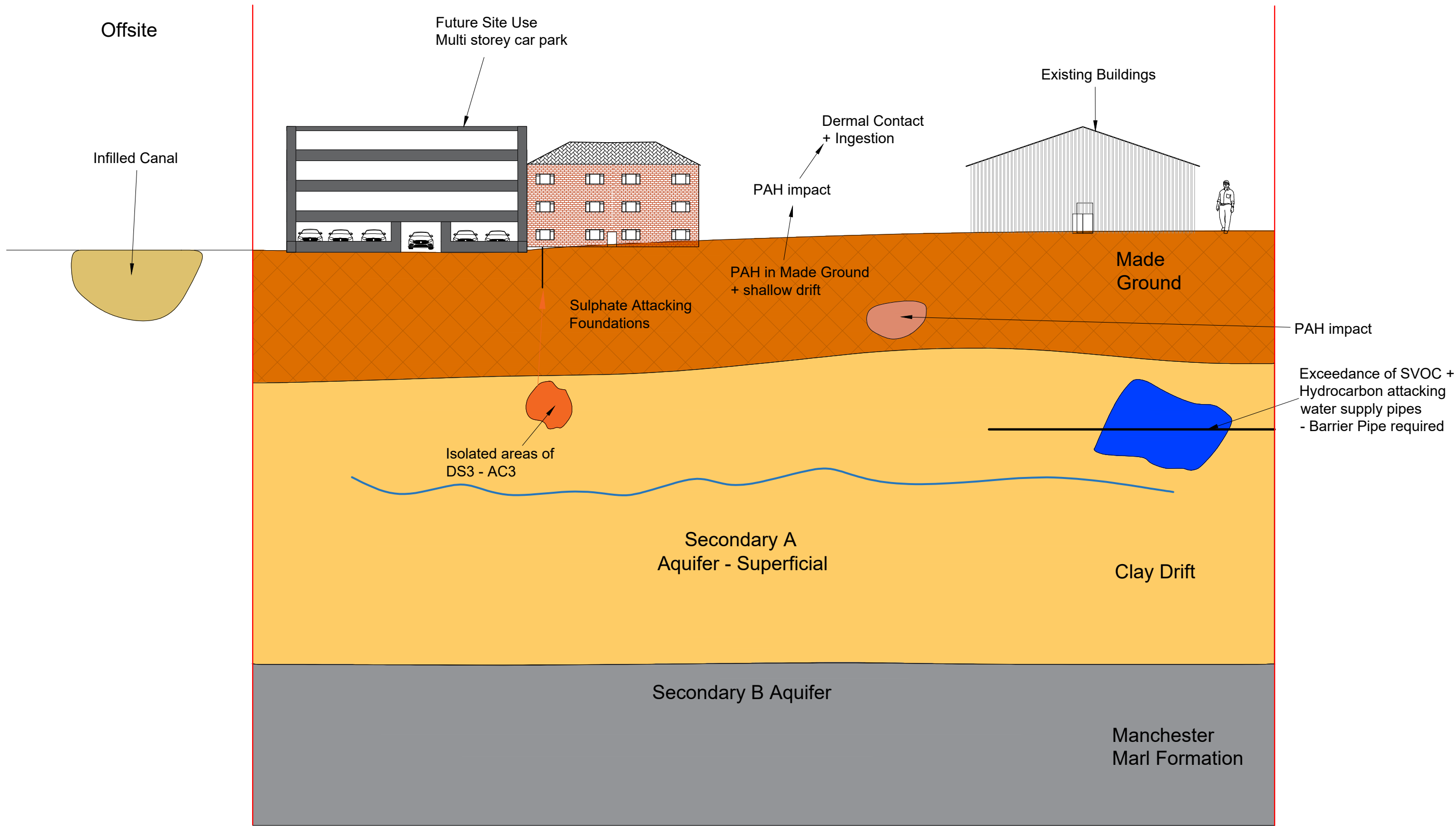
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e3p

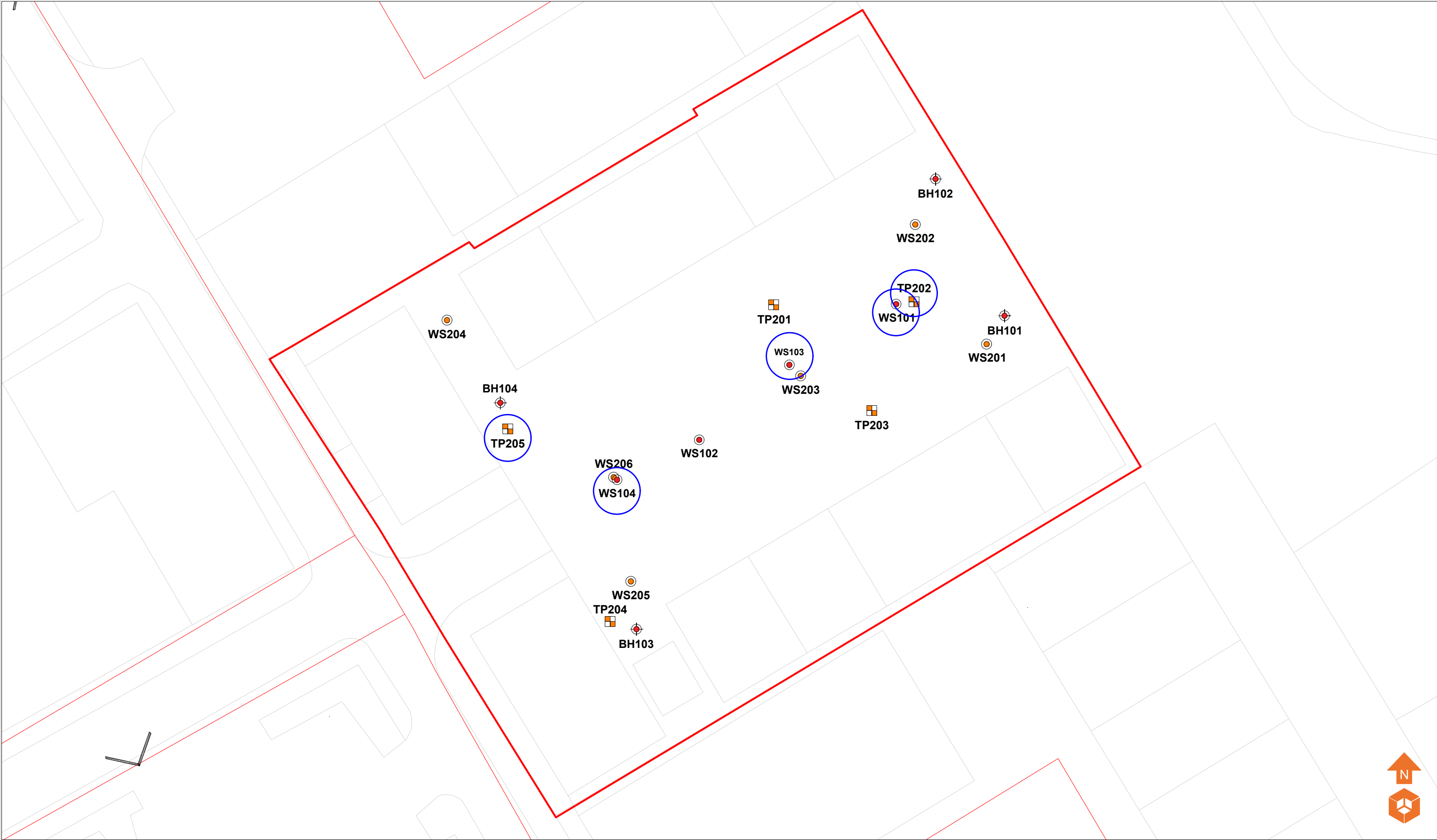
Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

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Depth of Made Ground Plan



Geology Key Made Ground Clay Drift Manchester Marl Formation Isolated DS3 - AC3 PAH Impact SVOC Exceedance Multi Storey Car Park Infilled Pond Water Pipe	Notes:					Client:		Job No:		Date:		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		
						Bowmer and Kirkland		15-849		31.08.2022				
								Drawing No:		Scale:				
								010		1:1000 @ A3				
					Job Title:		Drawing Title:		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.					
					Ancoats Mobility Hub		Conceptual Site Model							
					P1	REVA	31.08.2022	LM	MJ					
					Phase	Issue	Date	Drawn	Checked					



Location Symbols WS101 Approximate Window Sample Probehole Location TP101 Approximate Trial Pit Location WS201 Approximate Window Sample Probehole Location (2021) BH101 Approximate Cable Percussive Borehole Location (2021)					Contamination Exceedances Soils Non Volatile PAH					Notes:					Client: Bowmer and Kirkland					Job No: 15-849		Date: 31.08.2022		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					
										Job Title: Ancoats Mobility Hub					Drawing No: 018				Scale: 1:1000 @ A3				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 Phase					REVA Issue					31.08.2022 Date					LM Drawn					MJ Checked									

APPENDIX IV PHOTOGRAPHS

PLATE 1 SITE FACING EAST



PLATE 2 VIEW OF SITE FACING WEST



PLATE 3 VIEW OF SITE FACING WEST



PLATE 4 TP102 ARISINGS AND EXCAVATION



PLATE 5 PEAK FOREST CANAL



PLATE 6 WS101 ARISINGS



APPENDIX V

E3P EXPLORATORY HOLE LOGS



e3p

Trial Pit Log

TrialPit No
TP101
Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849Co-ords: 385173.00 - 398908.00
Level:Date
27/06/2022

Location: Manchester

Dimensions (m): 2.80

Scale
1:30

Client: Bowmer & Kirkland

Depth
2.90Logged
G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			MADE GROUND: Asphalt.	
				0.40			MADE GROUND: Concrete with rebar.	
	0.70	ES		0.60			MADE GROUND: Light greyish brown very sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone and mudstone with fragments of ash.	
				1.30			MADE GROUND: Black slightly clayey very sandy gravel with rare cobbles. Gravel is fine to medium subangular to subrounded of sandstone with frequent fragments of clinker, brick, concrete and ash. Cobbles are subangular of sandstone. (Slight hydrocarbon odour)	1
	1.60	HVP	24				MADE GROUND: Soft to firm dark grey slightly gravelly sandy clay. Gravel is fine to medium subangular to subrounded of mudstone and sandstone with frequent fragments of brick and clinker.	2
	2.50	ES		2.20			Stiff grey mottled brown slightly gravelly CLAY. Gravel is fine subangular to subrounded of sandstone and mudstone.	
	2.50	HVP	100					
				2.90			End of Pit at 2.90m	3
								4

Trial Pit Photographs



TP101



TP101 Spoil

Remarks: 1. Complete. 2. Slight hydrocarbon odour between 0.40-1.30m bgl. 3. Breaking hard standing out, 10 mins.

Stability: Stable.



Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385188.00 - 398912.00
Level:

Date
27/06/2022

Location: Manchester

Dimensions (m): 3.20

Scale
1:30

Client: Bowmer & Kirkland

Depth
3.35

Logged
G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
 2.00	0.30	ES		0.20			MADE GROUND: Asphalt.	
							MADE GROUND: Concrete.	
				0.45			MADE GROUND: Light greyish brown very sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone and mudstone with fragments of ash.	
				0.60				
							MADE GROUND: Black slightly clayey sandy gravel with occasional cobbles. Gravel is fine to medium subangular to subrounded of sandstone and mudstone with frequent fragments of clinker, glass, brick, and ceramic. Cobbles are subangular of sandstone.	1
	1.90							
	2.00	HVP	20				Soft to firm dark grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone and coal.	2
	2.50	HVP	22					
	2.60	B						
	2.80							
	3.00	B					Very stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone, mudstone and coal.	3
	3.00	ES						
	3.20	ES						
	3.20	HVP	110					
	3.35						End of Pit at 3.35m	
								4

Trial Pit Photographs



TP102



TP102 Spoil

Remarks: 1. Complete. 2. Slight hydrocarbon odour between 0.45-1.90m bgl. 3. Water strike encountered at 2.00m bgl on the clay with a slow ingress. 3. Breaking hard standing out, 10 mins.

Stability: Stable.

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385186.00 - 398898.00
Level:

Date
27/06/2022

Location: Manchester

Dimensions (m): 2.90

Scale
1:30

Client: Bowmer & Kirkland

Depth
3.50

Logged
G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
							MADE GROUND: Asphalt.	
	0.50	ES		0.45			MADE GROUND: Black slightly clayey sandy gravel. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone with frequent fragments of brick, clinker, ceramic and glass.	1
	0.80 0.90	B ES						
	1.80	HVP	20	1.70			Soft to firm dark grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone and coal.	2
	2.50	HVP	32	2.70			Stiff brown mottled grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone, sandstone and coal.	3
	3.20 3.30	ES HVP	116	3.50			End of Pit at 3.50m	4

Trial Pit Photographs



TP103



TP103 Spoil

Remarks: 1. Complete. 2. Breaking hard standing out, 10 mins.

Stability: Stable.



e3p

Trial Pit Log

TrialPit No
TP104
Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849Co-ords: 385158.00 - 398883.00
Level:Date
27/06/2022

Location: Manchester

Dimensions (m): 2.80

Scale
1:30

Client: Bowmer & Kirkland

Depth
1.90Logged
G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.00	ES		0.15			MADE GROUND: Asphalt.	
				0.30			MADE GROUND: Concrete with rebar.	
	0.40	ES		0.50			MADE GROUND: Brownish grey sandy gravel. Gravel is fine to medium angular to subrounded of mudstone and ash.	
	0.70	ES		1.00			MADE GROUND: Dark brown slightly clayey fine to medium sandy gravel. Gravel is fine to coarse subangular to subrounded of mudstone and sandstone with frequent fragments of glass, brick, clinker, ceramic, metal pipe and plastic bags. (Redundant land drain circa 0.60m bgl)	1
	1.20	HVP	74	1.60			MADE GROUND: Stiff brown slightly sandy clay with fragments of brick.	
	1.70	B					Stiff light grey slightly sandy CLAY.	
	1.80	ES						
	1.80	HVP	106	1.90			End of Pit at 1.90m	2
								3
								4

Trial Pit Photographs



TP104



TP104 Spoil

Remarks: 1. Terminated due to instability. 2. Gravel indicative of service identified at 0.65m bgl, trial pit moved 0.50m away to continue dig. 3. Breaking hard standing out, 10 mins.

Stability: Unstable.





e3p

Trial Pit Log

TrialPit No
TP105
Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849Co-ords: 385148.00 - 398896.00
Level:Date
27/06/2022

Location: Manchester

Dimensions (m): 3.00

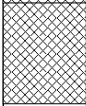
Scale
1:30

Client: Bowmer & Kirkland

Depth
0.70

0.60

Logged
G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.35	ES		0.30			MADE GROUND: Asphalt.	
				0.70			MADE GROUND: Brown sandy gravel. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone with frequent brick, clinker, concrete and ash.	
							End of Pit at 0.70m	
								1
								2
								3
								4

Trial Pit Photographs



TP105

Remarks: 1. Terminated due to redundant services at 0.65m bgl. 2. Possible water pipe 1.30m long and 10cm diameter. 3. Breaking hard standing out, 10 mins.

Stability: Stable.



Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385195.00 - 398906.00

Hole Type
WS

Location: Manchester

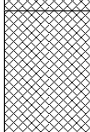
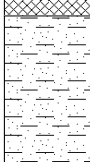
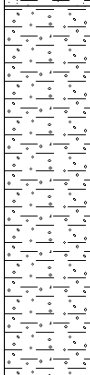
Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			MADE GROUND: Asphalt.	
					0.40			MADE GROUND: Concrete.	
		1.00	ES	N=4 (1,2/1,1,1,1)	1.10			MADE GROUND: Black slightly clayey sandy gravel. Gravel is fine to medium subangular to subrounded of mudstone and sandstone with frequent fragments of clinker, brick and glass.	1
		1.20					MADE GROUND: Brown mottled grey clay with fragments of brick and clinker.		
		2.00		N=3 (1,0/1,1,1,0)	2.00			Soft, low strength slightly sandy dark grey CLAY	2
		3.00	ES U100	N=19 (3,3/3,5,5,6)	3.00			Very stiff, high strength brown mottled grey slightly gravelly CLAY. Gravel is fine subangular to subrounded of sandstone and mudstone. (Circa 5.00 m bgl becoming stiff, medium strength)	3
		3.30							
		3.50							
		4.00				N=23 (4,4/5,5,6,7)			4
				5.00		N=15 (3,4/3,3,4,5)			
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete. 2. Water strike encountered at 2.00m bgl.

Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385188.00 - 398917.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.15			MADE GROUND: Asphalt.	
					0.40			MADE GROUND: Concrete with fragments of brick and ash.	
		0.60	ES	N=6 (1,0/1,1,2,2)	1.40			MADE GROUND: Blackish brown slightly sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone with frequent fragments of clinker, brick, coal and ash. (Slight hydrocarbon odour from 0.80m bgl)	1
		1.00							
		2.00			N=10 (2,3/2,2,3,3)			MADE GROUND: Brown slightly sandy very gravelly clay. Gravel is fine to medium subangular to subrounded of coal, sandstone and mudstone with frequent fragments of brick, clinker and ceramic.	2
		2.80	ES	N=29 (4,5/6,8,8,7)	2.60			Very stiff, high strength brown mottled grey slightly sandy slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone and coal.	3
		3.00							
		3.50	U100						
		4.00		N=22 (4,5/4,5,6,7)					4
		5.00		N=19 (4,4/4,5,5,5)					5
			5.45		----- End of borehole at 5.45 m			6	
								7	
								8	
								9	
								10	

Remarks

1. Complete.

Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385177.00 - 398902.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15			MADE GROUND: Asphalt.	
		0.30			0.30			MADE GROUND: Concrete.	
		0.70			0.70			MADE GROUND: Light greyish brown sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone with frequent fragments of concrete and ash.	
		1.00		N=11 (4,2/2,3,3,3)	1.10			MADE GROUND: Dark brown sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone, mudstone with frequent fragments of clinker, brick and ash.	1
		1.30	ES		1.50			MADE GROUND: Dark brown mottled grey very gravelly clay. Gravel is fine to medium subangular to subrounded of sandstone and fragments of clinker. (Black staining circa 1.30m bgl with a slight hydrocarbon odour)	2
		1.50	U100					Stiff, medium strength brown mottled grey slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of mudstone, sandstone and coal. (Circa 3.00 m bgl becoming very stiff, high strength)	3
		2.00		N=14 (2,2/3,3,4,4)					
		2.40	ES						
		3.00		N=33 (4,6/7,7,9,10)					
		4.00		50 (6,8/50 for 295mm)	4.40			End of borehole at 4.40 m	4

Remarks

1. Refusal within stiff CLAY.

Borehole Log

Borehole No.

WS104

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385142.00 - 398907.00

Hole Type
WS

Location: Manchester

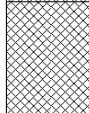
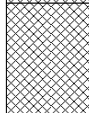
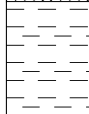
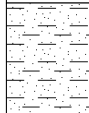
Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Asphalt.	
		0.75	ES					MADE GROUND: Brown sandy gravel. Gravel is fine to coarse subangular to subrounded of sandstone and mudstone with fragments of brick, clinker and concrete.	1
		1.00		N=2 (1,0/0,1,1,0)					
					1.40			MADE GROUND: Brown slightly gravelly sandy slightly clay. Gravel is fine subangular to subrounded of sandstone with occasional fragments of brick.	2
		2.00	ES						
		2.00		N=4 (1,1/1,0,2,1)					
		2.50	U100		2.50			Very soft, extremely low strength grey CLAY.	3
		3.00	ES						
		3.00		N=1 (1,0/0,1,0,0)					
					3.70			Stiff slightly gravelly CLAY. Gravel is fine to medium subangular to subrounded of sandstone, mudstone and coal.	4
		4.00		N=33 (4,4/5,8,9,11)					
		5.00		N=25 (4,4/5,6,6,8)					5
					5.45			End of borehole at 5.45 m	
									6
									7
									8
									9
									10

Remarks

1. Complete.

Borehole Log

Borehole No.

WS105

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385162.00 - 398884.00

Hole Type
WS

Location: Manchester

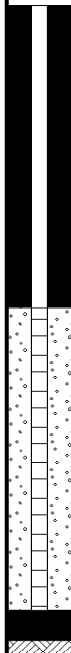
Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15			MADE GROUND: Asphalt.	
		0.30	ES					greyish brown sandy gravel. Gravel is fine to medium subangular to subrounded of sandstone and mudstone with frequent fragments of concrete, brick and ash.	
		1.00		N=11 (1,1/2,2,3,4)	1.00			MADE GROUND: Very dark slightly sandy very gravelly clay. Gravel is fine to medium subangular to subrounded of sandstone, mudstone and coal with frequent fragments of clinker, brick, ceramic, ash and concrete.	1
		1.40	ES		1.30			MADE GROUND: Brown sandy clay	
		2.00	ES		1.65			MADE GROUND: Very dark slightly sandy very gravelly clay. Gravel is fine to medium subangular to subrounded of sandstone, mudstone and coal with frequent fragments of clinker, brick, ceramic, ash and concrete.	2
		2.00		N=16 (2,3/3,4,4,5)					
		2.50	U100					Stiff, medium strength brown mottled light grey slightly sandy slightly gravelly CLAY. Gravel is fine subangular to subrounded of sandstone, mudstone and coal. (Circa 4.00 m bgl becoming very stiff, high strength)	3
		3.00		N=21 (4,4/4,5,6,6)					
		4.00		N=38 (6,6/7,10,10,11)					4
		5.00		N=46 (6,6/8,11,13,14)					5
					5.45			End of borehole at 5.45 m	6
									7
									8
									9
									10

Remarks

1. Complete.



Borehole Log

Borehole No.

WS106

Sheet 1 of 1

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385158.00 - 398891.00

Hole Type
WS

Location: Manchester

Level:

Scale
1:50

Client: Bowmer & Kirkland

Dates: 28/06/2022 -

Logged By
G.Calvert

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.20			MADE GROUND: Asphalt.	
					0.70			MADE GROUND: Concrete.	
								----- End of borehole at 0.70 m	
									1
									2
									3
									4
									5
									6
									7
									8
									9
									10

Remarks

1. Refusal due to concrete obstruction.



APPENDIX VI CHEMICAL AND GEOTECHNICAL TESTING RESULTS

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Analytical Report Number : 22-69041

Project / Site name:	Ancoats Mobility Hub	Samples received on:	30/06/2022
Your job number:	15 849	Samples instructed on/ Analysis started on:	04/07/2022
Your order number:	002081	Analysis completed by:	12/07/2022
Report Issue Number:	1	Report issued on:	12/07/2022
Samples Analysed:	2 leachate samples - 16 soil samples		


Signed:

Izabela Wójcik
Reporting Specialist
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: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336657	2336658	2336659	2336660	2336661
Sample Reference				TP101	TP101	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	2.50	0.30	0.90	3.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	16	7.1	24	13
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.2	0.9	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	-	10.2	7.5	-
Total Cyanide	mg/kg	1	MCERTS	11	< 1.0	26	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	1300	-	2000	2100	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.26	-	0.38	0.81	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	530	-	750	1600	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	264	-	375	806	-
Sulphide	mg/kg	1	MCERTS	65	-	66	410	-
Total Sulphur	mg/kg	50	MCERTS	1800	-	1800	18000	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	5.5	-	5	3.4	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.39	< 0.05	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.3	< 0.05	-	-	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.89	< 0.05	-	-	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	5	< 0.05	-	-	< 0.05
Pyrene	mg/kg	0.05	MCERTS	6.2	< 0.05	-	-	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.1	< 0.05	-	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	2.7	< 0.05	-	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.2	< 0.05	-	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.2	< 0.05	-	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.2	< 0.05	-	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.4	< 0.05	-	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.79	< 0.05	-	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.6	< 0.05	-	-	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	39.9	< 0.80	-	-	< 0.80
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Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number	2336657	2336658	2336659	2336660	2336661
Sample Reference	TP101	TP101	TP102	TP103	TP103
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.70	2.50	0.30	0.90	3.20
Date Sampled	27/06/2022	27/06/2022	27/06/2022	27/06/2022	27/06/2022
Time Taken	None Supplied	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	26	12	21	47	9.2
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	130	-	-	150
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1.3	-	-	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	-	0.3	-	-	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	-	23	39	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	230	27	170	160	25
Lead (aqua regia extractable)	mg/kg	1	MCERTS	460	22	620	140	14
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	1.1	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	41	37	29	76	38
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	34	-	-	33
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	60	190	77	63

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	-	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	< 1.0	-

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	< 8.0	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	-	-	< 10	-

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-	13	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	42	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	66	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	-	-	120	-

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Your Order No: 002081

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Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	2.50	0.30	0.90	3.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	-	< 1.0
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	35	-	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	130	-	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	24	< 1.0	520	-	< 1.0
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	82	< 1.0	1300	-	< 1.0
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	12	< 10	370	-	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	MCERTS	120	< 10	2400	-	< 10

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-

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Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	< 1.0	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	< 0.2	< 0.2	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	25	1.1	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	12	0.6	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	3.4	1.2	-
Acenaphthene	mg/kg	0.05	MCERTS	0.39	-	27	0.69	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Dibenzofuran	mg/kg	0.2	MCERTS	< 0.2	-	14	0.7	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	< 0.3	< 0.3	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	0.4	< 0.2	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	21	2.1	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3	-
Phenanthrene	mg/kg	0.05	MCERTS	2.3	-	140	13	-
Anthracene	mg/kg	0.05	MCERTS	0.89	-	46	3.5	-
Carbazole	mg/kg	0.3	MCERTS	< 0.3	-	15	0.6	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2	-

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 Project / Site name: Ancoats Mobility Hub
 Your Order No: 002081

Lab Sample Number				2336657	2336658	2336659	2336660	2336661
Sample Reference				TP101	TP101	TP102	TP103	TP103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.70	2.50	0.30	0.90	3.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Anthraquinone	mg/kg	0.3	MCERTS	< 0.3	-	6.3	0.6	-
Fluoranthene	mg/kg	0.05	MCERTS	5	-	140	17	-
Pyrene	mg/kg	0.05	MCERTS	6.2	-	140	19	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	< 0.3	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.1	-	94	12	-
Chrysene	mg/kg	0.05	MCERTS	2.7	-	73	6.6	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.2	-	82	8.8	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	3.2	-	39	0.98	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.2	-	79	10	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.4	-	39	3.7	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.79	-	12	1.4	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.6	-	44	4.3	-

Miscellaneous Organics

Coal Tar		N/A	NONE	Not Identified	-	-	-	-
Total Residue	mg/kg	10	NONE	120	-	-	-	-

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

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Project / Site name: Ancoats Mobility Hub
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Lab Sample Number				2336662	2336663	2336664	2336665	2336666
Sample Reference				TP104	TP104	TP104	TP105	WS101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.70	1.80	0.35	1.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	2.2	15	14	5	17
Total mass of sample received	kg	0.001	NONE	0.3	0.2	0.3	0.2	0.9

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	SFS	DSA	N/A	DSA	SFS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	-	7.1	10.2	-
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	12	1.8
Total Sulphate as SO ₄	mg/kg	50	MCERTS	360	-	210	1600	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.025	-	0.052	0.24	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	51	-	100	470	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	25.3	-	51.6	236	-
Sulphide	mg/kg	1	MCERTS	43	-	14	37	-
Total Sulphur	mg/kg	50	MCERTS	460	-	190	980	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.9	-	0.6	3.7	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	1.4	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	0.76	-
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	8.2	-
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	5.8	-
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	43	-
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	10	-
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	59	-
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	55	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	27	-
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	25	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	31	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	12	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	26	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	15	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	3.7	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	17	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	< 0.80	340	-
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Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336662	2336663	2336664	2336665	2336666
Sample Reference				TP104	TP104	TP104	TP105	WS101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.70	1.80	0.35	1.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	28/06/2022
Time Taken				None Supplied	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	2.9	28	9	17	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	240	-	-	140
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1.4	-	-	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	-	0.4	-	-	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	2.6	-	26	25	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	2.9	70	13	110	100
Lead (aqua regia extractable)	mg/kg	1	MCERTS	12	250	18	600	97
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	1.1	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.3	26	16	26	32
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	33	-	-	34
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	37	94	40	140	66

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
o-xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	< 2.0	-	-	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	< 8.0	-	-	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	< 10	-	-	< 10

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	< 0.001	-	-	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	13	-	-	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	37	-	-	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	70	-	-	17
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	100	-	-	45
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	220	-	-	62

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Your Order No: 002081

Lab Sample Number				2336662	2336663	2336664	2336665	2336666
Sample Reference				TP104	TP104	TP104	TP105	WS101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.70	1.80	0.35	1.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	-	< 1.0	< 1.0	-
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	< 0.1	-
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	-	< 2.0	52	-
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	-	< 4.0	100	-
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	< 1.0	-	< 1.0	240	-
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	< 1.0	-	< 1.0	1300	-
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	-	< 10	510	-
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	MCERTS	< 10	-	< 10	2200	-

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-	< 1.0
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336662	2336663	2336664	2336665	2336666
Sample Reference				TP104	TP104	TP104	TP105	WS101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.70	1.80	0.35	1.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-	< 1.0
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-	< 1.0

SVOCs

Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-	< 0.2
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-	< 0.05
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-	< 0.2
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Naphthalene	mg/kg	0.05	MCERTS	-	1.1	-	-	0.26
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	-	0.5	-	-	< 0.1
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-	< 0.1
Acenaphthylene	mg/kg	0.05	MCERTS	-	0.21	-	-	0.14
Acenaphthene	mg/kg	0.05	MCERTS	-	1.6	-	-	0.23
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	0.7	-	-	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Fluorene	mg/kg	0.05	MCERTS	-	1.1	-	-	0.2
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Phenanthrene	mg/kg	0.05	MCERTS	-	8	-	-	2.2
Anthracene	mg/kg	0.05	MCERTS	-	1.5	-	-	0.46
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-	< 0.2

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336662	2336663	2336664	2336665	2336666
Sample Reference				TP104	TP104	TP104	TP105	WS101
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.40	0.70	1.80	0.35	1.20
Date Sampled				27/06/2022	27/06/2022	27/06/2022	27/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-	< 0.3
Fluoranthene	mg/kg	0.05	MCERTS	-	6	-	-	3.5
Pyrene	mg/kg	0.05	MCERTS	-	5.9	-	-	4.4
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	3	-	-	2.9
Chrysene	mg/kg	0.05	MCERTS	-	2.4	-	-	2.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	2.4	-	-	4.2
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	1.3	-	-	5.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	2.9	-	-	3.8
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	1.3	-	-	1.9
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.37	-	-	0.66
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	1.7	-	-	2.5
Miscellaneous Organics								
Coal Tar		N/A	NONE	-	-	-	-	-
Total Residue	mg/kg	10	NONE	-	-	-	-	-

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

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336667	2336668	2336669	2336670	2336671
Sample Reference				WS102	WS102	WS103	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	2.80	1.30	2.40	0.75
Date Sampled				28/06/2022	28/06/2022	28/06/2022	28/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.6	12	21	15	4.5
Total mass of sample received	kg	0.001	NONE	0.6	0.3	0.9	0.3	1.4

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8	-	7.5	8	-
Total Cyanide	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	850	-	880	170	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.22	-	0.29	0.044	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	430	-	570	88	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	218	-	286	44.2	-
Sulphide	mg/kg	1	MCERTS	24	-	150	7.5	-
Total Sulphur	mg/kg	50	MCERTS	690	-	1800	160	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	3.6	-	2.3	0.9	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.38
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.27
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.95
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.69
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	5.9
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	1.8
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	8.1
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	8.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	3.8
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	4.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	3.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	1.4
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	2.7
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	1.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	0.45
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	< 0.05	1.7

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	< 0.80	-	< 0.80	45.2
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Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336667	2336668	2336669	2336670	2336671
Sample Reference				WS102	WS102	WS103	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	2.80	1.30	2.40	0.75
Date Sampled				28/06/2022	28/06/2022	28/06/2022	28/06/2022	28/06/2022
Time Taken				None Supplied	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	16	8.3	22	8.6	6.7
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	130	-	-	58
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	1	-	-	0.34
Boron (water soluble)	mg/kg	0.2	MCERTS	-	< 0.2	-	-	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-	24	33	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	74	26	170	27	23
Lead (aqua regia extractable)	mg/kg	1	MCERTS	120	14	350	16	46
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	31	33	37	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	28	-	-	19
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	68	58	92	54	70

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	MCERTS	-	-	-	-	-

TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	MCERTS	-	-	-	-	-

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336667	2336668	2336669	2336670	2336671
Sample Reference				WS102	WS102	WS103	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	2.80	1.30	2.40	0.75
Date Sampled				28/06/2022	28/06/2022	28/06/2022	28/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	2.2	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	50	< 4.0	< 4.0	< 4.0	20
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	170	< 1.0	< 1.0	< 1.0	59
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	720	< 1.0	< 1.0	< 1.0	500
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	230	< 10	< 10	< 10	220
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	1200	< 10	< 10	< 10	800

VOCs

Chloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	< 1.0	-	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336667	2336668	2336669	2336670	2336671
Sample Reference				WS102	WS102	WS103	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	2.80	1.30	2.40	0.75
Date Sampled				28/06/2022	28/06/2022	28/06/2022	28/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	< 1.0	-	< 1.0	-	-

SVOCs

Aniline	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	< 0.2	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	7.2	-	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	3.4	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	< 0.1	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	1.2	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	5.7	-	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	3.1	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	< 0.3	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	5.8	-	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	37	-	1.8	-	-
Anthracene	mg/kg	0.05	MCERTS	7.3	-	0.47	-	-
Carbazole	mg/kg	0.3	MCERTS	1.8	-	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	-	-

Analytical Report Number: 22-69041
 Project / Site name: Ancoats Mobility Hub
 Your Order No: 002081

Lab Sample Number				2336667	2336668	2336669	2336670	2336671
Sample Reference				WS102	WS102	WS103	WS103	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	2.80	1.30	2.40	0.75
Date Sampled				28/06/2022	28/06/2022	28/06/2022	28/06/2022	28/06/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Anthraquinone	mg/kg	0.3	MCERTS	1.2	-	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	32	-	1.8	-	-
Pyrene	mg/kg	0.05	MCERTS	34	-	2	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	< 0.3	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	13	-	1	-	-
Chrysene	mg/kg	0.05	MCERTS	13	-	0.88	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	9	-	0.73	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	7.5	-	0.33	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	11	-	0.87	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	5.1	-	0.3	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	1.4	-	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	6.6	-	0.42	-	-

Miscellaneous Organics

Coal Tar		N/A	NONE	-	-	-	-	-
Total Residue	mg/kg	10	NONE	-	-	-	-	-

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

Analytical Report Number: 22-69041
 Project / Site name: Ancoats Mobility Hub
 Your Order No: 002081

Lab Sample Number				2336672
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				28/06/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	3.1
Total mass of sample received	kg	0.001	NONE	0.9

Asbestos in Soil	Type	N/A	ISO 17025	-
Asbestos Analyst ID	N/A	N/A	N/A	N/A

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-
Total Cyanide	mg/kg	1	MCERTS	-
Total Sulphate as SO ₄	mg/kg	50	MCERTS	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-
Sulphide	mg/kg	1	MCERTS	-
Total Sulphur	mg/kg	50	MCERTS	-
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	-

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.35
Acenaphthene	mg/kg	0.05	MCERTS	2.3
Fluorene	mg/kg	0.05	MCERTS	1.6
Phenanthrene	mg/kg	0.05	MCERTS	13
Anthracene	mg/kg	0.05	MCERTS	3.5
Fluoranthene	mg/kg	0.05	MCERTS	12
Pyrene	mg/kg	0.05	MCERTS	13
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6
Chrysene	mg/kg	0.05	MCERTS	4.2
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.6
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.1
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.68
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	3.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	72
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Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336672
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				28/06/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	-
Chromium (hexavalent)	mg/kg	1.8	MCERTS	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6 _{HS_1D_AL}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC6 - EC8 _{HS_1D_AL}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC8 - EC10 _{HS_1D_AL}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aliphatic >EC10 - EC12 _{EH_CU_1D_AL}	mg/kg	1	MCERTS	-
TPH-CWG - Aliphatic >EC12 - EC16 _{EH_CU_1D_AL}	mg/kg	2	MCERTS	-
TPH-CWG - Aliphatic >EC16 - EC21 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic >EC21 - EC35 _{EH_CU_1D_AL}	mg/kg	8	MCERTS	-
TPH-CWG - Aliphatic (EC5 - EC35) _{EH_CU+HS_1D_AL}	mg/kg	10	MCERTS	-

TPH-CWG - Aromatic >EC5 - EC7 _{HS_1D_AR}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC7 - EC8 _{HS_1D_AR}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC8 - EC10 _{HS_1D_AR}	mg/kg	0.001	MCERTS	-
TPH-CWG - Aromatic >EC10 - EC12 _{EH_CU_1D_AR}	mg/kg	1	MCERTS	-
TPH-CWG - Aromatic >EC12 - EC16 _{EH_CU_1D_AR}	mg/kg	2	MCERTS	-
TPH-CWG - Aromatic >EC16 - EC21 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic >EC21 - EC35 _{EH_CU_1D_AR}	mg/kg	10	MCERTS	-
TPH-CWG - Aromatic (EC5 - EC35) _{EH_CU+HS_1D_AR}	mg/kg	10	MCERTS	-

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336672
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				28/06/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	-
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	MCERTS	-
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	-
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	-
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	-
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	-
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	-
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	MCERTS	-

VOCS

Chloromethane	µg/kg	1	ISO 17025	-
Chloroethane	µg/kg	1	NONE	-
Bromomethane	µg/kg	1	ISO 17025	-
Vinyl Chloride	µg/kg	1	NONE	-
Trichlorofluoromethane	µg/kg	1	NONE	-
1,1-Dichloroethene	µg/kg	1	NONE	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-
Trichloromethane	µg/kg	1	MCERTS	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-
Benzene	µg/kg	1	MCERTS	-
Tetrachloromethane	µg/kg	1	MCERTS	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-
Trichloroethene	µg/kg	1	MCERTS	-
Dibromomethane	µg/kg	1	MCERTS	-
Bromodichloromethane	µg/kg	1	MCERTS	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-
Toluene	µg/kg	1	MCERTS	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-
Dibromochloromethane	µg/kg	1	ISO 17025	-
Tetrachloroethene	µg/kg	1	NONE	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-
Chlorobenzene	µg/kg	1	MCERTS	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-
Ethylbenzene	µg/kg	1	MCERTS	-
p & m-Xylene	µg/kg	1	MCERTS	-
Styrene	µg/kg	1	MCERTS	-
Tribromomethane	µg/kg	1	NONE	-
o-Xylene	µg/kg	1	MCERTS	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-
Isopropylbenzene	µg/kg	1	MCERTS	-
Bromobenzene	µg/kg	1	MCERTS	-
n-Propylbenzene	µg/kg	1	ISO 17025	-
2-Chlorotoluene	µg/kg	1	MCERTS	-
4-Chlorotoluene	µg/kg	1	MCERTS	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-
tert-Butylbenzene	µg/kg	1	MCERTS	-

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336672
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				28/06/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-
sec-Butylbenzene	µg/kg	1	MCERTS	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-
Butylbenzene	µg/kg	1	MCERTS	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-

SVOCs

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

Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub
Your Order No: 002081

Lab Sample Number				2336672
Sample Reference				WS105
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				28/06/2022
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Anthraquinone	mg/kg	0.3	MCERTS	-
Fluoranthene	mg/kg	0.05	MCERTS	-
Pyrene	mg/kg	0.05	MCERTS	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-
Chrysene	mg/kg	0.05	MCERTS	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-

Miscellaneous Organics

Coal Tar		N/A	NONE	Not Identified
Total Residue	mg/kg	10	NONE	3000

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



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Environmental Science

Analytical Report Number: 22-69041

Project / Site name: Ancoats Mobility Hub

Your Order No: 002081

Lab Sample Number				2336696	2336697
Sample Reference				TP101	WS103
Sample Number				None Supplied	None Supplied
Depth (m)				0.70	1.30
Date Sampled				27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH (automated)	pH Units	N/A	ISO 17025	7.6	7.6
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	6	1.4

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	1.6	1.9
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Speciated PAHs

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

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2
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Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	3.6	2.8
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4	0.6
Copper (dissolved)	µg/l	0.7	ISO 17025	3.6	3.3
Lead (dissolved)	µg/l	1	ISO 17025	2.1	4
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.5	1.3
Selenium (dissolved)	µg/l	4	ISO 17025	6.5	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	16	14



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Analytical Report Number: 22-69041
Project / Site name: Ancoats Mobility Hub

Your Order No: 002081

Lab Sample Number				2336696	2336697
Sample Reference				TP101	WS103
Sample Number				None Supplied	None Supplied
Depth (m)				0.70	1.30
Date Sampled				27/06/2022	27/06/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_1D_TOTAL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_#1_#2_MS	µg/l	10	NONE	< 10	< 10

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

Analytical Report Number : 22-69041
Project / Site name: Ancoats Mobility Hub

* 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 *
2336657	TP101	None Supplied	0.7	Brown loam and clay with gravel and vegetation.
2336658	TP101	None Supplied	2.5	Brown loam and clay with gravel and vegetation.
2336659	TP102	None Supplied	0.3	Brown loam and clay with gravel and vegetation.
2336660	TP103	None Supplied	0.9	Brown loam and clay with gravel and vegetation.
2336661	TP103	None Supplied	3.2	Brown clay with gravel.
2336662	TP104	None Supplied	0.4	Brown clay with gravel and vegetation.
2336663	TP104	None Supplied	0.7	Brown loam and clay with gravel and vegetation.
2336664	TP104	None Supplied	1.8	Brown clay with gravel and vegetation.
2336665	TP105	None Supplied	0.35	Brown loam and clay with gravel and vegetation.
2336666	WS101	None Supplied	1.2	Brown loam and clay with gravel and vegetation.
2336667	WS102	None Supplied	0.6	Brown loam and sand with gravel and tar.
2336668	WS102	None Supplied	2.8	Brown clay and sand with gravel.
2336669	WS103	None Supplied	1.3	Brown clay and sand with gravel.
2336670	WS103	None Supplied	2.4	Brown clay and sand with gravel.
2336671	WS104	None Supplied	0.75	Brown loam and sand with gravel and rubble.
2336672	WS105	None Supplied	0.3	Black tar with gravel.**

**Non MCERTS Matrix.

Analytical Report Number : 22-69041
Project / Site name: Ancoats Mobility Hub

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 (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
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
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide 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 : 22-69041
Project / Site name: Ancoats Mobility Hub

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
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
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
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
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
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
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
Coal Tar in Soil	DCM Extraction with qualitative interpretation via GC/MS	In-house method	L064-PL	D	NONE
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 diphenylcarbazide 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
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

Analytical Report Number : 22-69041
Project / Site name: Ancoats Mobility Hub

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

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

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

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

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

Analytical Report Number : 22-69041
Project / Site name: Ancoats Mobility Hub

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TP101	None Supplied	S	2336657	bc	Coal Tar in Soil	L064-PL	b
TP101	None Supplied	S	2336657	bc	Monohydric phenols in soil	L080-PL	b
TP101	None Supplied	S	2336657	bc	Semi-volatile organic compounds in soil	L064-PL	b
TP101	None Supplied	S	2336657	bc	Speciated EPA-16 PAHs in soil	L064-PL	b
TP101	None Supplied	S	2336657	bc	Sulphide in soil	L010-PL	c
TP101	None Supplied	S	2336657	bc	TPH in (Soil)	L076-PL	b
TP101	None Supplied	S	2336657	bc	Total cyanide in soil	L080-PL	c
TP101	None Supplied	S	2336657	bc	Volatile organic compounds in soil	L073B-PL	b
TP101	None Supplied	S	2336658	c	Total cyanide in soil	L080-PL	c
TP102	None Supplied	S	2336659	c	Sulphide in soil	L010-PL	c
TP102	None Supplied	S	2336659	c	Total cyanide in soil	L080-PL	c
TP103	None Supplied	S	2336660	c	Sulphide in soil	L010-PL	c
TP103	None Supplied	S	2336660	c	Total cyanide in soil	L080-PL	c
TP103	None Supplied	S	2336661	c	Total cyanide in soil	L080-PL	c
TP104	None Supplied	S	2336662	c	Sulphide in soil	L010-PL	c
TP104	None Supplied	S	2336662	c	Total cyanide in soil	L080-PL	c
TP104	None Supplied	S	2336663	c	Total cyanide in soil	L080-PL	c
TP104	None Supplied	S	2336664	c	Sulphide in soil	L010-PL	c
TP104	None Supplied	S	2336664	c	Total cyanide in soil	L080-PL	c
TP105	None Supplied	S	2336665	c	Sulphide in soil	L010-PL	c
TP105	None Supplied	S	2336665	c	Total cyanide in soil	L080-PL	c

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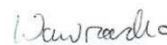
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Analytical Report Number : 22-69043

Project / Site name:	Ancoats Mobility Hub	Samples received on:	30/06/2022
Your job number:	15 849	Samples instructed on/ Analysis started on:	04/07/2022
Your order number:	002081	Analysis completed by:	12/07/2022
Report Issue Number:	1	Report issued on:	12/07/2022
Samples Analysed:	3 wac multi samples		



Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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Waste Acceptance Criteria Analytical Results							
Report No:	22-69043						
					Client: E3P		
Location	Ancoats Mobility Hub						
Lab Reference (Sample Number)	2336682				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	28/06/2022				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS102						
Depth (m)	0.60						
Solid Waste Analysis							
TOC (%)**	3.1				3%	5%	6%
Loss on Ignition (%) **	9.5				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) ^{EH, ID, CU, AL} #	340				500	--	--
Total PAH (WAC-17) (mg/kg)	198				100	--	--
pH (units)**	7.9				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	3.2				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.036	0.020		0.21	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	0.0086	0.0034		0.039	0.5	10	70
Copper *	0.0098	0.0080		0.082	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.030	0.011		0.13	0.5	10	30
Nickel *	0.0033	0.0034		0.034	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.021	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.018	0.0046		0.059	4	50	200
Chloride *	< 4.0	< 4.0		< 15	800	15000	25000
Fluoride	1.1	0.61		6.5	10	150	500
Sulphate *	140	16		270	1000	20000	50000
TDS*	250	75		910	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	7.3	7.9		78	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.60						
Dry Matter (%)	93						
Moisture (%)	6.6						
Stage 1							
Volume Eluate L2 (litres)	0.32						
Filtered Eluate VE1 (litres)	0.16						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCFETS accredited		

* = UKAS accredited (liquid eluate analysis only)

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results							
Report No:	22-69043						
					Client: E3P		
Location	Ancoats Mobility Hub						
Lab Reference (Sample Number)	2336683				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	28/06/2022				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS103						
Depth (m)	1.30						
Solid Waste Analysis							
TOC (%)**	1.6				3%	5%	6%
Loss on Ignition (%) **	8.9				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL #	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	10.6				100	--	--
pH (units)**	7.3				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	2.0				--	To be evaluated	To be evaluated
Eluate Analysis		2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test	
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)		mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)	
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.088	0.052		0.56	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	< 0.0010	0.0012		0.011	0.5	10	70
Copper *	0.010	0.0049		0.055	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.0059	0.0070		0.069	0.5	10	30
Nickel *	0.0074	0.0038		0.042	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.043	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.013	0.0053		0.062	4	50	200
Chloride *	31	< 4.0		59	800	15000	25000
Fluoride	0.65	0.79		7.7	10	150	500
Sulphate *	510	100		1500	1000	20000	50000
TDS*	430	200		2300	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	17	4.7		61	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.90						
Dry Matter (%)	79						
Moisture (%)	21						
Stage 1							
Volume Eluate L2 (litres)	0.30						
Filtered Eluate VE1 (litres)	0.20						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results							
Report No:	22-69043						
					Client: E3P		
Location	Ancoats Mobility Hub						
Lab Reference (Sample Number)	2336684				Landfill Waste Acceptance Criteria		
					Limits		
Sampling Date	28/06/2022				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WS105						
Depth (m)	0.30						
Solid Waste Analysis							
TOC (%)**	2.4				3%	5%	6%
Loss on Ignition (%) **	5.0				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.30				1	--	--
Mineral Oil (mg/kg) EH_1D_CU_AL #	420				500	--	--
Total PAH (WAC-17) (mg/kg)	72.0				100	--	--
pH (units)**	7.8				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	3.4				--	To be evaluated	To be evaluated
Eluate Analysis	2:1	8:1		Cumulative 10:1	Limit values for compliance leaching test		
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)	mg/l	mg/l		mg/kg	using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic *	< 0.010	< 0.010		< 0.050	0.5	2	25
Barium *	0.14	0.040		0.51	20	100	300
Cadmium *	< 0.0005	< 0.0005		< 0.0020	0.04	1	5
Chromium *	< 0.0010	0.0017		0.016	0.5	10	70
Copper *	0.0087	0.0073		0.074	2	50	100
Mercury *	< 0.0015	< 0.0015		< 0.010	0.01	0.2	2
Molybdenum *	0.0067	0.0073		0.072	0.5	10	30
Nickel *	0.0041	0.0039		0.040	0.4	10	40
Lead *	< 0.0050	< 0.0050		0.045	0.5	10	50
Antimony *	< 0.0050	< 0.0050		< 0.020	0.06	0.7	5
Selenium *	< 0.010	< 0.010		< 0.040	0.1	0.5	7
Zinc *	0.0029	0.0030		0.030	4	50	200
Chloride *	< 4.0	< 4.0		17	800	15000	25000
Fluoride	1.1	0.64		6.9	10	150	500
Sulphate *	990	56		1600	1000	20000	50000
TDS*	680	100		1700	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.13	< 0.13		< 0.50	1	-	-
DOC	6.3	5.9		60	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	0.90						
Dry Matter (%)	97						
Moisture (%)	3.1						
Stage 1							
Volume Eluate L2 (litres)	0.34						
Filtered Eluate VE1 (litres)	0.20						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					*= UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Analytical Report Number : 22-69043
Project / Site name: Ancoats Mobility Hub

* 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 *
2336682	WS102	None Supplied	0.6	Brown loam and sand with gravel and tar.
2336683	WS103	None Supplied	1.3	Brown clay and sand with gravel.
2336684	WS105	None Supplied	0.3	Black tar with gravel.**

**Non MCERTS Matrix

Analytical Report Number : 22-69043
Project / Site name: Ancoats Mobility Hub

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
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
Preparation WAC leachate		In-house method	L043-PL	W	NONE
Speciated WAC-17 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. MCERTS accredited except Coronene.	L064-PL	D	MCERTS
Chloride in WAC leachate (BS EN 12457-3 Prep)	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride in WAC leachate (BS EN 12457-3 Prep)	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L033-PL	W	ISO 17025
Phenol Index in WAC leachate (BS EN 12457-3 Prep)	Determination of monohydric phenols in leachate by continuous flow analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Sulphate in WAC leachate (BS EN 12457-3 Prep)	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025
TDS in WAC leachate (BS EN 12457-3 Prep)	Determination of total dissolved solids in leachate by electrometric measurement.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L031-PL	W	NONE
DOC in WAC leachate (BS EN 12457-3 Prep)	Determination of dissolved organic carbon in leachate by TOC/DOC NDIR analyser.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L037-PL	W	ISO 17025
PCB's by GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
BTEX (Sum of BTEX compounds) in soil	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil in Soil C10 - C40	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method based on USEPA 8270	L076-PL	D	NONE
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS

Analytical Report Number : 22-69043
Project / Site name: Ancoats Mobility Hub

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 WAC leachate (BS EN 12457-3 Prep)	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on Standard Methods for the Examination of Water and Waste Water, 21st Ed.	L039-PL	W	ISO 17025

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

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

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

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



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Environmental Science

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Analytical Report Number : 22-71111

Project / Site name:	Poland St	Samples received on:	13/07/2022
Your job number:	15849	Samples instructed on/ Analysis started on:	13/07/2022
Your order number:		Analysis completed by:	20/07/2022
Report Issue Number:	1	Report issued on:	20/07/2022
Samples Analysed:	2 water samples		

Signed:

Izabela Wójcik

Izabela Wójcik
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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



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Analytical Report Number: 22-71111

Project / Site name: Poland St

Lab Sample Number				2348642	2348643
Sample Reference				WS101	WS105
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				11/07/2022	11/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

General Inorganics

pH	pH Units	N/A	ISO 17025	7.2	7.1
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	53	4.1
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	7.34	8.36

Total Phenols

Total Phenols (monohydric)	µg/l	1	ISO 17025	6.3	2.1
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Heavy Metals / Metalloids

Calcium (dissolved)	mg/l	0.012	ISO 17025	200	170
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0

Arsenic (dissolved)	µg/l	0.15	ISO 17025	8.32	2.08
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	1.5	6.1
Lead (dissolved)	µg/l	0.2	ISO 17025	0.3	0.6
Manganese (dissolved)	µg/l	0.05	ISO 17025	1800	990
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	9.7	4.1
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.2	3.1
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.1	14



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Environmental Science

Analytical Report Number: 22-71111

Project / Site name: Poland St

Lab Sample Number				2348642	2348643
Sample Reference				WS101	WS105
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				11/07/2022	11/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH1 (C10 - C40) EH_2D_TOTAL_#1_#2	µg/l	10	ISO 17025	350	< 10
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TPH-CWG - Aliphatic >C5 - C6 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10 HS_1D_AL	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35 EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35) HS+EH_1D_AL_#1_#2_MS	µg/l	10	NONE	< 10	< 10

TPH-CWG - Aromatic >C5 - C7 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10 HS_1D_AR	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	20	< 10
TPH-CWG - Aromatic >C12 - C16 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	98	< 10
TPH-CWG - Aromatic >C16 - C21 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	120	< 10
TPH-CWG - Aromatic >C21 - C35 EH_1D_AR_#1_#2_MS	µg/l	10	NONE	120	< 10
TPH-CWG - Aromatic (C5 - C35) HS+EH_1D_AR_#1_#2_MS	µg/l	10	NONE	350	< 10

VOCs

Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0



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Analytical Report Number: 22-71111

Project / Site name: Poland St

Lab Sample Number				2348642	2348643
Sample Reference				WS101	WS105
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				11/07/2022	11/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	0.92	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	1.3	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05

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

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Environmental Science

Analytical Report Number: 22-71111

Project / Site name: Poland St

Lab Sample Number				2348642	2348643
Sample Reference				WS101	WS105
Sample Number				None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied
Date Sampled				11/07/2022	11/07/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status		
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	0.48	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	0.4	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	1.1	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	0.55	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	4	< 0.01
Anthracene	µg/l	0.01	ISO 17025	1.2	< 0.01
Carbazole	µg/l	0.05	NONE	0.6	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	0.91	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	9.2	< 0.01
Pyrene	µg/l	0.01	ISO 17025	11	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	7	< 0.01
Chrysene	µg/l	0.01	ISO 17025	7.3	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	9.5	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	3.1	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	9	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	4.6	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	1.7	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	6.2	< 0.01
3&4-Methylphenol	µg/l	0.1	NONE	< 0.10	< 0.10

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



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Environmental Science

Analytical Report Number : 22-71111

Project / Site name: Poland St

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 water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW, GW, Hg=SW, PW, Al=SW, PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu, Fe, Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	ISO 17025
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	ISO 17025

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

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector



4041



Analytical Report Number : 22-71111

Project / Site name: Poland St

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
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				

APPENDIX VII

ORIGIN OF TIER I 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	PROVISIONAL C4SL
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene ⁽ⁱⁱⁱ⁾	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C ₅ -C ₆ (aliphatic)	
TPH C ₆ -C ₈ (aliphatic)	
TPH C ₈ -C ₁₀ (aliphatic)	
TPH C ₁₀ -C ₁₂ (aliphatic)	
TPH C ₁₂ -C ₁₆ (aromatic)	
TPH C ₁₆ -C ₂₁ (aromatic)	
TPH C ₂₁ -C ₃₅ (aromatic)	



APPENDIX VIII

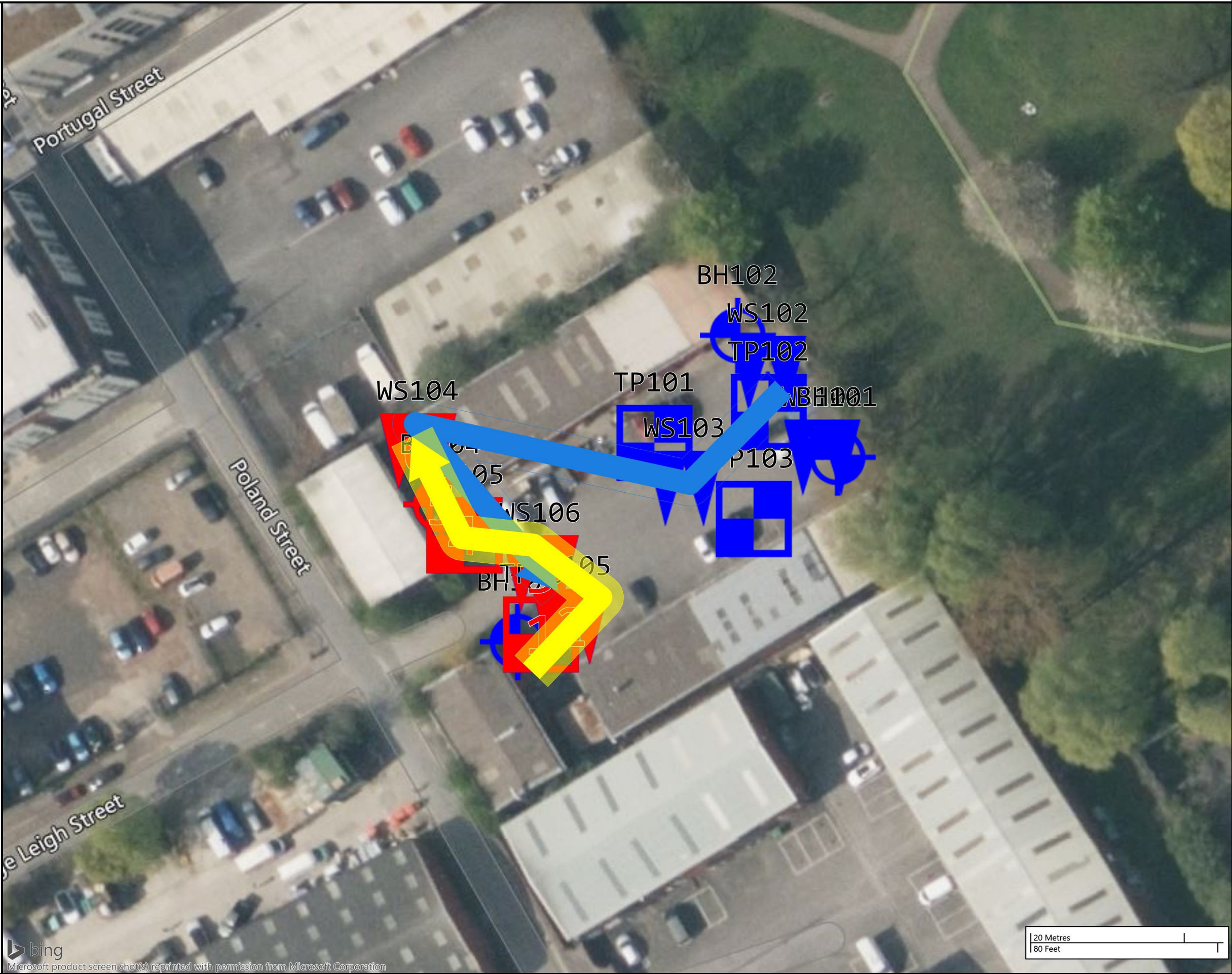
CROSS SECTIONS

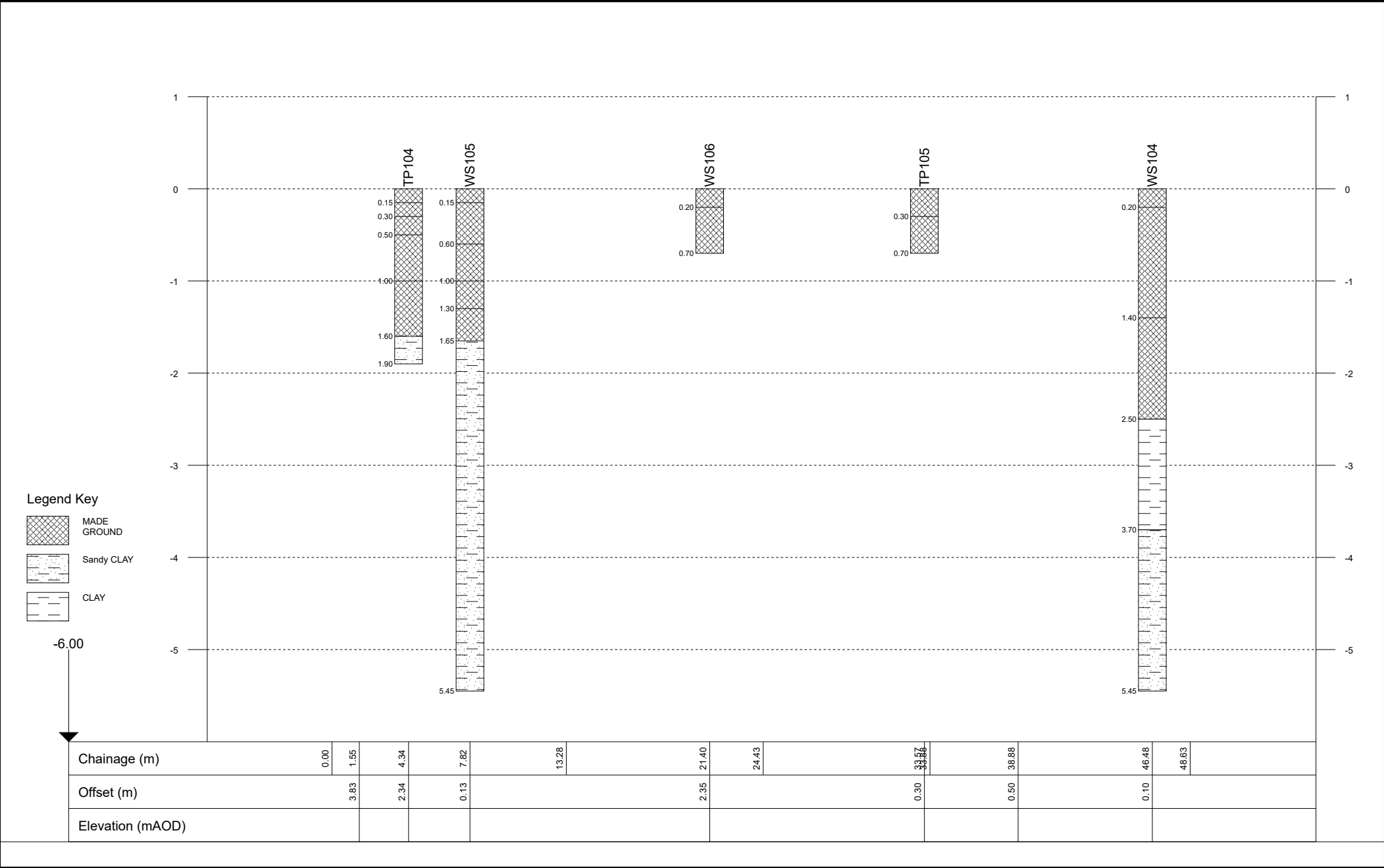
Project Id: 15849
Project Title: Ancoats Mobility Hub
Location: Manchester
Client: Bowmer & Kirkland

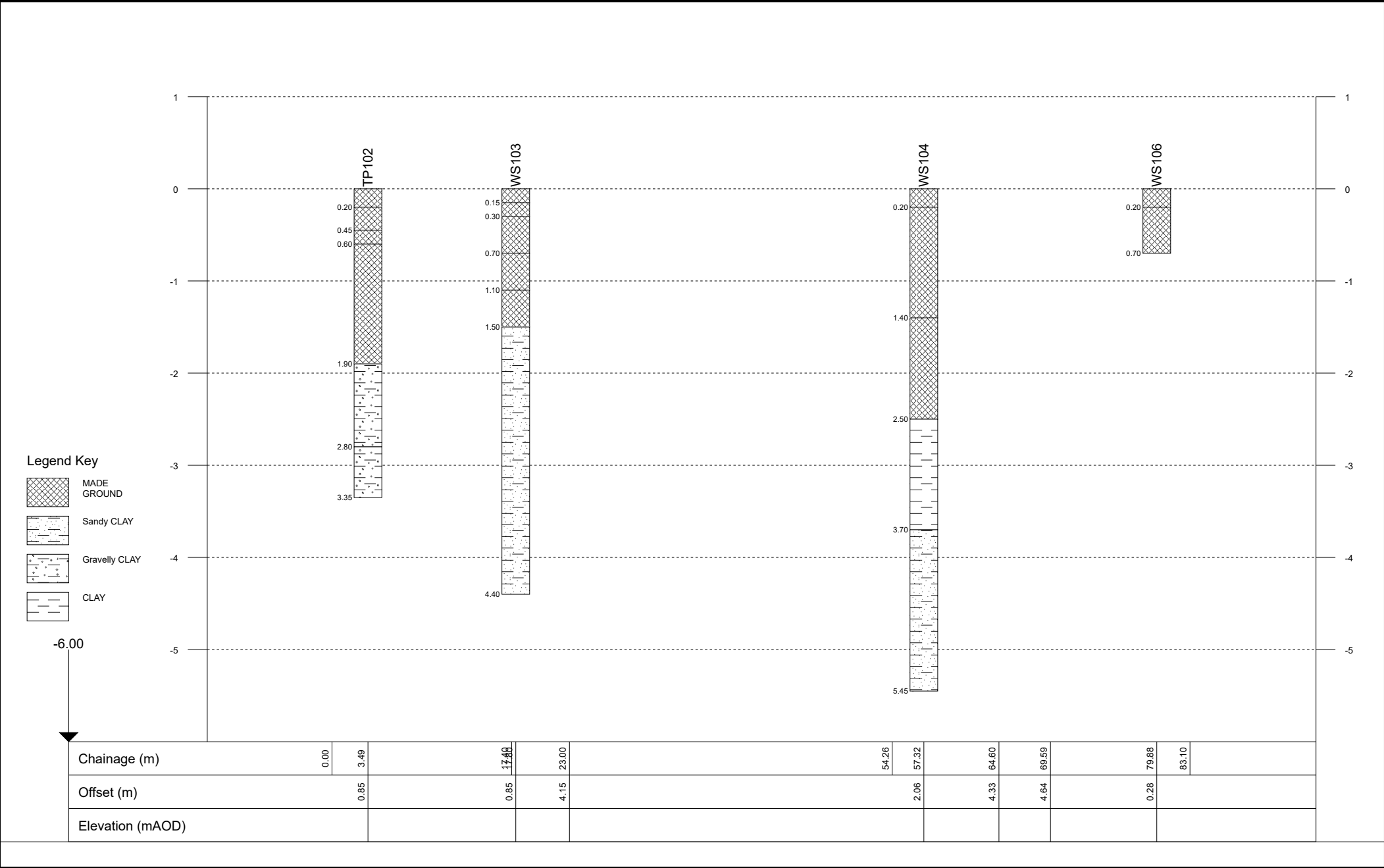
Title: Site Plan
Scale: 1:500
Engineer:
Contractor:



- Legend Key
- Sections - Section line 1
 - Sections - Section line 2
 - Locations By Type - Empty
 - Locations By Type - BH
 - Locations By Type - TP
 - Locations By Type - WS







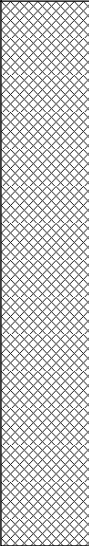


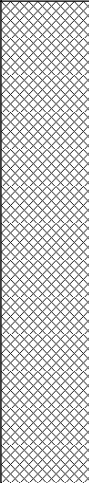
- APPENDIX 3** ▪ Post-demolition trial pits and chemical analysis results (February 2023)

Key

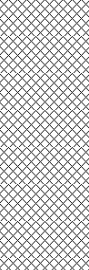
-  Trial Pit location
-  Stockpile location
-  Site Boundary



IDOM						TRIAL PIT LOG		TrialPit No MTP202 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385135.00 - 398899.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00 0.60		Scale 1:25	
Equipment: 13T Excavator						Depth 1.80		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V		1.80 1.80			MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including whole bricks.		
	1.50 - 1.60	D,J,V					MADE GROUND: Concrete floor (refusal) End of Pit at 1.800m		
							1		
							2		
							3		
							4		
							5		
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.			

IDOM					TRIAL PIT LOG		TrialPit No MTP203 Sheet 1 of 1	
Project Name: Poland Street			Project No. 20376e		Co-ords: 385139.00 - 398907.00		Date 21/02/2023	
Location: Ancoats, Manchester					Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator					Depth 2.50		Logged JT Checked	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50 - 0.60	D,J,V		1.60			MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including whole bricks.	
	1.50 - 1.60	D,J,V					Soft to firm greyish brown slightly sandy CLAY with occasional wood, peat and rare coal. Sand is fine to medium.	
	2.00 - 2.10	D,J,V					End of Pit at 2.500m	
				2.50				
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM						TRIAL PIT LOG		TrialPit No MTP204 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385172.00 - 398925.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.40		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results				MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including whole bricks.		
							Dark black ashy layer within MADE GROUND		
							MADE GROUND: Dark grey slightly silty gravelly SAND with interbedded reworked clay. Gravel is medium to coarse and subangular to subrounded of various lithologies including brick and coal fragments.		
							Firm dark grey mottled CLAY.		
End of Pit at 2.400m									
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.			

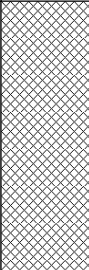
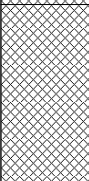
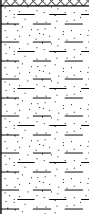
IDOM						TRIAL PIT LOG		TrialPit No MTP205 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385185.00 - 398923.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.20		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V		0.90			MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including whole bricks.		1
	1.50 - 1.60	D,J,V					Firm mottled greyish brown slightly sandy CLAY with organic odour.		
	2.00 - 2.10	D,J,V				1.90		Firm mottled greyish brown slightly sandy CLAY with slight organic odour.	
				2.20			End of Pit at 2.200m		3
									5
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides unstable			Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM						TRIAL PIT LOG		TrialPit No MTP206 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385190.00 - 398919.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.10		Logged JT	Checked
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V					MADE GROUND: Dark grey gravelly slightly silty SAND with ash, clinker and various anthropogenic waste. Gravel is fine to coarse and sub rounded to sub angular comprising various lithologies including whole bricks. Dark black ashy layer within MADE GROUND		
							Firm greyish brown slightly sandy wet CLAY with grey mottling and a slight organic odour.		
							Firm dark grey wet mottled CLAY with slight organic odour.		
1.50 - 1.60	D,J,V								
2.00 - 2.10	D,J,V		End of Pit at 2.100m						
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)						Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.	

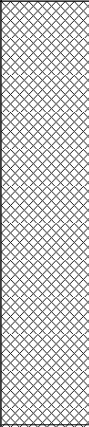
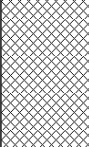
IDOM						TRIAL PIT LOG		TrialPit No MTP207 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385196.00 - 398913.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.60		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V		0.60			MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular of various lithologies including brick fragments.		
							Soft dark brown gravelly CLAY with strong hydrocarbon odour. Gravel is fine to medium subrounded of various lithologies.		
	1.50 - 1.60	D,J,V					Visible hydrocarbon sheen on CLAY		
	2.00 - 2.10	D,J,V		2.10			Firm dark grey silty CLAY with slight hydrocarbon odour.		
				2.60			End of Pit at 2.600m		
							End of Pit at 2.600m		
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable			Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM						TRIAL PIT LOG		TrialPit No MTP208 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385196.00 - 398893.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.30		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V		0.60			MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including rare brick fragments.		
	1.50 - 1.60	D,J,V					Soft dark brown gravelly CLAY with strong hydro carbon odour. Gravel is fine to medium of various lithologies.		
						Visible hydrocarbon sheen on CLAY			
						CLAY becoming firmer and gravel content decreasing			
	2.00 - 2.10	D,J,V		2.10			Soft dark brown gravelly CLAY with strong hydro carbon odour. Gravel is fine to medium of various lithologies.		
2.30			2.30			End of Pit at 2.300m			
							5		
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides unstable			Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM						TRIAL PIT LOG		TrialPit No MTP211 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385163.00 - 398908.00 Level:		Date 21/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.10		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V		0.90			MADE GROUND: Soft brownish grey sandy reworked CLAY. Gravel is fine to medium subrounded of various lithologies including whole bricks		1
	1.50 - 1.60	D,J,V		1.50			MADE GROUND: Soft brownish grey sandy reworked CLAY. Gravel is fine to medium subrounded of various lithologies including brick fragments.		
	2.00 - 2.10	D,J,V		2.10			Firm dark brown grey mottling slightly sandy CLAY. Sand is fine to medium.		
	End of Pit at 2.100m								
									3
									4
									5
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable			Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM					TRIAL PIT LOG		TrialPit No MTP212 Sheet 1 of 1	
Project Name: Poland Street			Project No. 20376e		Co-ords: 385171.00 - 398915.00 Level:		Date 22/02/2023	
Location: Ancoats, Manchester					Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator					Depth 2.20		Logged JT	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50 - 0.60	D,J,V		0.90			MADE GROUND: Dark grey slightly silty gravelly SAND. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including ash brick fragments.	1
	1.50 - 1.60	D,J,V		1.50			MADE GROUND: Soft dark greyish black gravelly reworked CLAY. Gravel is fine to medium subrounded various lithologies including brick fragments.	
	2.00 - 2.10	D,J,V		2.20			Firm dark brown slightly sandy CLAY with grey mottling and rare coal. Sand is fine to medium.	2
	End of Pit at 2.200m							3
							4	
							5	
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.		

IDOM						TRIAL PIT LOG		TrialPit No MTP213 Sheet 1 of 1	
Project Name: Poland Street				Project No. 20376e		Co-ords: 385179.00 - 398916.00		Date 22/02/2023	
Location: Ancoats, Manchester						Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator						Depth 2.10		Logged JT Checked	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.50 - 0.60	D,J,V					MADE GROUND: Dark grey slightly silty gravelly SAND with ash, clinker and various anthropogenic fragments. Gravel is fine to coarse and subrounded to subangular comprising various lithologies including brick fragments. Dark black ashy layer within MADE GROUND		
1.50 - 1.60	D,J,V		Firm dark brown grey mottling slightly sandy CLAY. Sand is fine to medium.						
2.00 - 2.10	D,J,V		Firm dark brown grey mottled CLAY with slight organic odour.						
						End of Pit at 2.100m			
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)						Stability Pit sides stable		Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.	

IDOM					TRIAL PIT LOG		TrialPit No MTP216 Sheet 1 of 1	
Project Name: Poland Street			Project No. 20376e		Co-ords: 385169.00 - 398897.00 Level:		Date 22/02/2023	
Location: Ancoats, Manchester					Dimensions (m): 2.00		Scale 1:25	
Equipment: 13T Excavator					Depth 2.30		Logged JT Checked	
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50 - 0.60	D,J,V					MADE GROUND: Dark grey gravelly slightly silty SAND with ash, clinker and various anthropogenic waste. Gravel is fine to coarse and sub rounded to sub angular comprising various lithologies including whole bricks.	
							<i>Interbeded lighter coloured silty sandy material</i>	
	1.50 - 1.60	D,J,V		1.40			MADE GROUND: Soft dark greyish black gravelly reworked CLAY. Gravel is fine to medium comprising various lithologies including brig fragments.	
	2.00 - 2.10	D,J,V		1.90			Firm dark brownish grey slightly sandy CLAY. Sand is fine to medium.	
			2.30			End of Pit at 2.300m		
							3	
							4	
							5	
D = small disturbed sample (tub) J = organic sample (amber glass jar) V = volatile sample (amber glass vial) B = bulk bag sample HSV = hand shear vane (kPa) PP = pocket penetrometer (kg.cm2) PID = photoionisation detector (ppm)				Stability Pit sides stable			Remarks Coordinates and levels, where indicated, must not be used for design purposes. The user is responsible for verifying all site and setting out dimensions.	



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Rose Lane Industrial Estate
Rose Lane
Lenham Heath
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ME17 2JN
t: 01622 850410

DETS Report No: 23-02724

Site Reference: Poland Street

Project / Job Ref: 20376

Order No: 23-1-FDO-LABS

Sample Receipt Date: 24/02/2023

Sample Scheduled Date: 27/02/2023

Report Issue Number: 0

Reporting Date: 07/03/2023

Authorised by:

Interim Report

Dates of laboratory activities for each tested analyte are available upon request.

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

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.



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Soil Analysis Certificate						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP201	MTP203	MTP204	MTP204	MTP204
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637284	637285	637286	637287	637288

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	8.2	7.5	7.7	7.7	7.7
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	1720	721	296	370	133
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	1.72	0.72	0.30	0.37	0.13
Organic Matter (SOM)	%	< 0.1	MCERTS	5.5	9.4	36.4	30.4	7.2
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	3.2	5.5	21.2	17.7	4.2
Arsenic (As)	mg/kg	< 2	MCERTS	17	11	31	29	20
Barium (Ba)	mg/kg	< 2.5	MCERTS	188	128	138	138	126
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (III)	mg/kg	< 2	NONE	20	18	22	24	26
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	51	24	633	327	66
Lead (Pb)	mg/kg	< 3	MCERTS	195	83	272	285	89
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	23	17	31	28	30
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	28	23	41	35	35
Zinc (Zn)	mg/kg	< 3	MCERTS	151	66	96	110	70
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
 Subcontracted analysis (S)

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



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Soil Analysis Certificate						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP205	MTP205	MTP206	MTP207	MTP207
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	1.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637289	637290	637291	637292	637293

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.8	7.6	7.8	7.4	7.7
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	50	25	96	212	92
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	0.03	0.10	0.21	0.09
Organic Matter (SOM)	%	< 0.1	MCERTS	5.5	1.9	6.4	< 0.1	8.2
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	3.2	1.1	3.7	< 0.1	4.8
Arsenic (As)	mg/kg	< 2	MCERTS	17	10	16	24	17
Barium (Ba)	mg/kg	< 2.5	MCERTS	93	139	170	210	155
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (III)	mg/kg	< 2	NONE	14	22	22	19	23
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	58	20	68	192	73
Lead (Pb)	mg/kg	< 3	MCERTS	111	30	84	356	120
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	2.1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	19	22	31	32	32
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	27	33	36	41	35
Zinc (Zn)	mg/kg	< 3	MCERTS	79	49	61	90	75
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP208	MTP208	MTP209	MTP210	MTP211
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637294	637295	637296	637297	637298

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.6	7.7	8.3	7.4	7.5
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	574	269	584	49	14
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.57	0.27	0.58	0.05	0.01
Organic Matter (SOM)	%	< 0.1	MCERTS	17.4	5.1	10	6.3	2.1
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	10.1	3	5.8	3.7	1.2
Arsenic (As)	mg/kg	< 2	MCERTS	28	16	24	14	8
Barium (Ba)	mg/kg	< 2.5	MCERTS	158	150	158	112	155
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	< 0.2	0.4	< 0.2	< 0.2
Chromium (III)	mg/kg	< 2	NONE	19	23	19	18	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	111	64	75	38	22
Lead (Pb)	mg/kg	< 3	MCERTS	453	118	199	117	18
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	29	30	26	18	32
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	38	34	33	31	28
Zinc (Zn)	mg/kg	< 3	MCERTS	215	68	127	51	51
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

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Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-02724	Date Sampled	22/02/23	22/02/23	22/02/23	22/02/23	22/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP214	MTP215	MTP216	MSP01	MSP02
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	2.00	0.50	0.50	None Supplied	None Supplied
Reporting Date: 07/03/2023	DETS Sample No	637299	637300	637301	637302	637303

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.1	7.4	7.4	7.7	7.8
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	36	38	78	1520	609
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.04	0.04	0.08	1.52	0.61
Organic Matter (SOM)	%	< 0.1	MCERTS	14.4	48	17.1	4.3	26
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	8.4	27.9	10	2.5	15.1
Arsenic (As)	mg/kg	< 2	MCERTS	29	30	50	8	38
Barium (Ba)	mg/kg	< 2.5	MCERTS	813	417	233	70	196
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	0.6	< 0.2	2.3	< 0.2
Chromium (III)	mg/kg	< 2	NONE	1890	41	27	12	24
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	113	179	94	20	222
Lead (Pb)	mg/kg	< 3	MCERTS	191	1250	296	51	522
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	3
Nickel (Ni)	mg/kg	< 3	MCERTS	257	42	36	10	37
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Vanadium (V)	mg/kg	< 1	MCERTS	107	47	55	14	41
Zinc (Zn)	mg/kg	< 3	MCERTS	103	360	104	100	147
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate						
DETS Report No: 23-02724	Date Sampled	22/02/23				
Idom	Time Sampled	None Supplied				
Site Reference: Poland Street	TP / BH No	MSP03				
Project / Job Ref: 20376	Additional Refs	None Supplied				
Order No: 23-1-FDO-LABS	Depth (m)	None Supplied				
Reporting Date: 07/03/2023	DETS Sample No	637304				

Determinand	Unit	RL	Accreditation	(n)				
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected				
pH	pH Units	N/a	MCERTS	9.4				
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	94				
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.09				
Organic Matter (SOM)	%	< 0.1	MCERTS	8.1				
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	4.7				
Arsenic (As)	mg/kg	< 2	MCERTS	20				
Barium (Ba)	mg/kg	< 2.5	MCERTS	72				
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2				
Chromium (III)	mg/kg	< 2	NONE	19				
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2				
Copper (Cu)	mg/kg	< 4	MCERTS	23				
Lead (Pb)	mg/kg	< 3	MCERTS	66				
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1				
Nickel (Ni)	mg/kg	< 3	MCERTS	12				
Selenium (Se)	mg/kg	< 2	MCERTS	< 2				
Vanadium (V)	mg/kg	< 1	MCERTS	33				
Zinc (Zn)	mg/kg	< 3	MCERTS	99				
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP201	MTP203	MTP204	MTP204	MTP204
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637284	637285	637286	637287	637288

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)
Naphthalene	mg/kg	< 0.1	MCERTS	0.55	< 0.1	0.62	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	0.55	< 0.1	1.79	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	0.38	< 0.1	1.03	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	3.09	< 0.1	7.73	0.39
Anthracene	mg/kg	< 0.1	MCERTS	0.55	< 0.1	1.70	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	3.02	< 0.1	8.11	0.58
Pyrene	mg/kg	< 0.1	MCERTS	2.91	< 0.1	7.29	0.64
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.13	< 0.1	3.19	0.31
Chrysene	mg/kg	< 0.1	MCERTS	1.24	< 0.1	3.35	0.37
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.11	< 0.1	2.87	0.39
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.33	< 0.1	1.05	0.13
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.90	< 0.1	2.49	0.34
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.41	< 0.1	1.13	0.21
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.31	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.40	< 0.1	1.06	0.22
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	16.6	< 1.6	43.7	3.6

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



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP205	MTP205	MTP206	MTP207	MTP207
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	1.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637289	637290	637291	637292	637293

Determinand	Unit	RL	Accreditation	(n)				
Naphthalene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	< 0.1	1.12	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	0.14	< 0.1	< 0.1	0.29	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	0.25	0.22	< 0.1	8.68	0.25
Fluorene	mg/kg	< 0.1	MCERTS	0.27	0.13	< 0.1	5.45	0.17
Phenanthrene	mg/kg	< 0.1	MCERTS	1.17	1.37	0.73	8.52	0.76
Anthracene	mg/kg	< 0.1	MCERTS	0.47	0.34	0.18	4.67	0.19
Fluoranthene	mg/kg	< 0.1	MCERTS	3.87	2.13	1.04	9.63	0.76
Pyrene	mg/kg	< 0.1	MCERTS	4.17	2.28	1.16	8.42	0.75
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.55	0.99	0.44	3.21	0.30
Chrysene	mg/kg	< 0.1	MCERTS	1.64	1.13	0.48	2.71	0.31
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.98	1.02	0.39	2.17	0.29
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.71	0.36	0.15	0.94	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	2.37	0.90	0.38	2.39	0.26
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	1.09	0.43	0.18	1.02	0.15
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	0.28	0.13	< 0.1	0.30	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	1.02	0.42	0.16	0.90	0.15
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	21.2	11.9	5.3	60.4	4.3



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP208	MTP208	MTP209	MTP210	MTP211
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637294	637295	637296	637297	637298

Determinand	Unit	RL	Accreditation	(n)			
Naphthalene	mg/kg	< 0.1	MCERTS	0.86	< 0.1	1.97	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	0.53	0.13	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	0.74	< 0.1	1.25	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	1.03	0.12	0.76	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	3.85	0.56	5.68	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	1.15	0.13	1.19	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	4.19	0.40	4.87	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	4.32	0.38	4.53	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.36	0.13	1.85	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	1.54	0.13	1.91	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.14	< 0.1	1.71	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.41	< 0.1	0.68	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1.05	< 0.1	1.54	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.50	< 0.1	0.76	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	0.20	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.46	< 0.1	0.68	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	23.1	2	29.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-02724	Date Sampled	22/02/23	22/02/23	22/02/23	22/02/23	22/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP214	MTP215	MTP216	MSP01	MSP02
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	2.00	0.50	0.50	None Supplied	None Supplied
Reporting Date: 07/03/2023	DETS Sample No	637299	637300	637301	637302	637303

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Naphthalene	mg/kg	< 0.1	MCERTS	0.19	0.53	3.47	2.50	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	0.32	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	0.23	1.72	3.39	2.25	0.17
Fluorene	mg/kg	< 0.1	MCERTS	0.20	1.43	2.33	1.73	0.17
Phenanthrene	mg/kg	< 0.1	MCERTS	1.85	16.50	21.80	10.80	2.24
Anthracene	mg/kg	< 0.1	MCERTS	0.46	3.50	5.43	2.53	0.54
Fluoranthene	mg/kg	< 0.1	MCERTS	2.07	26.40	23.40	10.90	3.83
Pyrene	mg/kg	< 0.1	MCERTS	2.09	30.50	22.40	9.38	4.50
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.87	12.70	9.69	5.43	2.91
Chrysene	mg/kg	< 0.1	MCERTS	0.89	14	10.20	3.59	2.17
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.81	11.70	10.20	4.24	3.24
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.30	3.80	3.51	1.61	1.10
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.74	10.80	8.63	3.99	2.89
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.39	4.56	3.88	1.92	1.10
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	1.36	0.65	0.28	0.18
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.38	4.20	2.46	1.23	0.75
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	11.4	144	131	62.4	25.8



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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 23-02724	Date Sampled	22/02/23				
Idom	Time Sampled	None Supplied				
Site Reference: Poland Street	TP / BH No	MSP03				
Project / Job Ref: 20376	Additional Refs	None Supplied				
Order No: 23-1-FDO-LABS	Depth (m)	None Supplied				
Reporting Date: 07/03/2023	DETS Sample No	637304				

Determinand	Unit	RL	Accreditation	(n)				
Naphthalene	mg/kg	< 0.1	MCERTS	0.20				
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1				
Acenaphthene	mg/kg	< 0.1	MCERTS	0.21				
Fluorene	mg/kg	< 0.1	MCERTS	0.15				
Phenanthrene	mg/kg	< 0.1	MCERTS	1.52				
Anthracene	mg/kg	< 0.1	MCERTS	0.32				
Fluoranthene	mg/kg	< 0.1	MCERTS	2.16				
Pyrene	mg/kg	< 0.1	MCERTS	2.03				
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	1.33				
Chrysene	mg/kg	< 0.1	MCERTS	1.10				
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	1.38				
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.48				
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	1.50				
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.65				
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1				
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.44				
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	13.5				



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP201	MTP203	MTP204	MTP204	MTP204
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637284	637285	637286	637287	637288

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10	< 10
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30	< 30
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	4	< 2	11
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	16	< 3	39
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	29	< 10	47
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10	< 10
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	50	< 30	98
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	< 60	< 60	98

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



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP205	MTP205	MTP206	MTP207	MTP207
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	1.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637289	637290	637291	637292	637293

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	40	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	82	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	142	< 3
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	24	< 10
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30	< 30	289	< 30
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	8	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	3	< 2	< 2	8	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	5	< 2	< 2	86	3
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	27	10	< 3	117	7
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	36	32	< 10	78	< 10
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	78	42	< 30	289	< 30
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	78	< 60	< 60	578	< 60



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP208	MTP208	MTP209	MTP210	MTP211
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637294	637295	637296	637297	637298

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C16 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30	< 30	< 30	< 30
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	3	< 2	< 2	< 2	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	16	< 2	10	< 2	< 2
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	42	< 3	34	14	14
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	32	< 10	57	143	103
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	92	< 30	102	156	117
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	92	< 60	102	156	117



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-02724	Date Sampled	22/02/23	22/02/23	22/02/23	22/02/23	22/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP214	MTP215	MTP216	MSP01	MSP02
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	2.00	0.50	0.50	None Supplied	None Supplied
Reporting Date: 07/03/2023	DETS Sample No	637299	637300	637301	637302	637303

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10	< 10	< 10	47	< 10
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30	< 30	< 30	47	< 30
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2	< 2	< 2	4	< 2
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2	23	28	20	3
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	20	208	151	79	33
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	65	310	257	178	87
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	87	541	435	281	123
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	87	541	435	328	123



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Soil Analysis Certificate - TPH LQM Banded

DETS Report No: 23-02724	Date Sampled	22/02/23				
Idom	Time Sampled	None Supplied				
Site Reference: Poland Street	TP / BH No	MSP03				
Project / Job Ref: 20376	Additional Refs	None Supplied				
Order No: 23-1-FDO-LABS	Depth (m)	None Supplied				
Reporting Date: 07/03/2023	DETS Sample No	637304				

Determinand	Unit	RL	Accreditation	(n)				
Aliphatic >C5 - C6 : HS_1D_MS_AL	mg/kg	< 0.01	NONE	< 0.01				
Aliphatic >C6 - C8 : HS_1D_MS_AL	mg/kg	< 0.05	NONE	< 0.05				
Aliphatic >C8 - C10 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C10 - C12 : EH_CU_1D_AL	mg/kg	< 2	MCERTS	< 2				
Aliphatic >C12 - C16 : EH_CU_1D_AL	mg/kg	< 3	MCERTS	< 3				
Aliphatic >C16 - C35 : EH_CU_1D_AL	mg/kg	< 10	MCERTS	< 10				
Aliphatic >C35 - C44 : EH_CU_1D_AL	mg/kg	< 10	NONE	< 10				
Aliphatic (C5 - C44) : HS_1D_MS+EH_CU_1D_AL	mg/kg	< 30	NONE	< 30				
Aromatic >C5 - C7 : HS_1D_MS_AR	mg/kg	< 0.01	NONE	< 0.01				
Aromatic >C7 - C8 : HS_1D_MS_AR	mg/kg	< 0.05	NONE	< 0.05				
Aromatic >C8 - C10 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2				
Aromatic >C10 - C12 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	< 2				
Aromatic >C12 - C16 : EH_CU_1D_AR	mg/kg	< 2	MCERTS	2				
Aromatic >C16 - C21 : EH_CU_1D_AR	mg/kg	< 3	MCERTS	13				
Aromatic >C21 - C35 : EH_CU_1D_AR	mg/kg	< 10	MCERTS	39				
Aromatic >C35 - C44 : EH_CU_1D_AR	mg/kg	< 10	NONE	< 10				
Aromatic (>C5 - C44) : HS_1D_MS+EH_CU_1D_AR	mg/kg	< 30	NONE	55				
Total >C5 - C44 : HS_1D_MS+EH_CU_1D_Tot al	mg/kg	< 60	NONE	< 60				



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP201	MTP203	MTP204	MTP204	MTP204
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637284	637285	637286	637287	637288

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	4	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	3	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5

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



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP205	MTP205	MTP206	MTP207	MTP207
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	1.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637289	637290	637291	637292	637293

Determinand	Unit	RL	Accreditation	(n)				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	9	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	5	< 2	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	8	< 2	< 2	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	4	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-02724	Date Sampled	21/02/23	21/02/23	21/02/23	21/02/23	21/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP208	MTP208	MTP209	MTP210	MTP211
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	1.50	2.00	0.50	1.50	2.00
Reporting Date: 07/03/2023	DETS Sample No	637294	637295	637296	637297	637298

Determinand	Unit	RL	Accreditation	(n)		
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	26	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	31	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	30	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5



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Tel : 01622 850410



Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-02724	Date Sampled	22/02/23	22/02/23	22/02/23	22/02/23	22/02/23
Idom	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Poland Street	TP / BH No	MTP214	MTP215	MTP216	MSP01	MSP02
Project / Job Ref: 20376	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: 23-1-FDO-LABS	Depth (m)	2.00	0.50	0.50	None Supplied	None Supplied
Reporting Date: 07/03/2023	DETS Sample No	637299	637300	637301	637302	637303

Determinand	Unit	RL	Accreditation	(n)	(n)	(n)	(n)	(n)
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5



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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 23-02724	Date Sampled	22/02/23				
Idom	Time Sampled	None Supplied				
Site Reference: Poland Street	TP / BH No	MSP03				
Project / Job Ref: 20376	Additional Refs	None Supplied				
Order No: 23-1-FDO-LABS	Depth (m)	None Supplied				
Reporting Date: 07/03/2023	DETS Sample No	637304				

Determinand	Unit	RL	Accreditation	(n)				
Benzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
Toluene : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
p & m-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
o-xylene : HS_1D_MS	ug/kg	< 2	MCERTS	< 2				
MTBE : HS_1D_MS	ug/kg	< 5	MCERTS	< 5				

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-02724		Date Sampled	21/02/23			Landfill Waste Acceptance Criteria Limits			
Idom		Time Sampled	None Supplied						
Site Reference: Poland Street		TP / BH No	MTP204						
Project / Job Ref: 20376		Additional Refs	None Supplied						
Order No: 23-1-FDO-LABS		Depth (m)	0.50						
Reporting Date: 07/03/2023		DETS Sample No	637286						
Determinand	Unit	MDL							
TOC ^{MU}	%	< 0.1	21.2				3%	5%	6%
Loss on Ignition	%	< 0.01	21.60				--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	< 0.05				6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1				1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	< 10				500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	44				100	--	--
pH ^{MU}	pH Units	N/a	7.7				--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 1				--	To be evaluated	To be evaluated
Eluate Analysis				10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)		
Arsenic ^U		< 0.01			< 0.1	0.5	2	25	
Barium ^U		0.03			0.3	20	100	300	
Cadmium ^U		< 0.0005			< 0.005	0.04	1	5	
Chromium ^U		< 0.005			< 0.05	0.5	10	70	
Copper ^U		< 0.01			< 0.1	2	50	100	
Mercury ^U		< 0.0005			< 0.005	0.01	0.2	2	
Molybdenum ^U		0.004			0.04	0.5	10	30	
Nickel ^U		< 0.007			< 0.07	0.4	10	40	
Lead ^U		< 0.005			< 0.05	0.5	10	50	
Antimony ^U		< 0.005			< 0.05	0.06	0.7	5	
Selenium ^U		< 0.005			< 0.05	0.1	0.5	7	
Zinc ^U		0.014			0.14	4	50	200	
Chloride ^U						800	15000	25000	
Fluoride ^U						10	150	500	
Sulphate ^U						1000	20000	50000	
TDS		119			1190	4000	60000	100000	
Phenol Index						1	-	-	
DOC		7.4			74	500	800	1000	
Leach Test Information									
Sample Mass (kg)				0.11					
Dry Matter (%)				80.4					
Moisture (%)				24.4					
Stage 1									
Volume Eluate L10 (litres)				0.88					

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
 M Denotes MCERTS accredited test
 U Denotes ISO17025 accredited test

Waste Acceptance Criteria Analytical Certificate - BS EN 12457/2

DETS Report No: 23-02724		Date Sampled	21/02/23		Landfill Waste Acceptance Criteria Limits		
Idom		Time Sampled	None Supplied				
Site Reference: Poland Street		TP / BH No	MTP208				
Project / Job Ref: 20376		Additional Refs	None Supplied				
Order No: 23-1-FDO-LABS		Depth (m)	1.50				
Reporting Date: 07/03/2023		DETS Sample No	637294				
Determinand	Unit	MDL			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
TOC ^{MU}	%	< 0.1	10.1		3%	5%	6%
Loss on Ignition	%	< 0.01	12.50		--	--	10%
BTEX ^{MU}	mg/kg	< 0.05	0.09		6	--	--
Sum of PCBs	mg/kg	< 0.1	< 0.1		1	--	--
Mineral Oil ^{MU}	mg/kg	< 10	< 10		500	--	--
Total PAH ^{MU}	mg/kg	< 1.7	23.1		100	--	--
pH ^{MU}	pH Units	N/a	7.6		--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	1.2		--	To be evaluated	To be evaluated
Eluate Analysis			10:1 mg/l		Cumulative 10:1 mg/kg	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)	
Arsenic ^U		< 0.01			< 0.1	0.5	25
Barium ^U		0.04			0.4	20	300
Cadmium ^U		< 0.0005			< 0.005	0.04	5
Chromium ^U		< 0.005			< 0.05	0.5	70
Copper ^U		< 0.01			< 0.1	2	100
Mercury ^U		< 0.0005			< 0.005	0.01	2
Molybdenum ^U		0.016			0.16	0.5	30
Nickel ^U		< 0.007			< 0.07	0.4	40
Lead ^U		< 0.005			< 0.05	0.5	50
Antimony ^U		< 0.005			< 0.05	0.06	5
Selenium ^U		< 0.005			< 0.05	0.1	7
Zinc ^U		0.021			0.21	4	200
Chloride ^U		4.3			43	800	25000
Fluoride ^U		< 0.5			< 5	10	500
Sulphate ^U		91.8			918	1000	50000
TDS		185			1851	4000	100000
Phenol Index						1	-
DOC		8.6			86.1	500	1000
Leach Test Information							
Sample Mass (kg)			0.12				
Dry Matter (%)			78				
Moisture (%)			28.2				
Stage 1							
Volume Eluate L10 (litres)			0.88				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
 Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation
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Soil Analysis Certificate - Sample Descriptions

DETS Report No: 23-02724	
Idom	
Site Reference: Poland Street	
Project / Job Ref: 20376	
Order No: 23-1-FDO-LABS	
Reporting Date: 07/03/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
637284	MTP201	None Supplied	1.50	14.2	Brown sandy clay with brick
637285	MTP203	None Supplied	2.00	33.3	Black clay with brick
637286	MTP204	None Supplied	0.50	19.6	Black sandy gravel with stones and concrete
637287	MTP204	None Supplied	1.50	23.5	Black sandy gravel with stones and concrete
637288	MTP204	None Supplied	2.00	16	Black sandy clay with stones
637289	MTP205	None Supplied	1.50	13.6	Brown sandy clay with stones
637290	MTP205	None Supplied	2.00	14.7	Brown clay with stones
637291	MTP206	None Supplied	1.50	18.1	Grey clay
637292	MTP207	None Supplied	1.50	23.2	Black sandy loam with stones and concrete
637293	MTP207	None Supplied	2.00	19.5	Brown sandy clay with brick
637294	MTP208	None Supplied	1.50	22	Black sandy loam with oil / petroleum and stones
637295	MTP208	None Supplied	2.00	17.4	Brown clay
637296	MTP209	None Supplied	0.50	14.1	Brown sandy clay with stones and concrete
637297	MTP210	None Supplied	1.50	19.8	Black sandy clay with stones
637298	MTP211	None Supplied	2.00	15.9	Brown clay
637299	MTP214	None Supplied	2.00	25.5	Grey clay with stones
637300	MTP215	None Supplied	0.50	17.5	Black sandy gravel with stones and concrete
637301	MTP216	None Supplied	0.50	22.7	Black sandy gravel with stones and concrete
637302	MSP01	None Supplied	None Supplied	10.3	Brown sandy gravel with stones and concrete
637303	MSP02	None Supplied	None Supplied	13.4	Black sandy gravel with stones and concrete
637304	MSP03	None Supplied	None Supplied	6	Brown sandy gravel with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/S}

Unsuitable Sample ^{U/S}



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-02724

Idom

Site Reference: Poland Street

Project / Job Ref: 20376

Order No: 23-1-FDO-LABS

Reporting Date: 07/03/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



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4480

Water Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-02724

Idom

Site Reference: Poland Street

Project / Job Ref: 20376

Order No: 23-1-FDO-LABS

Reporting Date: 07/03/2023

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered



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List of HWOL Acronyms and Operators	
DETS Report No: 23-02724	
Idom	
Site Reference: Poland Street	
Project / Job Ref: 20376	
Order No: 23-1-FDO-LABS	
Reporting Date: 07/03/2023	

Acronym	Description
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
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym
Benzene - HS_1D_MS
Ethylbenzene - HS_1D_MS
MTBE - HS_1D_MS
Mineral Oil (C10 - C40) (BS EN 12457-2) - EH_CU_1D_AL
TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR
TPH LQM - Aliphatic >C10 - C12 - EH_CU_1D_AL
TPH LQM - Aliphatic >C12 - C16 - EH_CU_1D_AL
TPH LQM - Aliphatic >C16 - C35 - EH_CU_1D_AL
TPH LQM - Aliphatic >C35 - C44 - EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AL
TPH LQM - Aliphatic >C5 - C6 - HS_1D_MS_AL
TPH LQM - Aliphatic >C6 - C8 - HS_1D_MS_AL
TPH LQM - Aliphatic >C8 - C10 - EH_CU_1D_AL
TPH LQM - Aromatic >C10 - C12 - EH_CU_1D_AR
TPH LQM - Aromatic >C12 - C16 - EH_CU_1D_AR
TPH LQM - Aromatic >C21 - C35 - EH_CU_1D_AR
TPH LQM - Aromatic >C35 - C44 - EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C44 - HS_1D_MS+EH_CU_1D_AR
TPH LQM - Aromatic >C5 - C7 - HS_1D_MS_AR
TPH LQM - Aromatic >C7 - C8 - HS_1D_MS_AR
TPH LQM - Aromatic >C8 - C10 - EH_CU_1D_AR
TPH LQM - Total >C5 - C44 - HS_1D_MS+EH_CU_1D_Total
Toluene - HS_1D_MS
Total BTEX (BS EN 12457-2) - HS_1D_MS_Total
m & p-xylene - HS_1D_MS
o-Xylene - HS_1D_MS

Parameter	Matrix Type	Suite Reference	Expanded Uncertainty Measurement	Unit
TOC	Soil	BS EN 12457	10.4	%
Loss on Ignition	Soil	BS EN 12457	16.9	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	21.1	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	17.9	%
pH	Soil	BS EN 12457	0.282	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	19.5	%
Barium	Leachate	BS EN 12457	12.2	%
Cadmium	Leachate	BS EN 12457	17.2	%
Chromium	Leachate	BS EN 12457	20.7	%
Copper	Leachate	BS EN 12457	14.1	%
Mercury	Leachate	BS EN 12457	16.7	%
Molybdenum	Leachate	BS EN 12457	13.3	%
Nickel	Leachate	BS EN 12457	14.0	%
Lead	Leachate	BS EN 12457	12.1	%
Antimony	Leachate	BS EN 12457	16.1	%
Selenium	Leachate	BS EN 12457	15.5	%
Zinc	Leachate	BS EN 12457	14.0	%
Chloride	Leachate	BS EN 12457	15.7	%
Fluoride	Leachate	BS EN 12457	19.1	%
Sulphate	Leachate	BS EN 12457	27.6	%
TDS	Leachate	BS EN 12457	10.0	%
Phenol Index	Leachate	BS EN 12457	12.9	%
DOC	Leachate	BS EN 12457	20.4	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	16.9	%
pH	Soil	BS 3882: 2015	0.282	Units
Carbonate	Soil	BS 3882: 2015	12.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	19.8	%
Copper	Soil	BS 3882: 2015	23.2	%
Nickel	Soil	BS 3882: 2015	32.6	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

Table 1: Summary of Soils Chemical Analysis Results - Post-demolition Trial pit investigation
February 2-23

CONTAMINANT	No of Tests	MAX (mg.kg ⁻¹)	MEAN (mg.kg ⁻¹)	SCREENING LEVEL (SL) (mg.kg ⁻¹)	No > SL *
HUMAN HEALTH RISK ASSESSMENT					
Asbestos in soil				Not Detected	
pH	21	9.4	7.7	5 – 9	1
Arsenic	21	50.0	21.8	640	0
Barium	21	813.0	191.4	22000	0
Cadmium	21	2.3	0.4	190	0
Chromium (III)	21	1890.0	110.8	8600	0
Hexavalent Chromium	21	2.0	2.0	33	0
Lead	21	1250.0	233.6	2300	0
Mercury	21	3.0	1.1	1100	0
Nickel	21	257.0	37.8	980	0
Selenium	21	2.0	2.0	12000	0
Vanadium	21	107.0	37.9	9000	0
TPH Aliphatic >EC ₅ - EC ₆	21	0.010	0.010	12000	0
TPH Aliphatic >EC ₆ - EC ₈	21	0.050	0.050	40000	0
TPH Aliphatic >EC ₈ - EC ₁₀	21	40.000	3.810	11000	0
TPH Aliphatic >EC ₁₀ - EC ₁₂	21	82.00	5.81	47000	0
TPH Aliphatic >EC ₁₂ - EC ₁₆	21	142.00	9.62	90000	0
TPH Aliphatic >EC ₁₆ - EC ₂₁	21	47.00	12.43	1800000	0
TPH Aliphatic >EC ₂₁ - EC ₃₅	21	10.00	10.00	1800000	0
TPH Aromatic >EC ₅ - EC ₇	21	0.010	0.010	86000	0
TPH Aromatic >EC ₇ - EC ₈	21	0.050	0.050	180000	0
TPH Aromatic >EC ₈ - EC ₁₀	21	8.000	2.286	17000	0
TPH Aromatic >EC ₁₀ - EC ₁₂	21	8.00	2.48	34000	0
TPH Aromatic >EC ₁₂ - EC ₁₆	21	86.00	10.90	38000	0
TPH Aromatic >EC ₁₆ - EC ₂₁	21	208.00	39.95	28000	0
TPH Aromatic >EC ₂₁ - EC ₃₅	21	310.00	73.95	28000	0
Benzene	21	0.009	0.002	90	0
Toluene	21	0.005	0.005	180000	0
Ethylbenzene	21	0.026	0.003	27000	0
Xylene	21	0.061	0.007	30000	0
Naphthalene	21	3.47	0.63	1100	0
Acenaphthylene	21	0.53	0.14	100000	0
Acenaphthene	21	8.68	1.07	100000	0
Fluorene	21	5.45	0.76	71000	0
Phenanthrene	21	21.80	4.24	23000	0
Anthracene	21	5.43	1.14	540000	0
Fluoranthene	21	26.40	5.14	23000	0
Pyrene	21	30.50	5.15	54000	0
Benzo(a)anthracene	21	12.70	2.28	180	0

Chrysene	21	14.00	2.25	350	0
Benzo(b)fluoranthene	21	11.70	2.15	45	0
Benzo(k)fluoranthene	21	3.80	0.77	1200	0
Benzo(a)pyrene	21	10.80	1.98	36	0
Indeno(1,2,3-c,d)pyrene	21	4.56	0.90	510	0
Dibenzo(a,h)anthracene	21	1.36	0.23	3.6	0
Benzo(g,h,i)perylene	21	4.20	0.73	4000	0
Phenol	21	2.0	2.0	1300	0
PHYTOTOXICITY RISK ASSESSMENT					
Copper	21	633.0	117.8	200	3
Nickel	21	257.0	37.8	110	1
Zinc	21	360.0	108.2	300	1

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