



e3p

Phase II Geoenvironmental Site Assessment
Ancoats Mobility Hub

Reference: 15-849-R1-2
Date: September 2022



PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Ancoats Mobility Hub
Poland Street
Manchester
M4 6AZ

Prepared for:



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Ancoats Mobility Hub

Phase II Geoenvironmental Site Assessment

September 2022

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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.
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Human Health – continued	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 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.



Building Floor Slabs	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



1.3. 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 and 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 VI 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



HOLE	DEPTH TO STRATUM (m bgl)						
	MADE GROUND HARDSTANDING	MADE GROUND	VERY SOFT TO SOFT CLAY	STIFF CLAY	VERY STIFF CLAY	DENSE SAND	BEDROCK
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 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	–	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



LOCATION	DEPTH TO STRIKE (m)	NOTES
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



LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m ²)	CONSISTENCY
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



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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)*
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



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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)*
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



LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	M _v (m ² /MN)	C _v (m ² /year)
				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 m²/MN up to 0.414 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 (C_v). As shown in Table 3.7, the coefficient ranges from 0.858 m²/yr to 42.938 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.

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 VI.

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 VI.



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



LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
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
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



LOCATION	DEPTH (m)	SO ₄ IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
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.

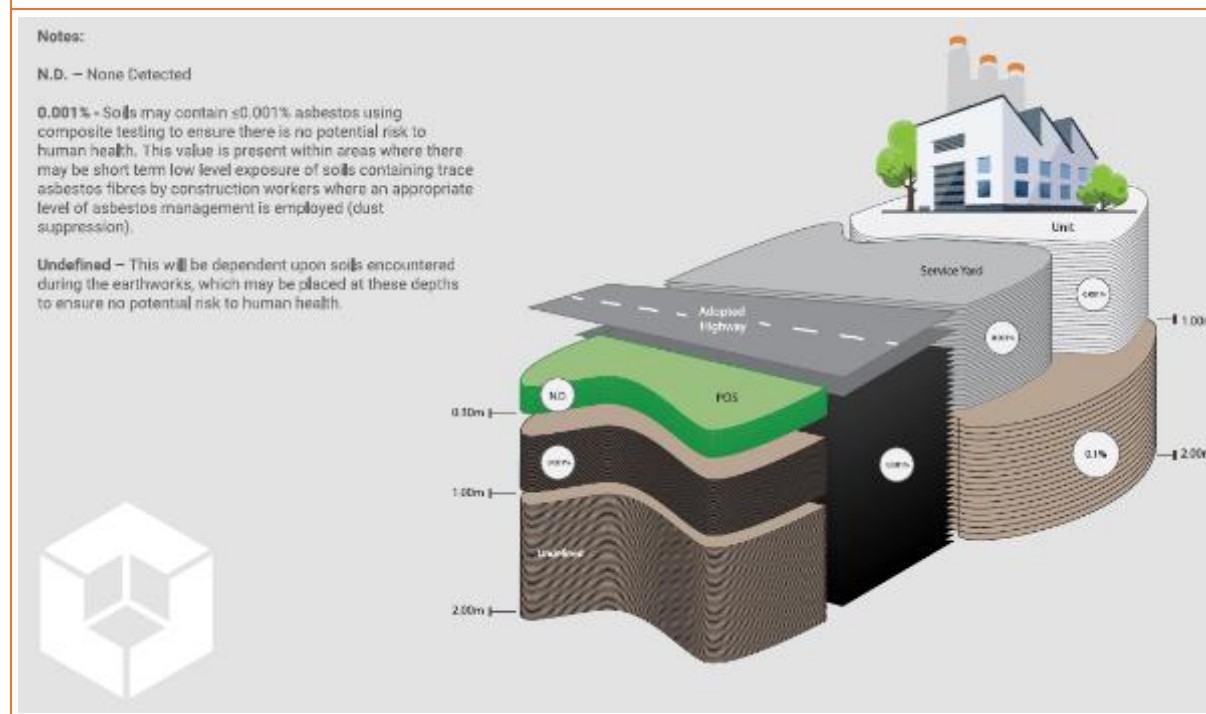
The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.



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.



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 CO ₂ <5 % Typical Max CH ₄ <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 <u>Current</u> 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/m²)	Allowable Bearing Pressure (kN/m²)
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)
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

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.



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



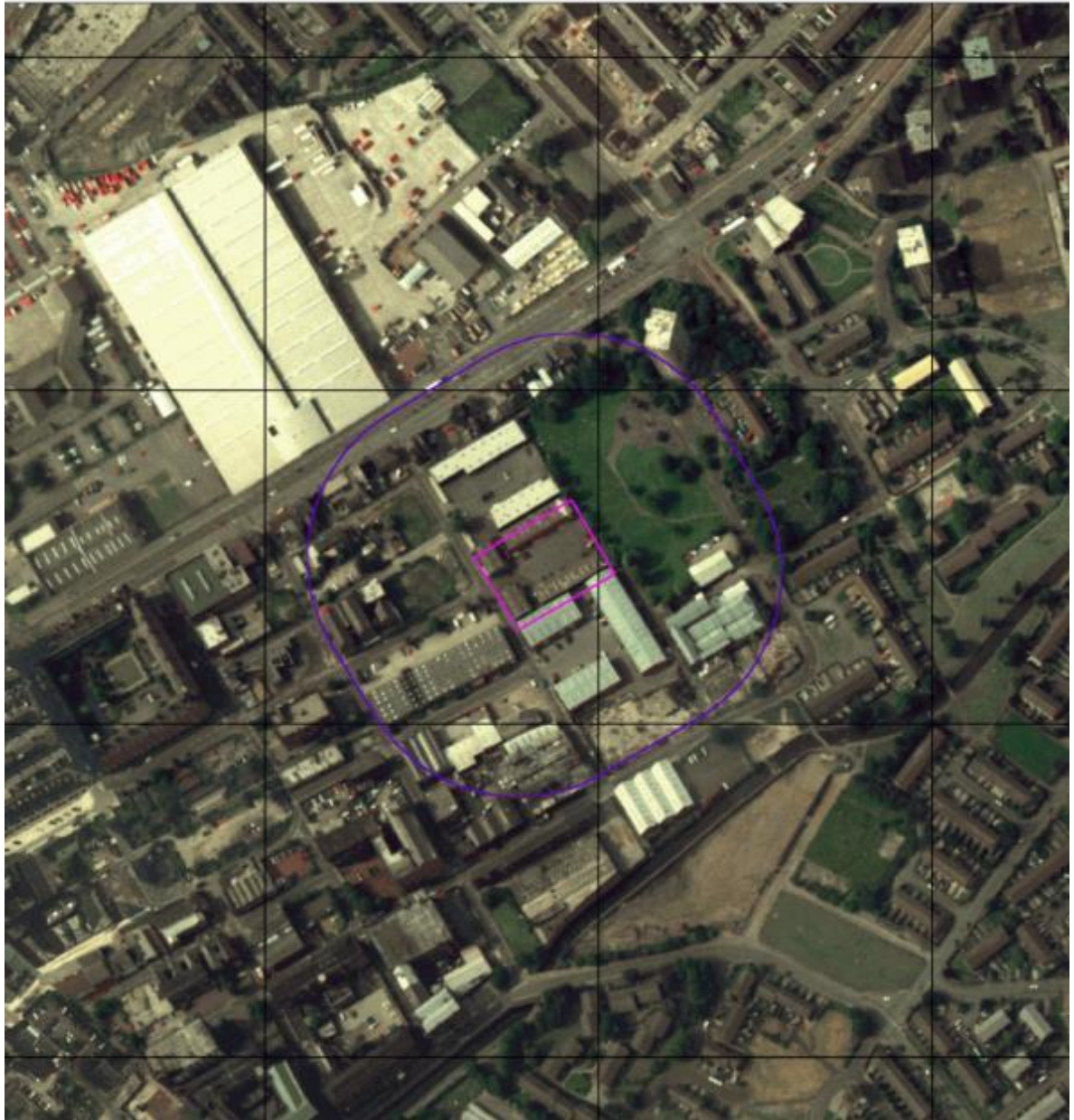
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance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

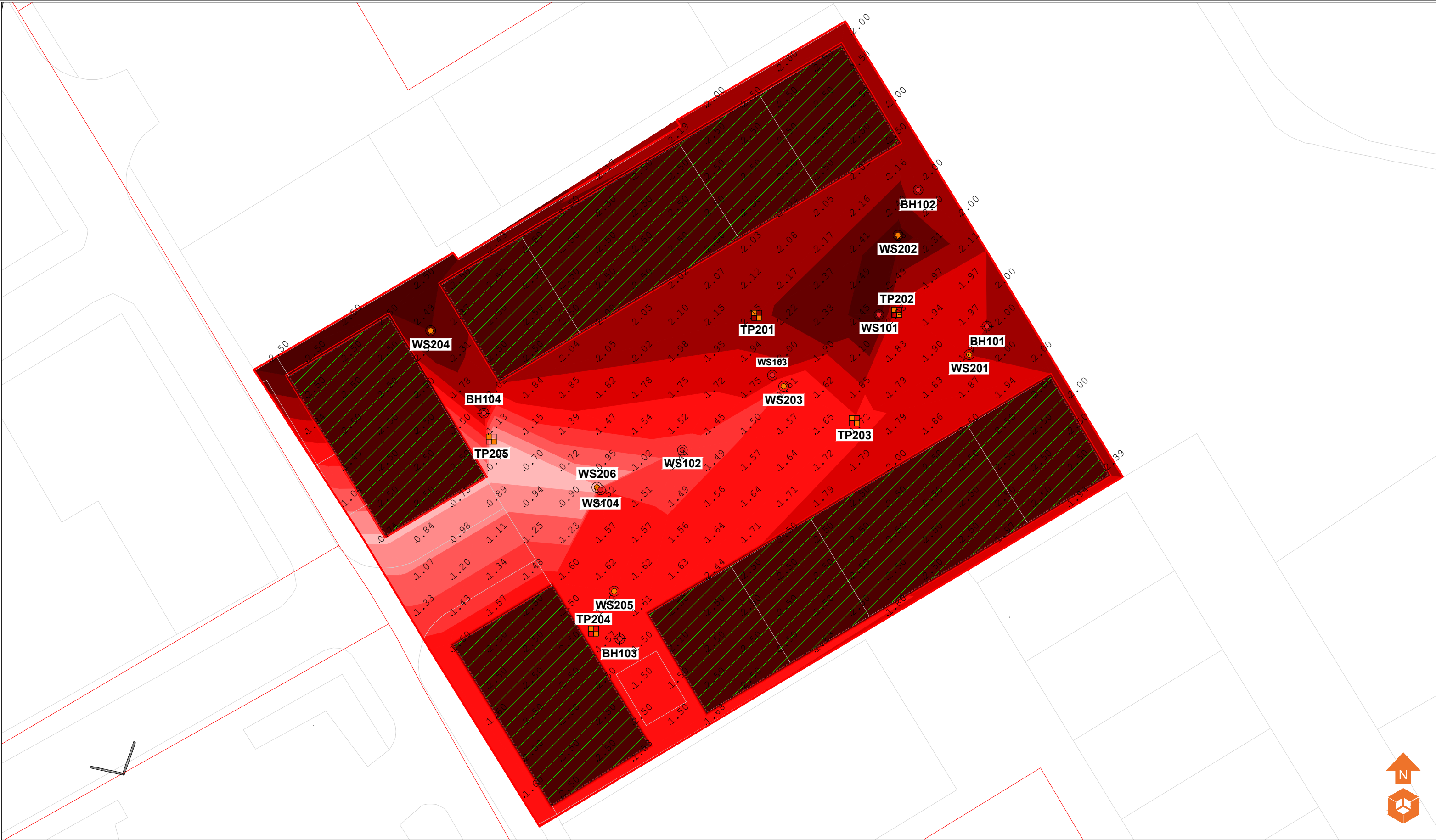




Historical Features Former Buildings Former Buildings Current Buildings Corporation Yard	Notes:	Client: Bowmer and Kirkland	Job No: 15-849	Date: 31.08.2022	e3p Environmental Engineering Partnership Ltd Taylor Road, Trafford Park Urmston, Manchester, M41 7JQ Tel: 0161 707 9612 E-mail: info@e3p.co.uk Website: 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.

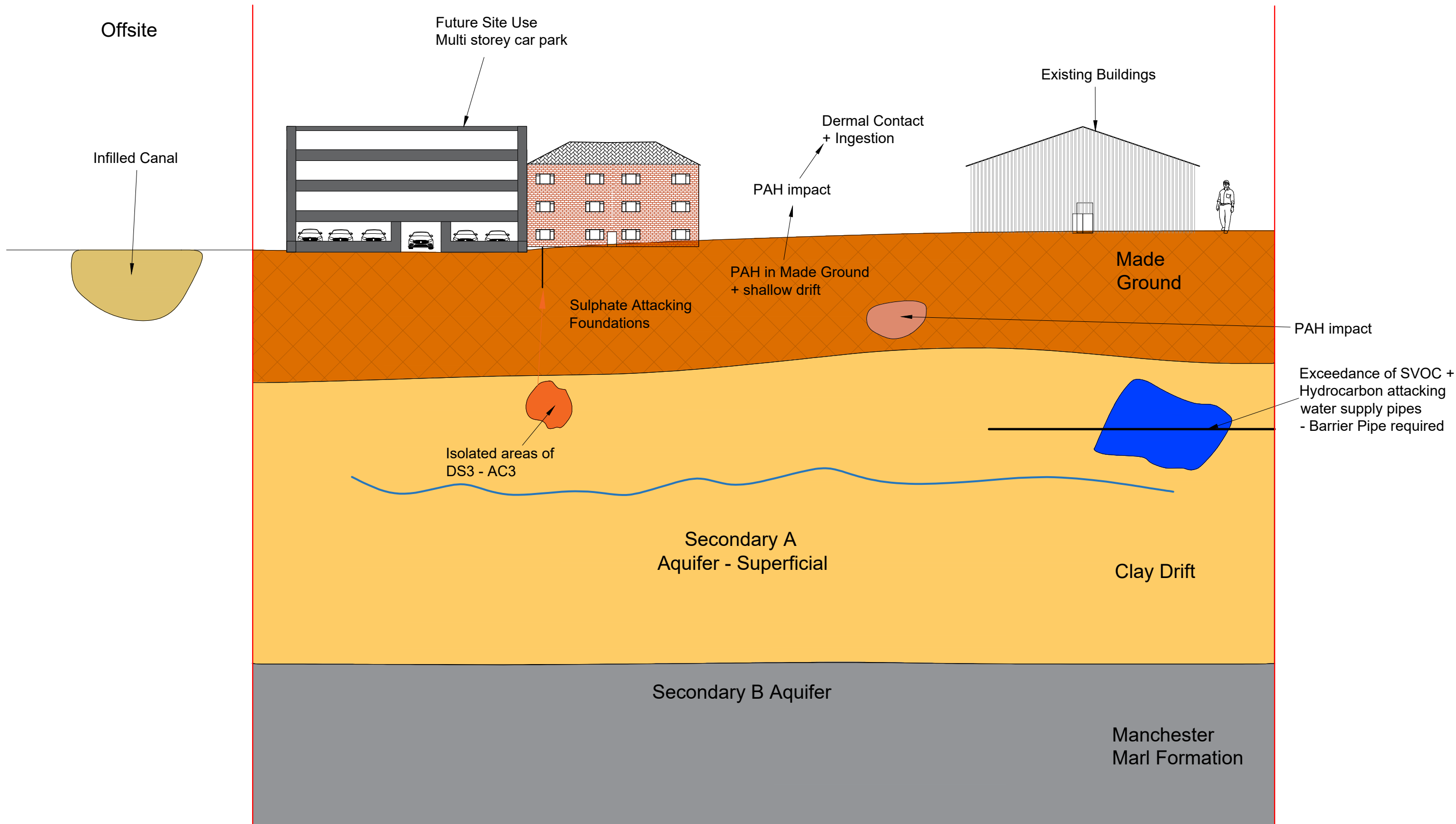


Site Features Buildings Soft Landscaping and trees Storage Containers Skip Hardstanding
--

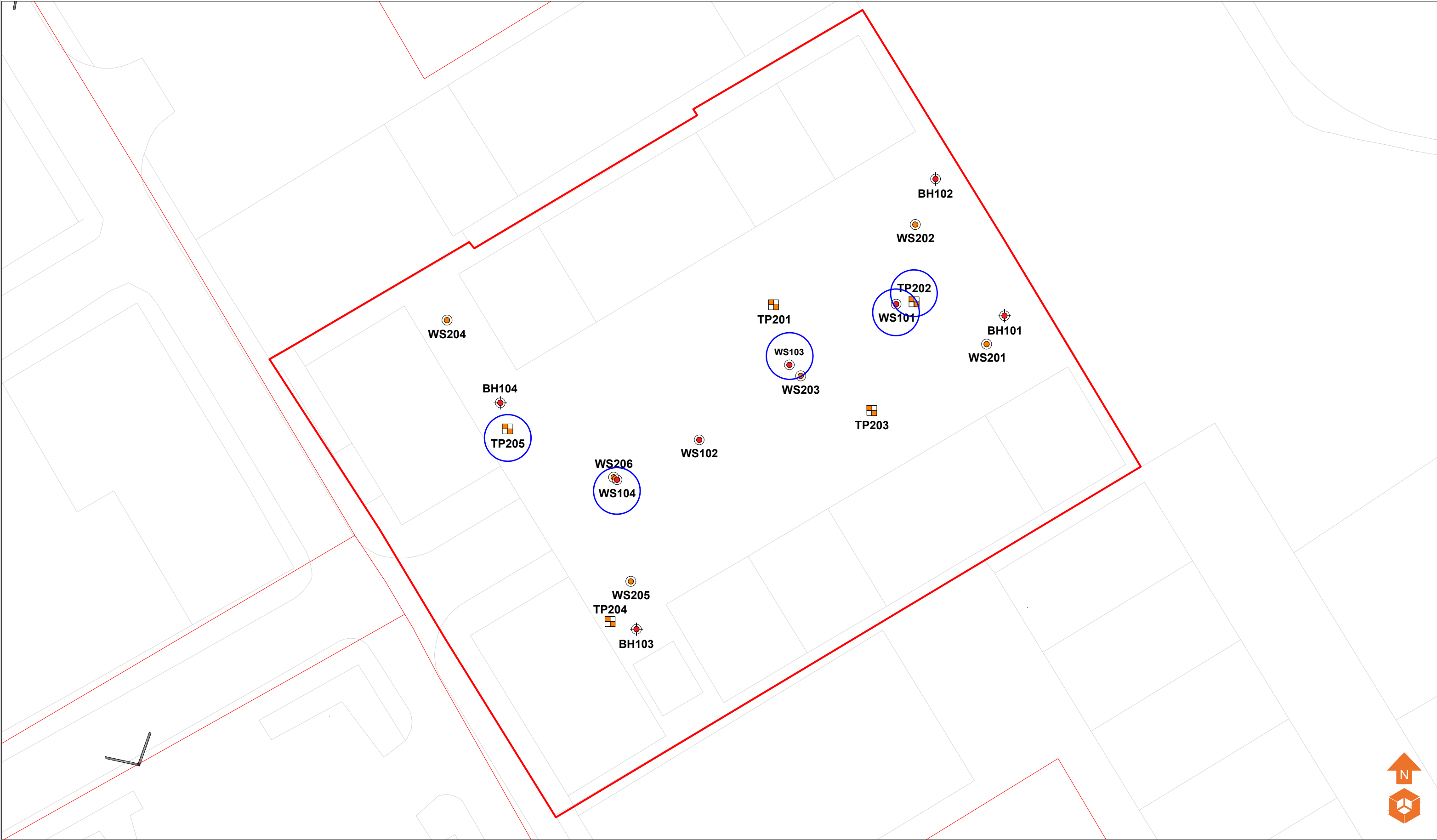


Location Symbols WS101 Approximate Window Sample Probehole Location TP101 Approximate Trial Pit Location WS101 Approximate Window Sample Probehole Location (2021) BSH101 Approximate Cable Percussive Borehole Location (2021)		Made Ground Depth (m) Depth of Made Ground 0.50 - 0.74m Depth of Made Ground 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 2.00 - 2.24m Depth of Made Ground >2.25m Depth inferred to be >2.50									
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: 006		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.	
Depth of Made Ground Plan											

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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 WS101 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

Project Name: Ancoats Mobility Hub

Project No.
15849

Co-ords: 385173.00 - 398908.00
Level:

Date
27/06/2022

Location: Manchester

Dimensions (m): 2.80

Scale
1:30

Client: Bowmer & Kirkland

Depth
2.90

Logged
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

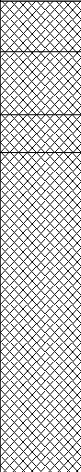
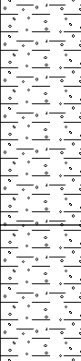
Dimensions (m): 3.20

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.	1
				0.45			MADE GROUND: Concrete.	
				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.	
							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.	
	2.00	HVP	20	1.90			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			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	B						
	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	Client: Bowmer & Kirkland	Dimensions (m): 2.90 Depth 3.50	Scale 1:30 Logged G.Calvert

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	ES		0.45			MADE GROUND: Asphalt.	
	0.80 0.90	B ES					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
	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.

Project Name: Ancoats Mobility Hub	Project No. 15849	Co-ords: 385158.00 - 398883.00 Level:	Date 27/06/2022
Location: Manchester		Dimensions (m): 2.80 Depth 1.90	Scale 1:30 Logged G.Calvert
Client: Bowmer & Kirkland			

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.

Project Name: Ancoats Mobility Hub	Project No. 15849	Co-ords: 385148.00 - 398896.00 Level:	Date 27/06/2022
Location: Manchester	Dimensions (m): 3.00 Depth 0.70		Scale 1:30
Client: Bowmer & Kirkland			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	

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

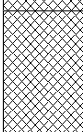
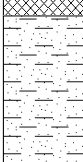
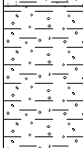
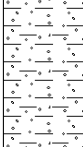
Level:

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)			
		5.00		N=15 (3,4/3,3,4,5)					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

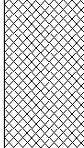
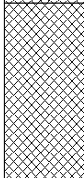
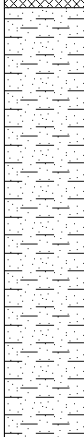
Level:

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	N=6 (1,0/1,1,2,2)	0.15			MADE GROUND: Asphalt.	1
					0.40			MADE GROUND: Concrete with fragments of brick and ash.	
		0.60	ES					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				1.40			
		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				6
								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			MADE GROUND: Asphalt.		
					0.30			MADE GROUND: Concrete.		
					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				4	
End of borehole at 4.40 m									5	
									6	
									7	
									8	
									9	
									10	

Remarks

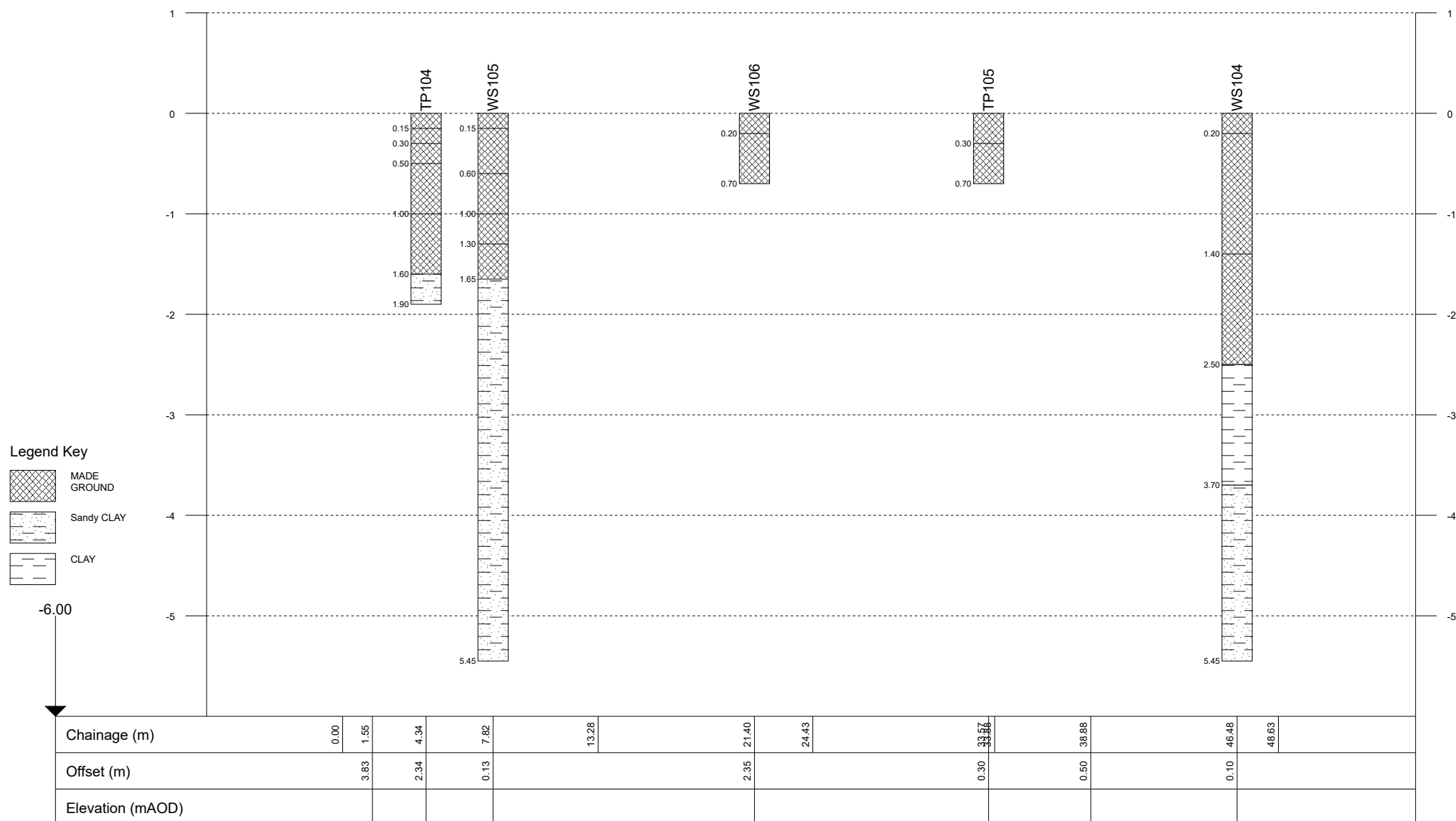
1. Refusal within stiff CLAY.

Title: Section line 2

Vertical Scale: 1:54

Horizontal Scale: 1:282

Engineer:

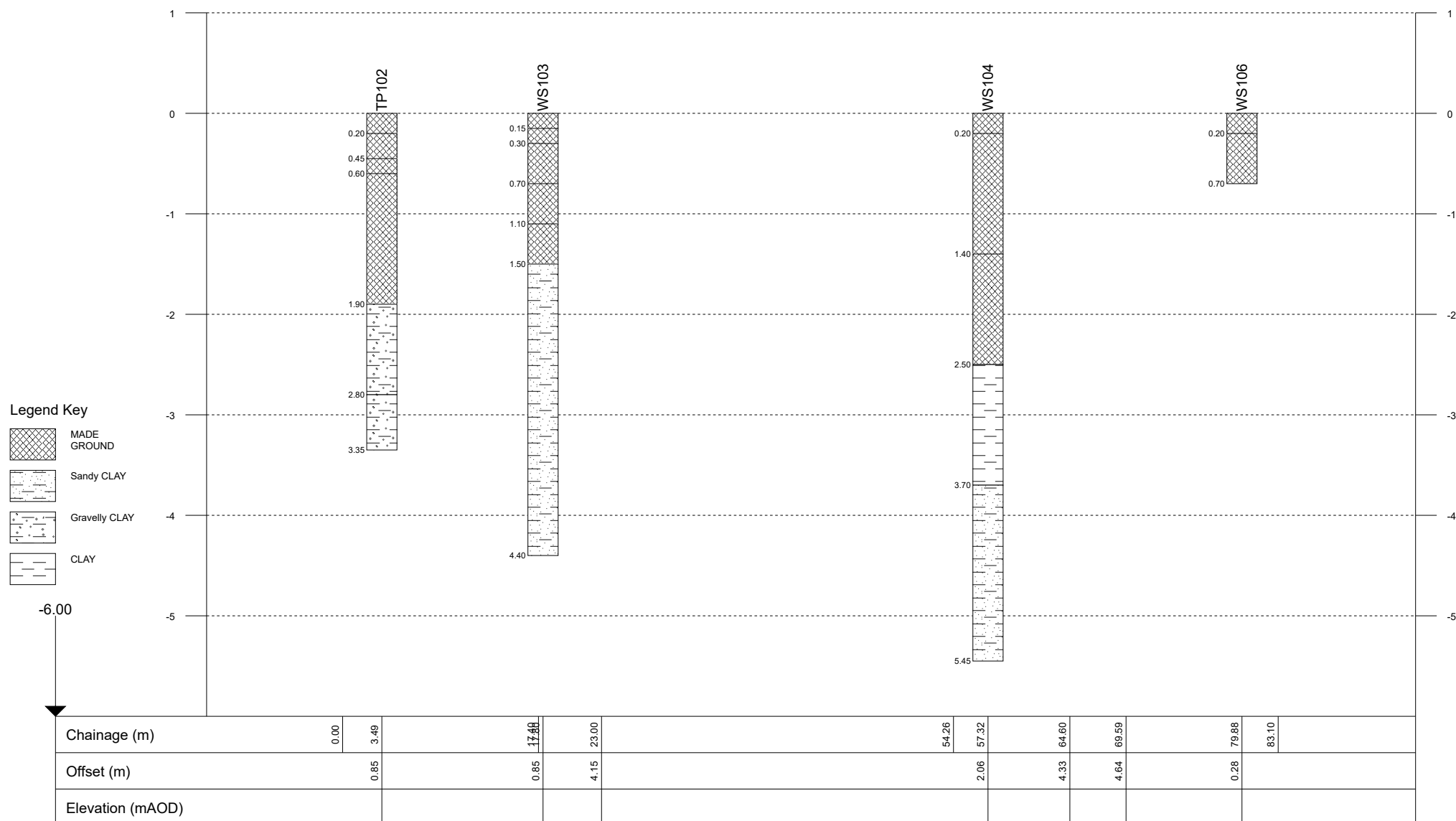


Title: Section line 1

Vertical Scale: 1:54

Horizontal Scale: 1:482

Engineer:



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

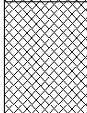
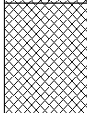
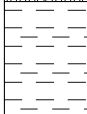
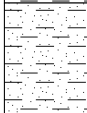
Level:

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

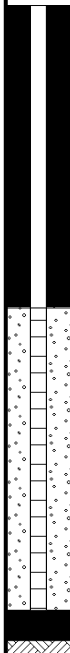
Level:

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		0.30			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

Olivia Jackson

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e: ojackson@e3p.co.uk

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

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 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

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	-
----------------------------	-------	---	--------	-------	---	-------	-------	---

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
-----------------------------	-------	-----	--------	------	--------	---	---	--------

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	-

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					
TPH (C5 - C6) HS_1D_TOTAL	mg/kg	1	NONE	< 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
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	35	-	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	130	-	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	24	< 1.0	520	-	< 1.0
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	1	MCERTS	82	< 1.0	1300	-	< 1.0
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	12	< 10	370	-	< 10
TPH Total C5 - C40 EH_CU+HS_1D_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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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					
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

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					
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

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					
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	-	-	-	-	-



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Environmental Science

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	-

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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	-

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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

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* 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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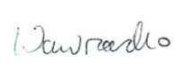
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Analytical Report Number : 22-69043

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_1D_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					** = MCERTS 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.
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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			
Sampling Date	28/06/2022				Limits			
Sample ID	WS105				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
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
(BS EN 12457 - 3 preparation utilising end over end leaching procedure)							Limit values for compliance leaching test	
	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
----------------------------	------	---	-----------	-----	-----

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
------------------------------------	------	----	-----------	-----	------

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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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		
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



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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				



LABORATORY REPORT



4043

Contract Number: PSL22/4488

Report Date: 26 July 2022

Client's Reference:

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Olivia Jackson/Georgia Calvert

Contract Title: Ancoats Mobility Hub

Date Received: 5/7/2022
Date Commenced: 5/7/2022
Date Completed: 18/07/2022

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)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP101		BULK	1.00		Dark brown very sandy very clayey GRAVEL.
TP102		BULK	2.60		Brown slightly gravelly sandy CLAY.
TP102		BULK	3.00		Brown gravelly sandy very silty CLAY with some organic material.
TP103		BULK	0.80		MADE GROUND dark brown clayey sand & gravel.
TP104		BULK	1.70		Grey slightly gravelly sandy CLAY.
WS101		U100	3.50	4.00	Very stiff brown sandy CLAY.
WS102		U100	3.50	4.00	Very stiff brown sandy CLAY.
WS103		U100	1.50	2.00	Firm brown slightly sandy CLAY.
WS104		U100	2.50	3.00	Soft brown slightly sandy CLAY with some organic material.
WS105		U100	2.50	3.00	Very stiff brown sandy CLAY.
WS101		SPT	4.00	4.45	Brown slightly sandy CLAY.
WS102		SPT	3.00	3.45	Brown slightly gravelly sandy CLAY.
WS103		SPT	3.00	3.45	Brown mottled grey slightly gravelly sandy CLAY.
WS104		SPT	2.00	2.45	Brown slightly gravelly slightly sandy CLAY with some organic material.
WS105		SPT	2.00	2.45	Brown slightly sandy CLAY.



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PSL

Professional Soils Laboratory

Ancoats Mobility Hub

Contract No:

PSL22/4488

Client Ref:

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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PSL

Professional Soils Laboratory

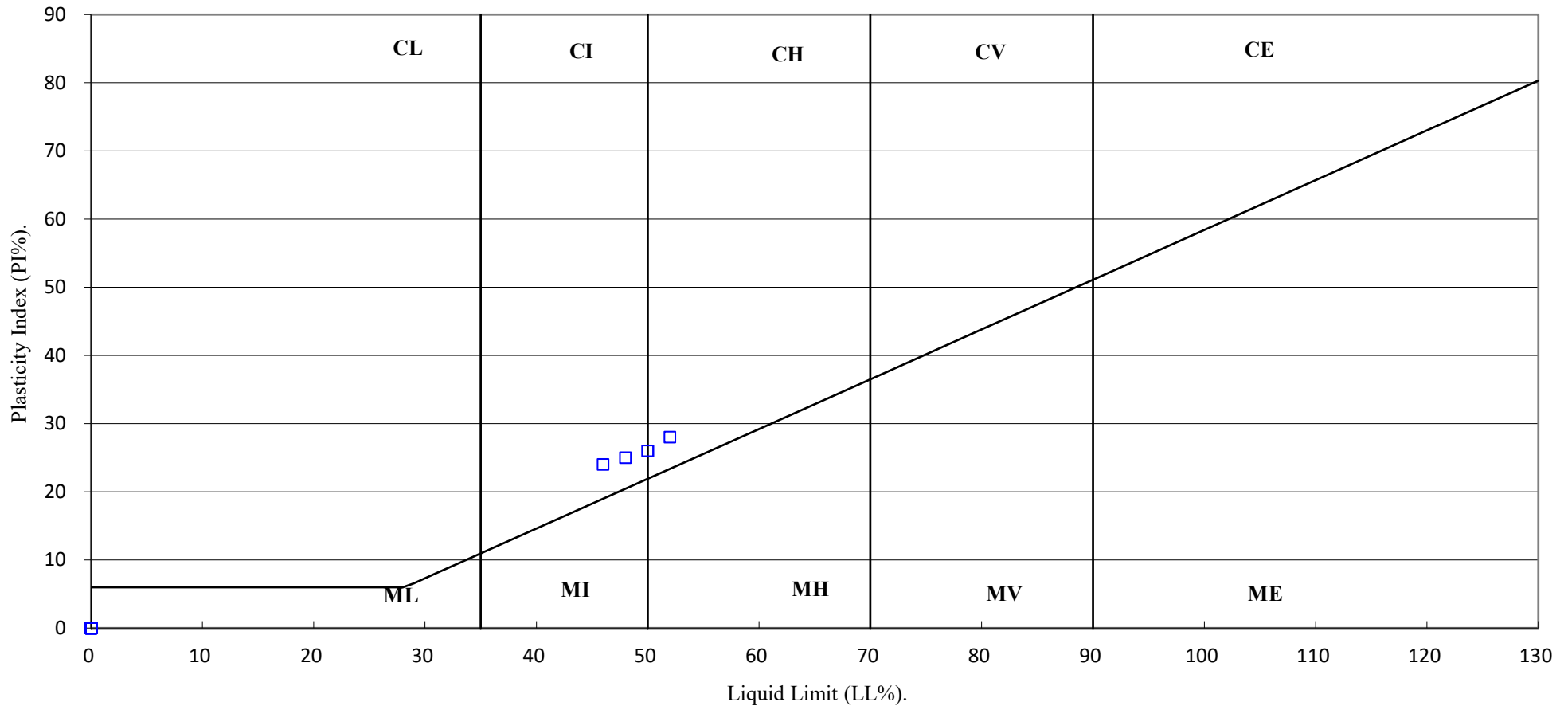
Ancoats Mobility Hub

Contract No:

PSL22/4488

Client Ref:

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL

Professional Soils Laboratory

Ancoats Mobility Hub

Contract No:

PSL22/4488

Client Ref:

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

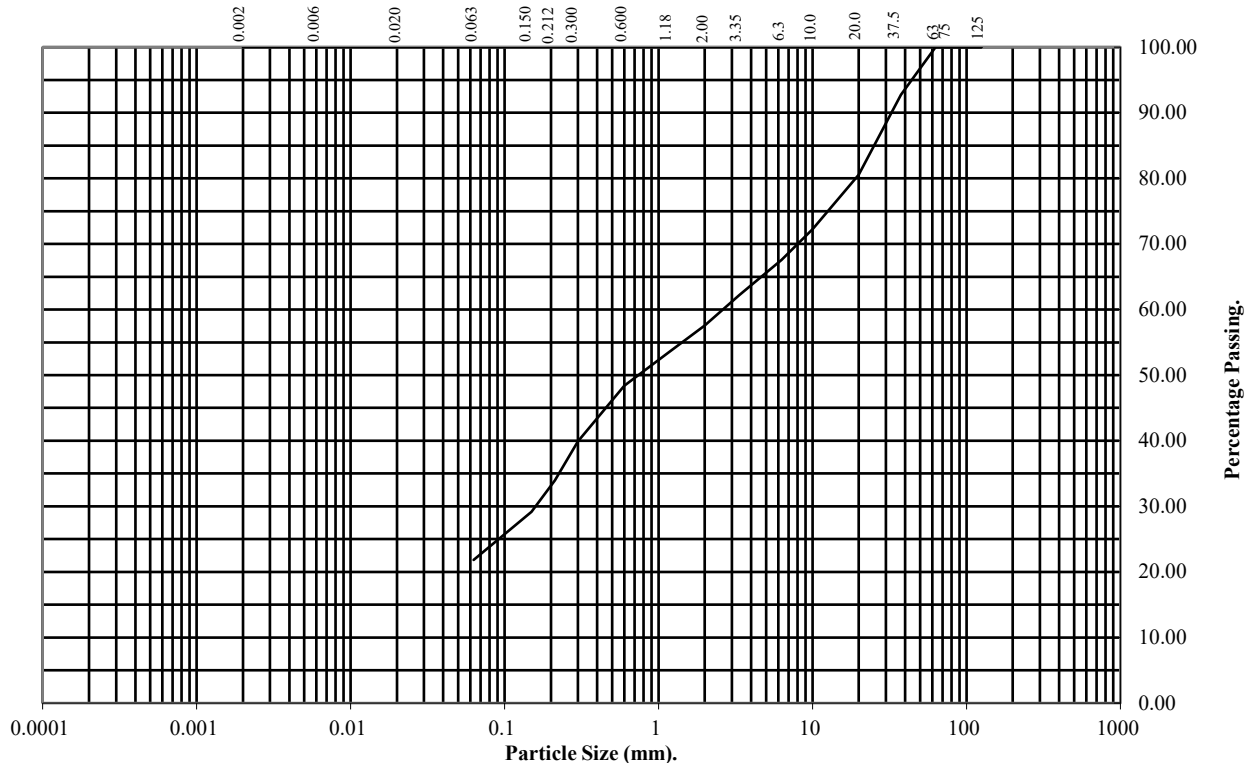
Hole Number: TP101

Top Depth (m): 1.00

Sample Number:

Base Depth(m):

Sample Type: BULK



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	81
10	72
6.3	68
3.35	62
2	58
1.18	54
0.6	48
0.3	40
0.212	34
0.15	29
0.063	22

Soil Fraction	Total Percentage
Cobbles	0
Gravel	42
Sand	36
Silt/Clay	22

Remarks:

See Summary of Soil Descriptions



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Contract No:

PSL22/4488

Client Ref:

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

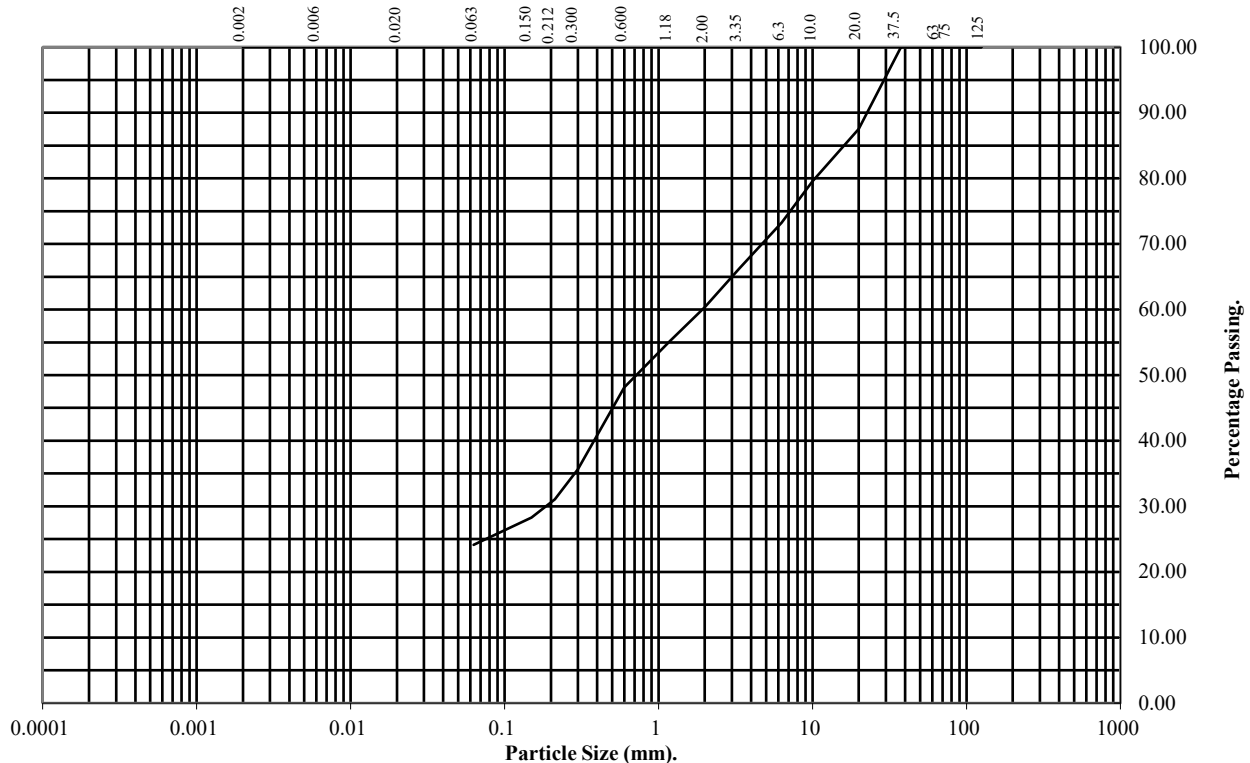
Hole Number: TP103

Top Depth (m): 0.80

Sample Number:

Base Depth(m):

Sample Type: BULK



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	88
10	80
6.3	73
3.35	66
2	60
1.18	55
0.6	48
0.3	36
0.212	31
0.15	28
0.063	24

Soil Fraction	Total Percentage
Cobbles	0
Gravel	40
Sand	36
Silt/Clay	24

Remarks:

See Summary of Soil Descriptions



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Contract No:

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Client Ref:

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

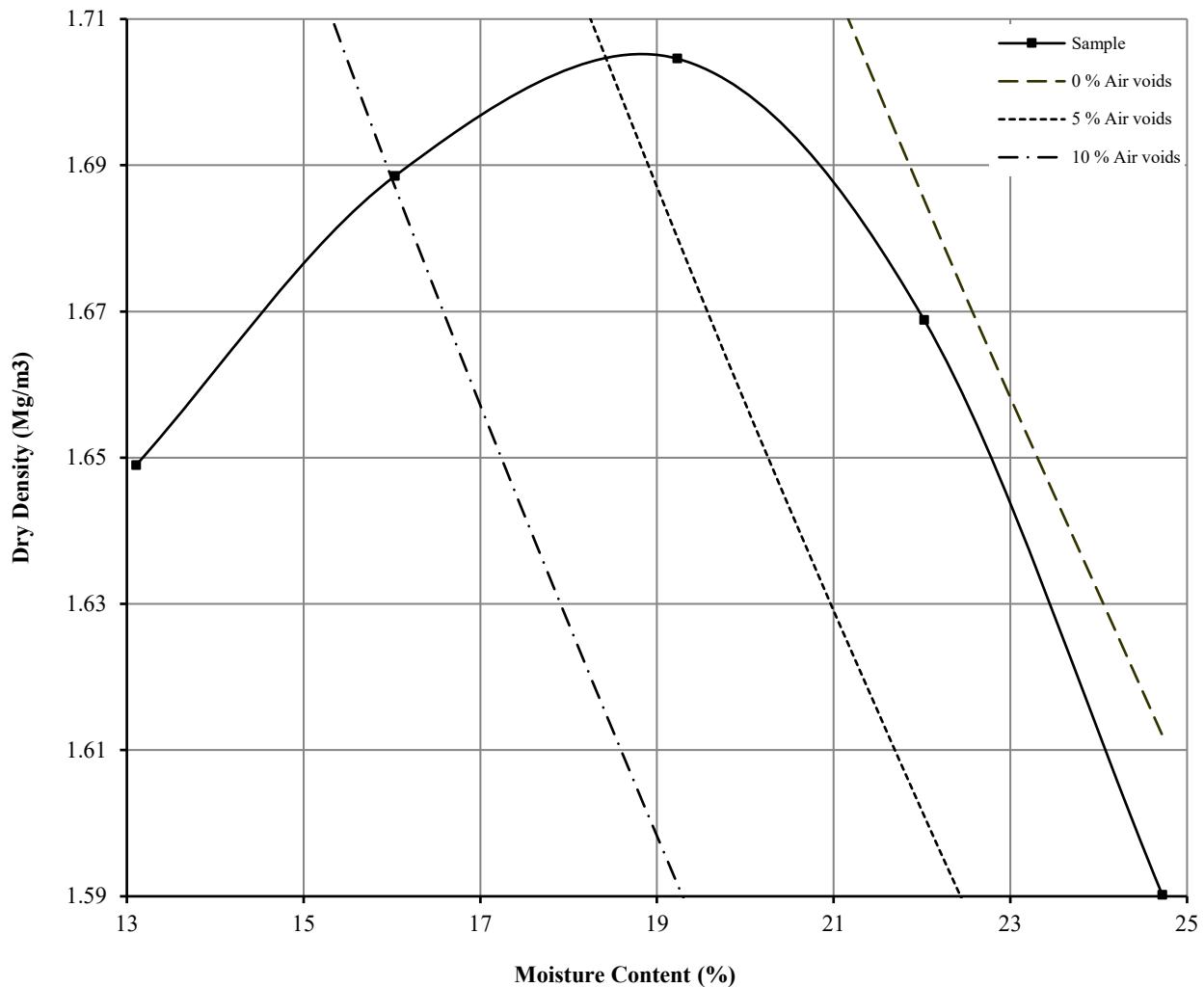
Hole Number: TP102

Top Depth (m) : 2.60

Sample Number:

Base Depth (m) :

Sample Type: BULK



Initial Moisture Content:	19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.68	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m3):	1.70		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	19			
Remarks See summary of soil descriptions				



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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.4 : 1990

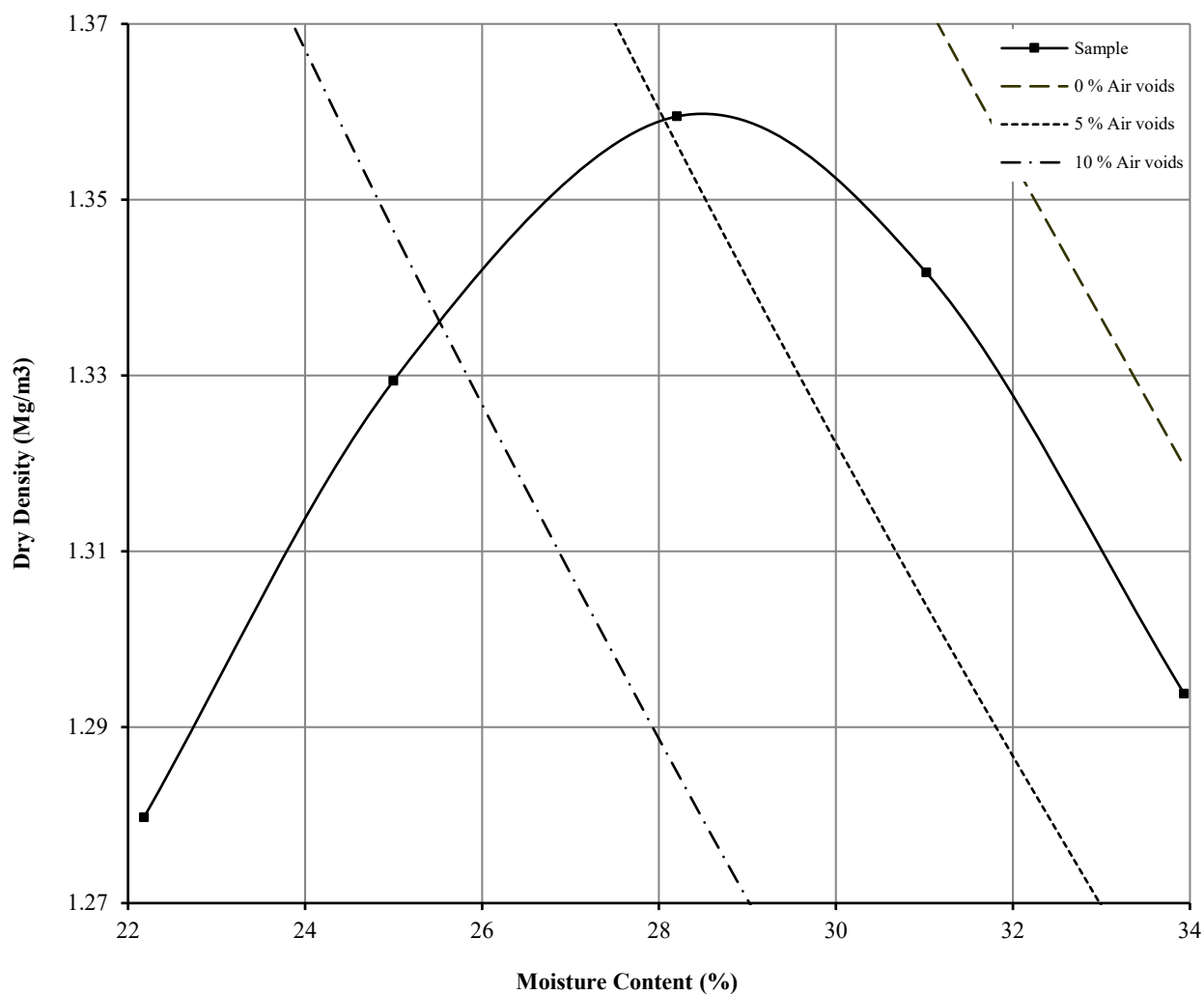
Hole Number: TP102

Top Depth (m) : 3.00

Sample Number:

Base Depth (m) :

Sample Type: BULK



Initial Moisture Content:	51	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.39	Assumed	Material Retained on 37.5 mm Test Sieve (%):	2
Maximum Dry Density (Mg/m3):	1.36		Material Retained on 20.0 mm Test Sieve (%):	4
Optimum Moisture Content (%):	28			
Remarks See summary of soil descriptions				



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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

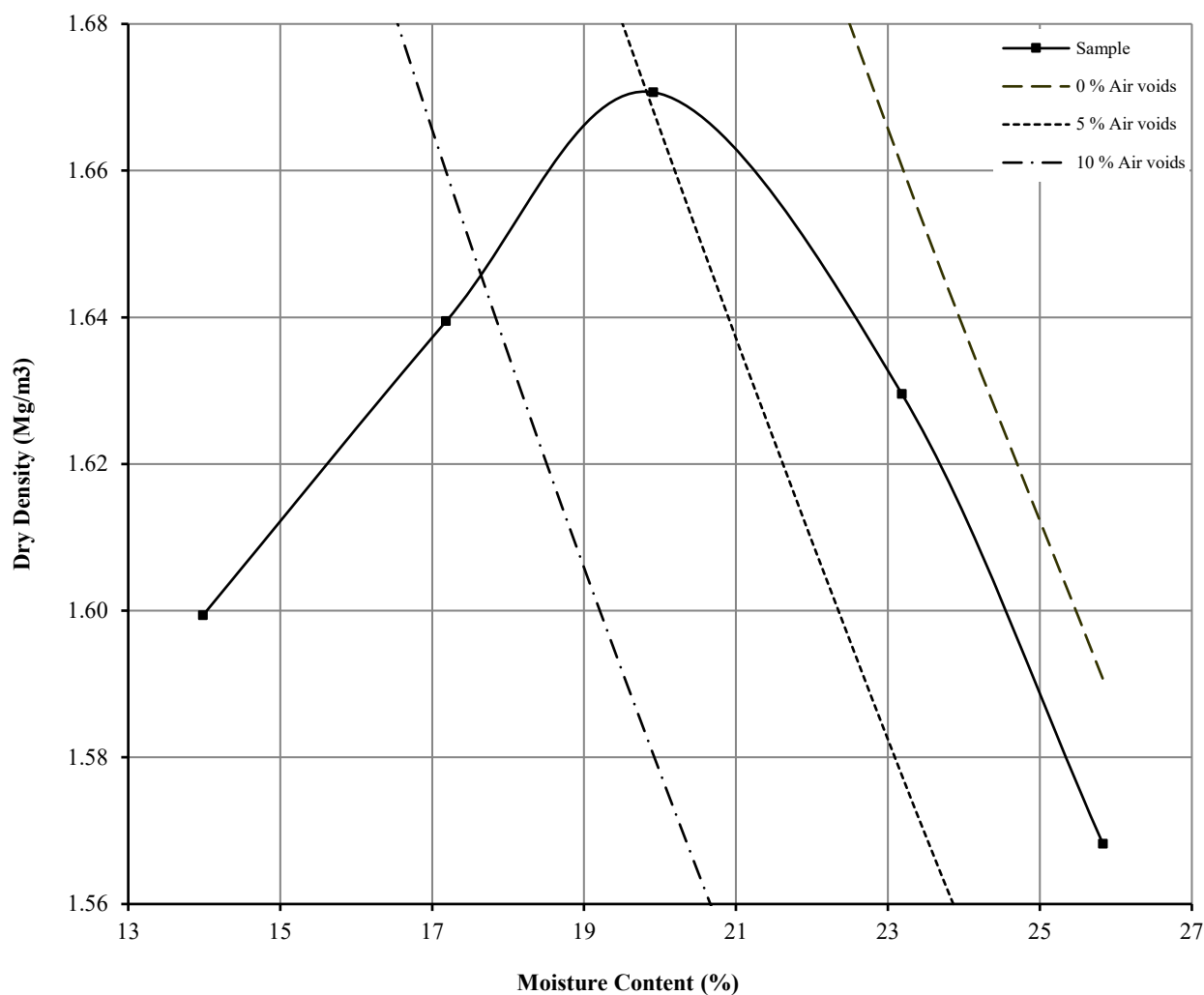
Hole Number: TP104

Top Depth (m) : 1.70

Sample Number:

Base Depth (m) :

Sample Type: BULK



Initial Moisture Content:	20	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.7	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (Mg/m3):	1.67		Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	20			
Remarks See summary of soil descriptions				



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

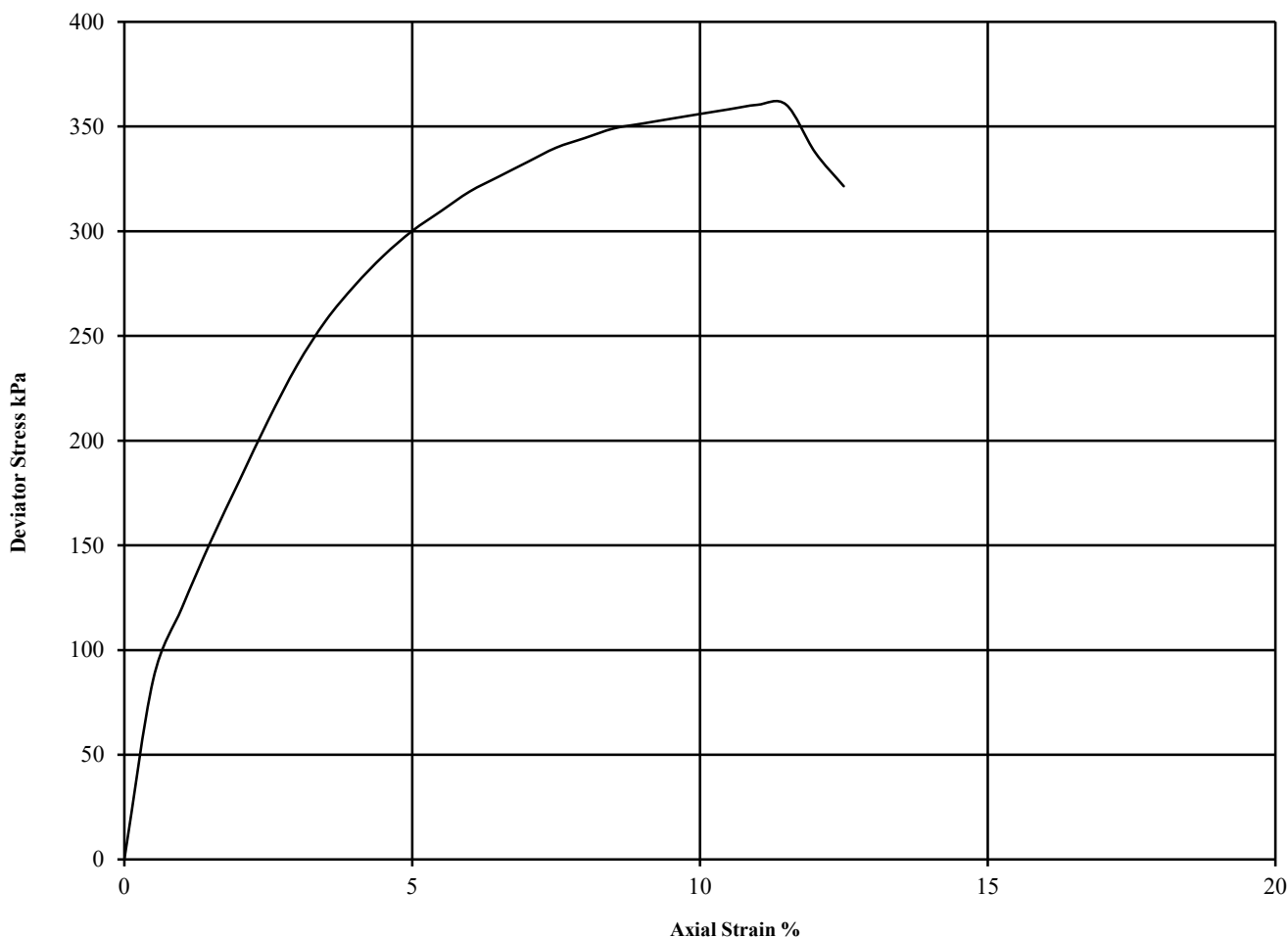
Hole Number: WS101

Top Depth (m): 3.50

Sample Number:

Base Depth (m): 4.00

Sample Type U100



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.50 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	20	2.45	2.03	75	360	180	11.5	Brittle	



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Ancoats Mobility Hub

Contract No:

PSL22/4488

Client Ref:

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

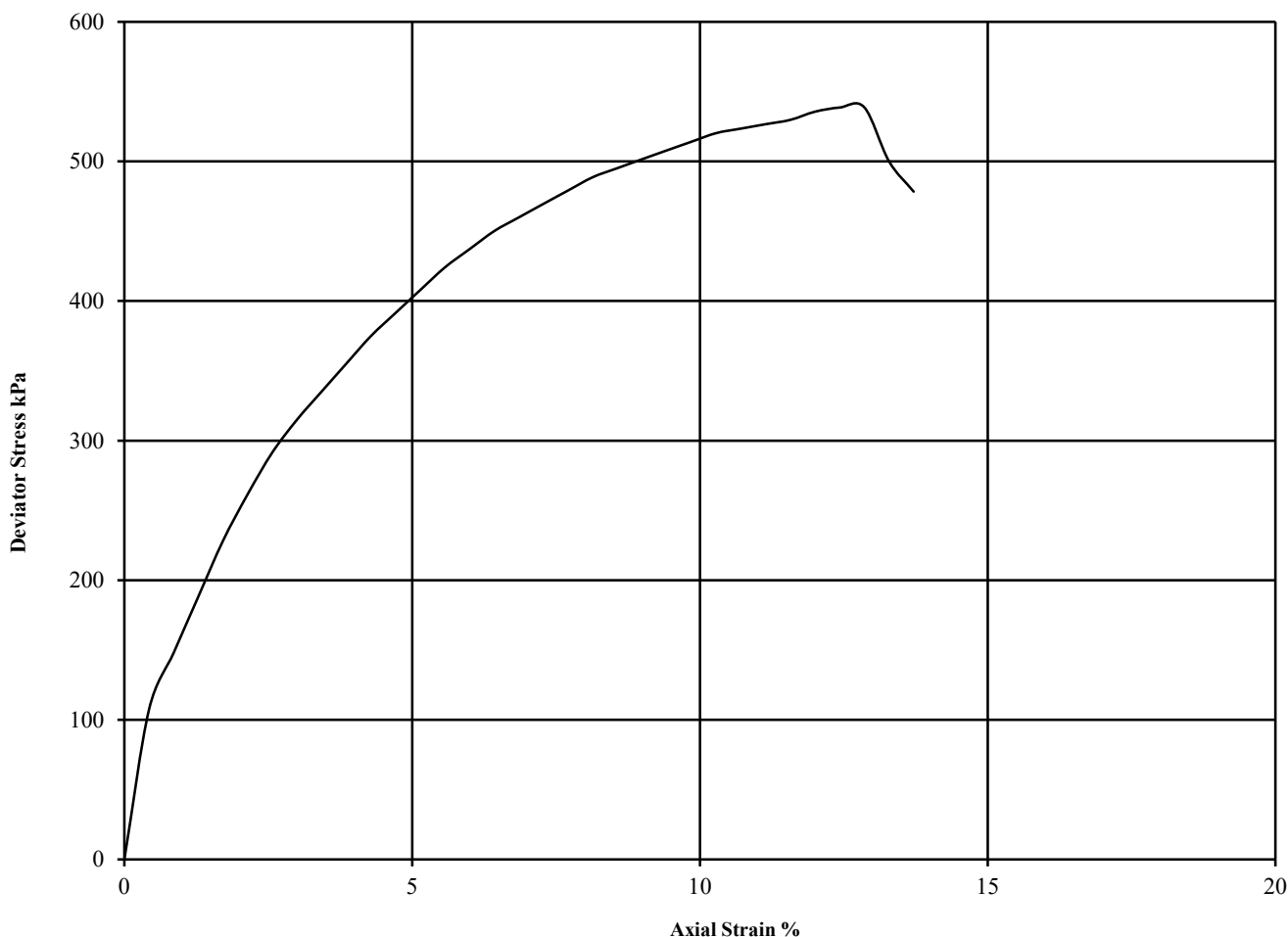
Hole Number: WS102

Top Depth (m): 3.50

Sample Number:

Base Depth (m): 4.00

Sample Type U100



Diameter (mm):		60		Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m ³)	Dry Density (Mg/m ³)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure		Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.56 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$				
1	19	2.12	1.78	75	539	269	12.9	Brittle		



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Ancoats Mobility Hub

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PSL22/4488

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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

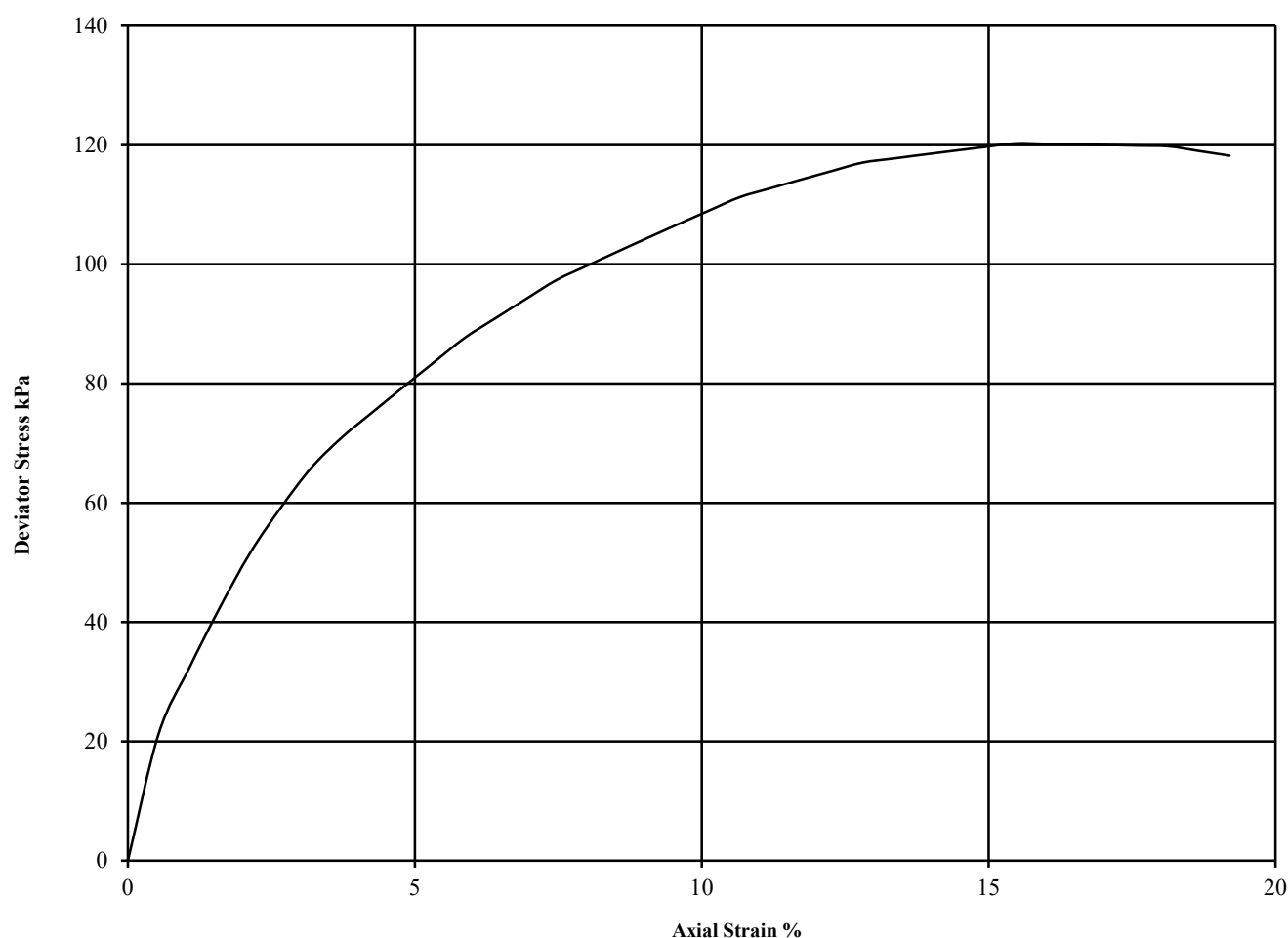
Hole Number: WS103

Top Depth (m): 1.50

Sample Number:

Base Depth (m): 2.00

Sample Type U100



Diameter (mm):		80	Height (mm):		150	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 0.43 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	27	2.04	1.61	35	120	60	15.5	Plastic	



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Client Ref:

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

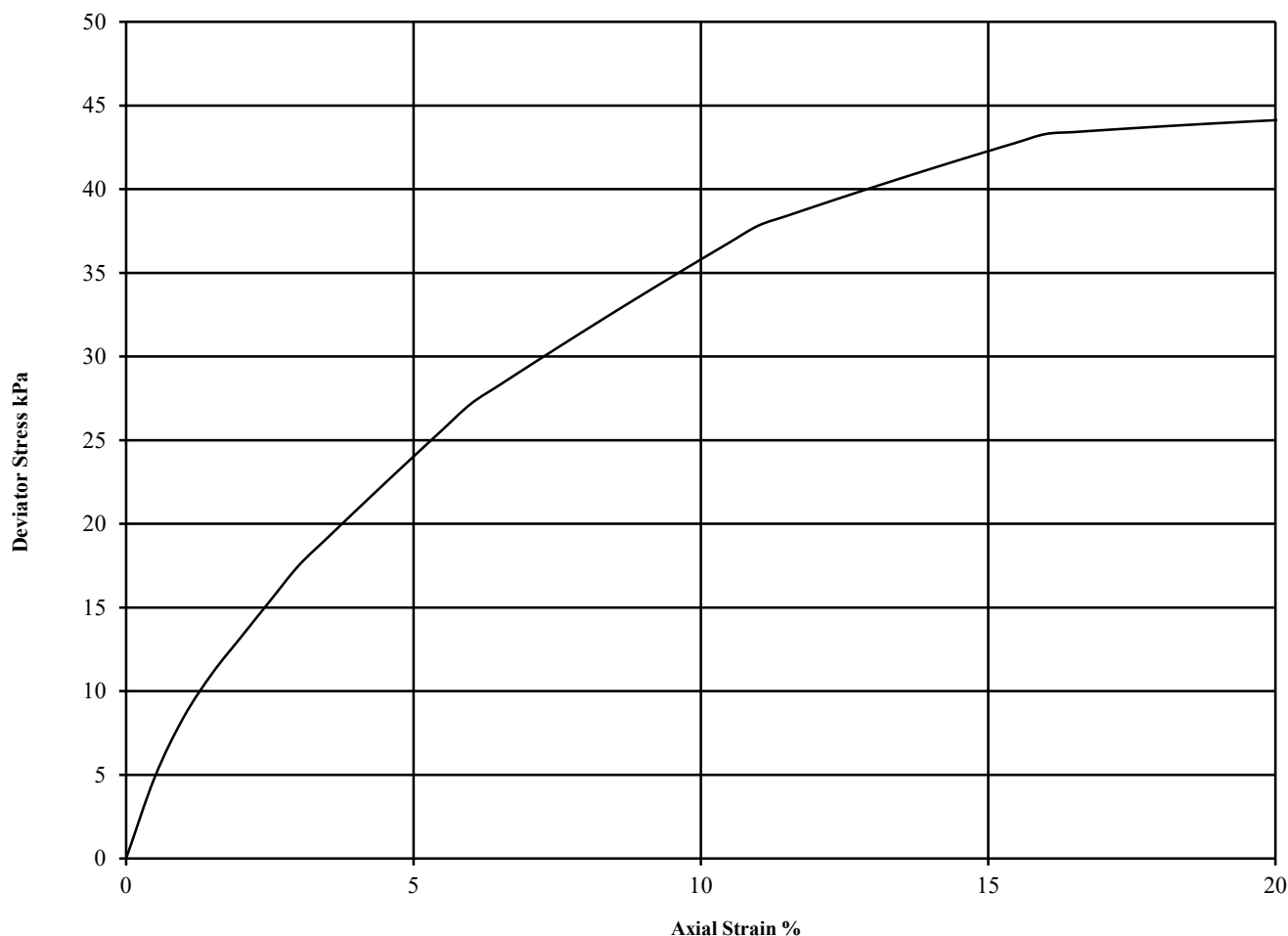
Hole Number: WS104

Top Depth (m): 2.50

Sample Number:

Base Depth (m): 3.00

Sample Type U100



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.46 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	40	1.86	1.33	55	44	22	20.5	Plastic	



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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

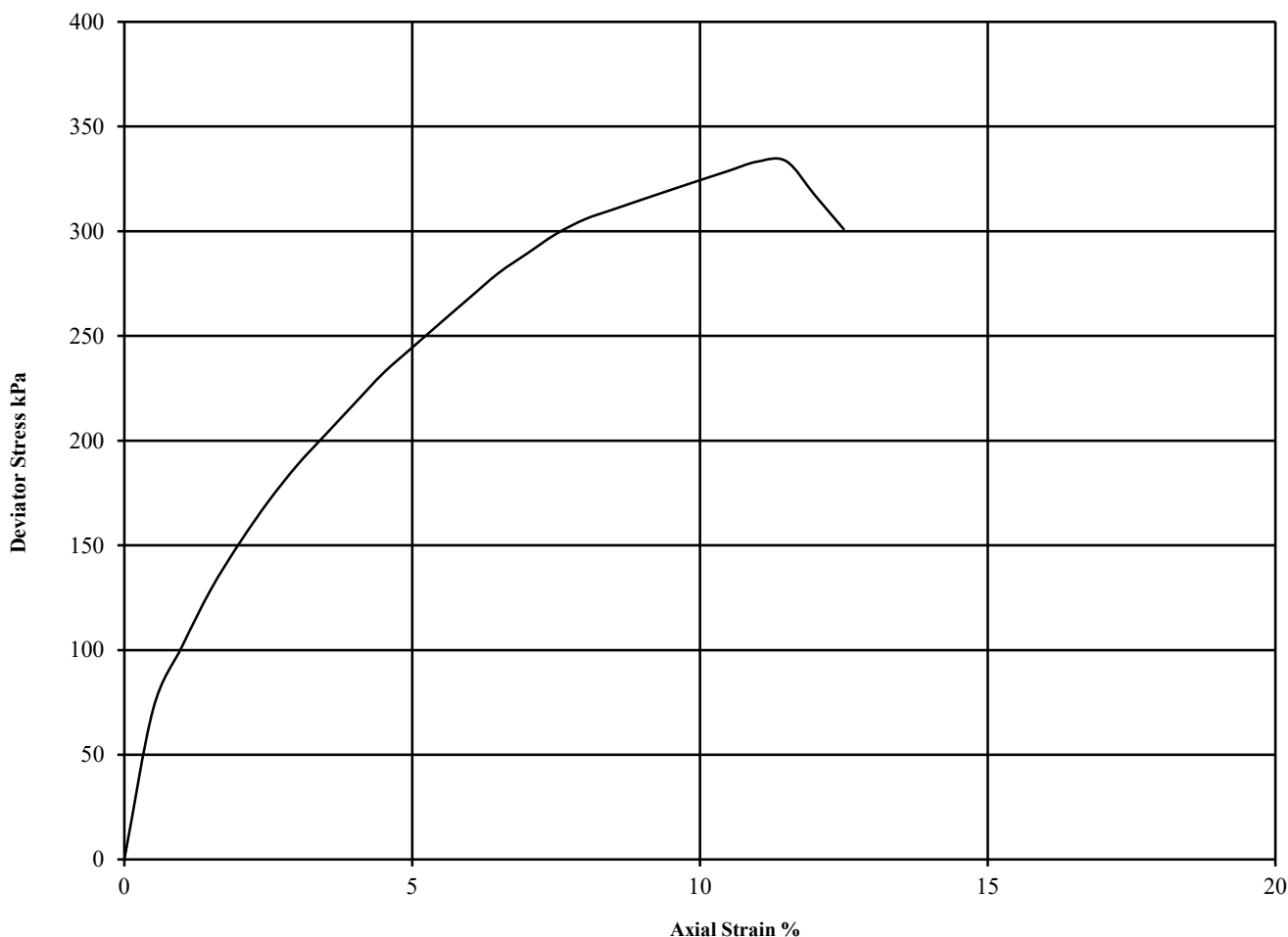
Hole Number: WS105

Top Depth (m): 2.50

Sample Number:

Base Depth (m): 3.00

Sample Type U100



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Corr. Max. Deviator Stress (kPa)	Shear Strength Cu (kPa)	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.50 See summary of soil descriptions
				θ_3	$(\theta_1 - \theta_3)_f$	$\frac{1}{2}(\theta_1 - \theta_3)_f$			
1	20	2.04	1.71	55	333	167	11.5	Brittle	



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Client Ref:

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: WS102

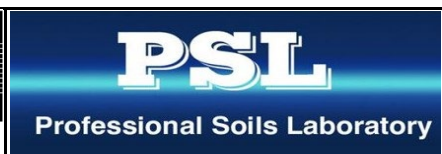
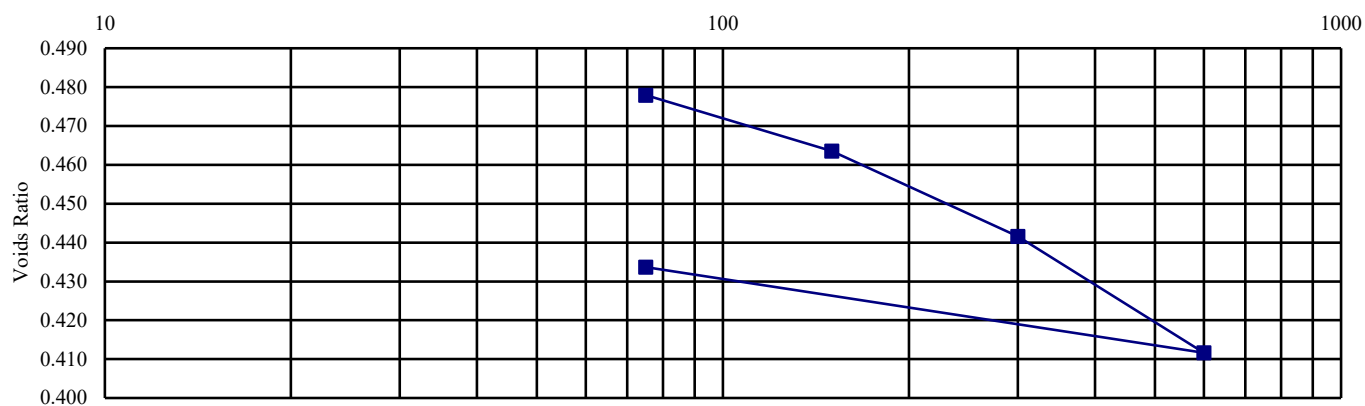
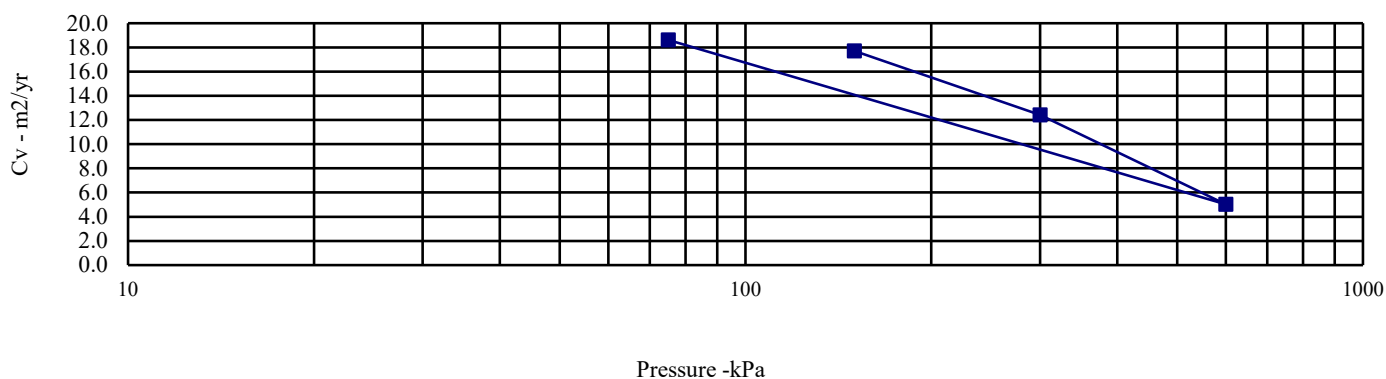
Top Depth (m): 3.50

Sample Number:

Base Depth (m) : 4.00

Sample Type: U100

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	18	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.10	0	75	Swelling	Swelling	Method used to	
Dry Density (Mg/m3):	1.77	75	150	0.130	17.709	determine CV:	T90
Voids Ratio:	0.497	150	300	0.100	12.427	Nominal temperature	
Degree of saturation:	98.6	300	600	0.069	5.020	during test ' C:	20
Height (mm):	20.04	600	75	0.030	18.614	Remarks:	
Diameter (mm)	50.06					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Ancoats Mobility Hub

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: WS103

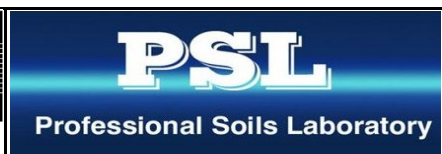
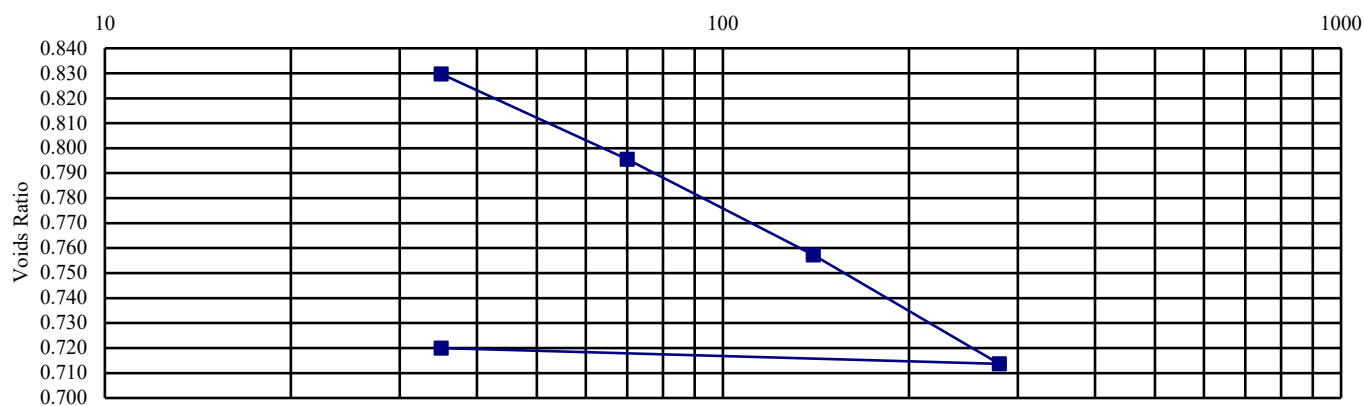
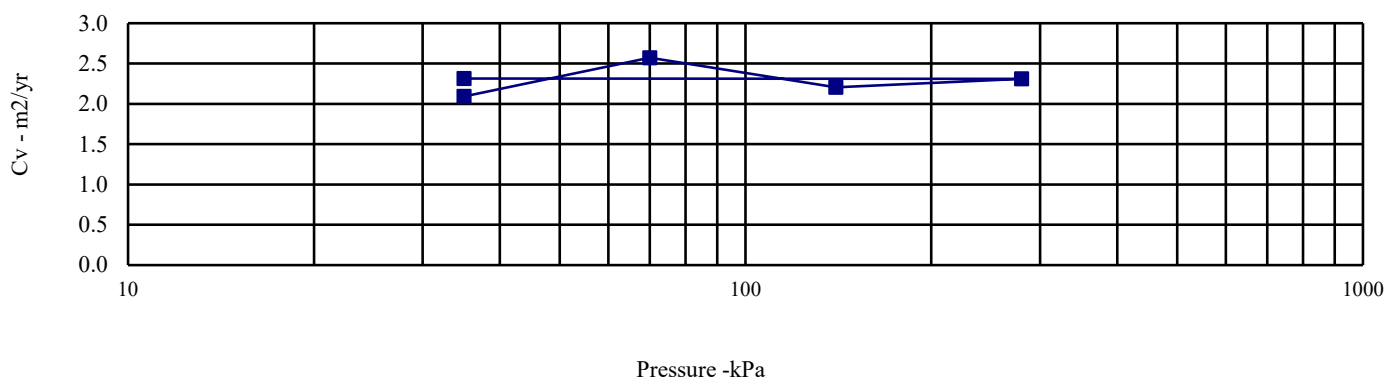
Top Depth (m): 1.50

Sample Number:

Base Depth (m) : 2.00

Sample Type: U100

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	27	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	1.79	0	35	0.752	2.092	Method used to	
Dry Density (Mg/m3):	1.41	35	70	0.532	2.572	determine CV:	T90
Voids Ratio:	0.879	70	140	0.305	2.203	Nominal temperature	
Degree of saturation:	81.8	140	280	0.177	2.309	during test ' C:	20
Height (mm):	20.06	280	35	0.015	2.315	Remarks:	
Diameter (mm)	75.11					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Ancoats Mobility Hub

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: WS104

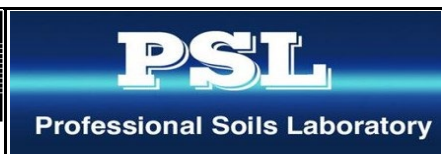
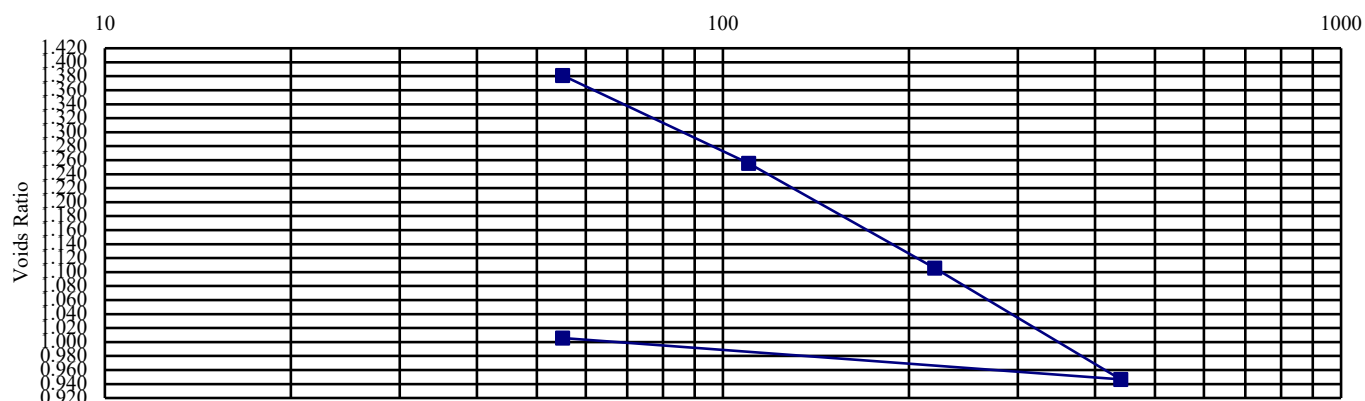
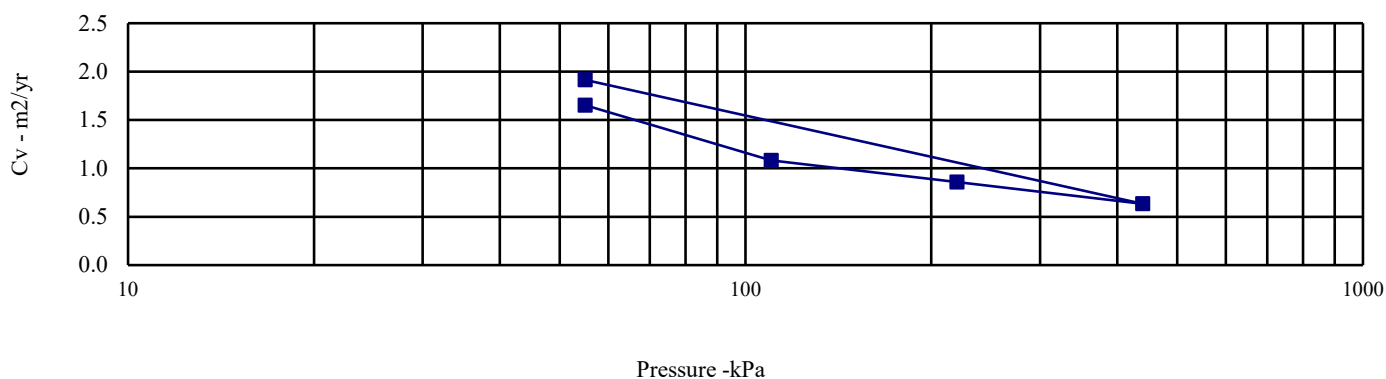
Top Depth (m): 2.50

Sample Number:

Base Depth (m) : 3.00

Sample Type: U100

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	56	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	1.61	0	55	1.390	1.652	Method used to	
Dry Density (Mg/m3):	1.03	55	110	0.959	1.083	determine CV:	T90
Voids Ratio:	1.578	110	220	0.603	0.858	Nominal temperature	
Degree of saturation:	94.3	220	440	0.344	0.633	during test ' C:	20
Height (mm):	20.07	440	55	0.079	1.914	Remarks:	
Diameter (mm)	50.06					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Ancoats Mobility Hub

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ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: WS105

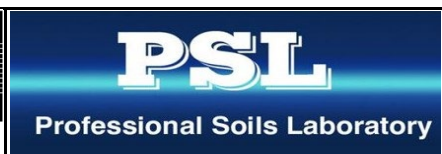
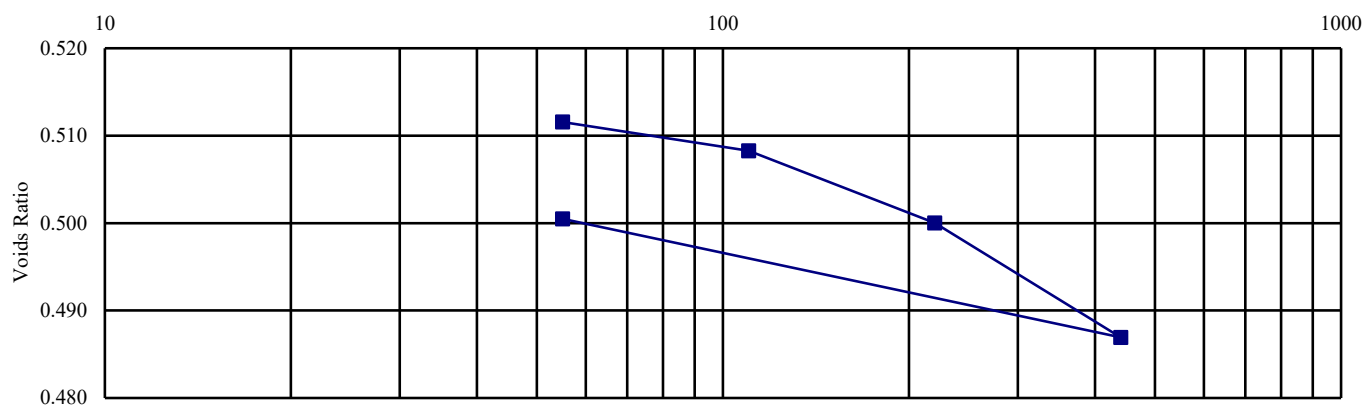
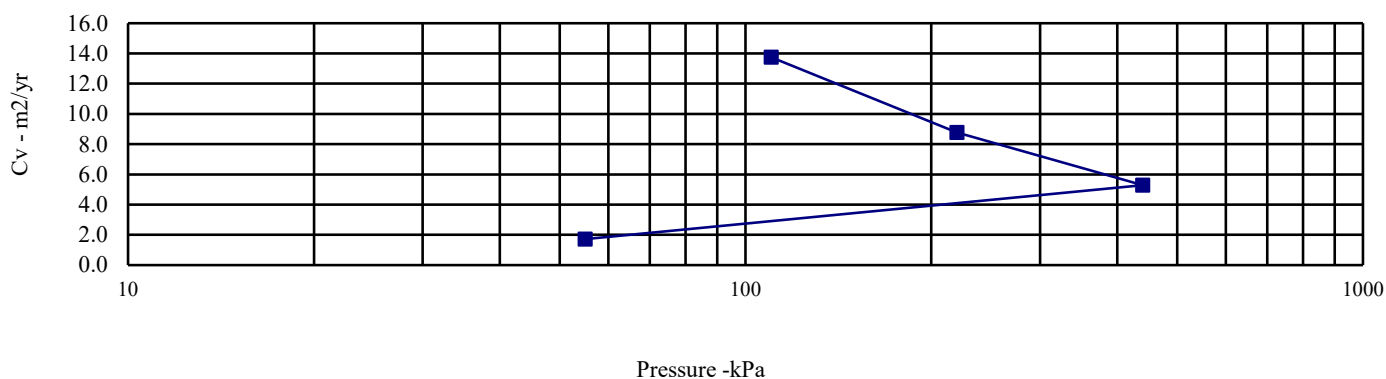
Top Depth (m): 2.50

Sample Number:

Base Depth (m) : 3.00

Sample Type: U100

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	19	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.09	0	55	Swelling	Swelling	Method used to	
Dry Density (Mg/m3):	1.76	55	110	0.040	13.748	determine CV:	T90
Voids Ratio:	0.505	110	220	0.050	8.763	Nominal temperature	
Degree of saturation:	98.5	220	440	0.040	5.288	during test ' C:	20
Height (mm):	20.11	440	55	0.024	1.720	Remarks:	
Diameter (mm)	50.05					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Ancoats Mobility Hub

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Client Ref:

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

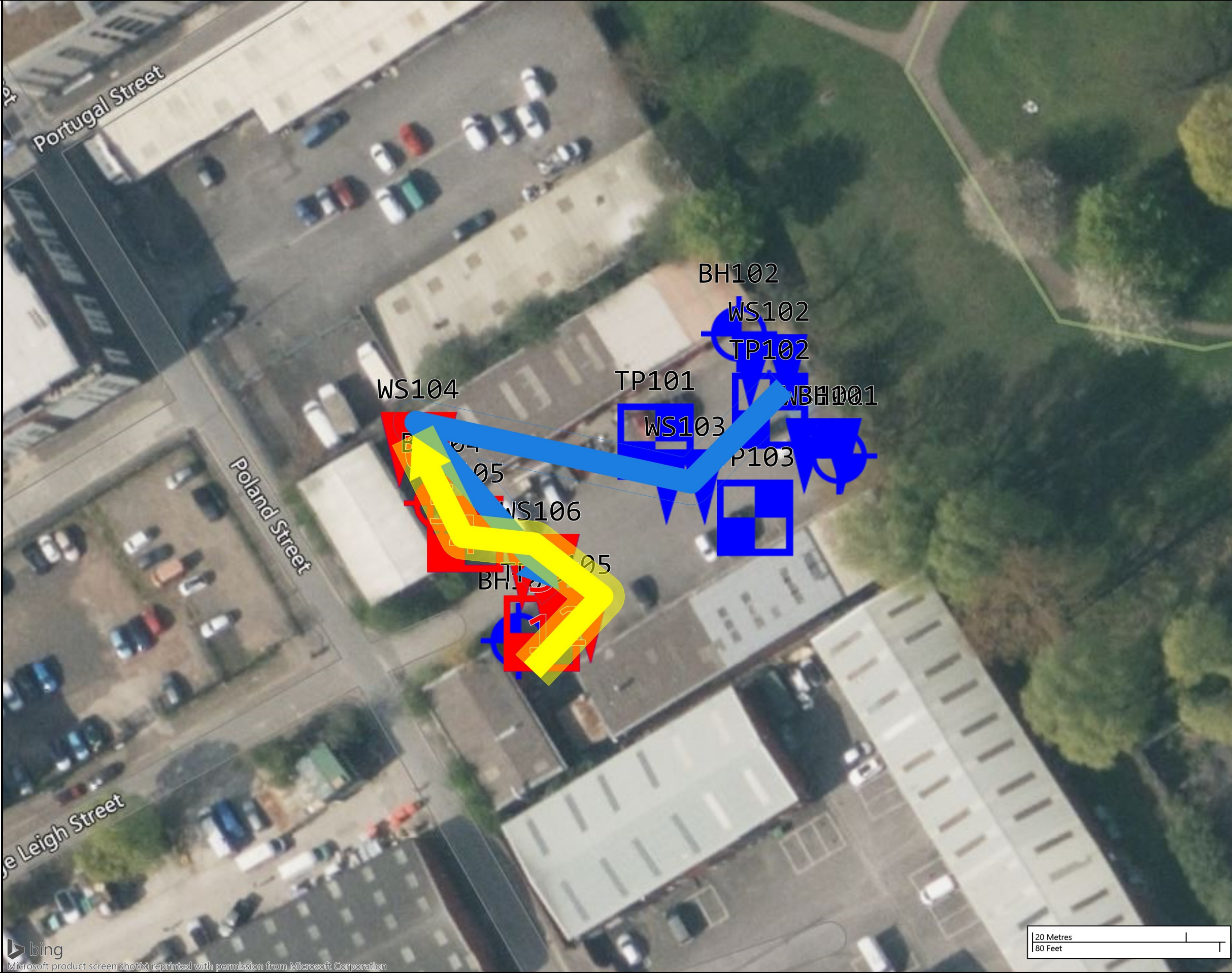
 Sections - Section line 2

 Locations By Type - Empty

 Locations By Type - BH

 Locations By Type - TP

 Locations By Type - WS

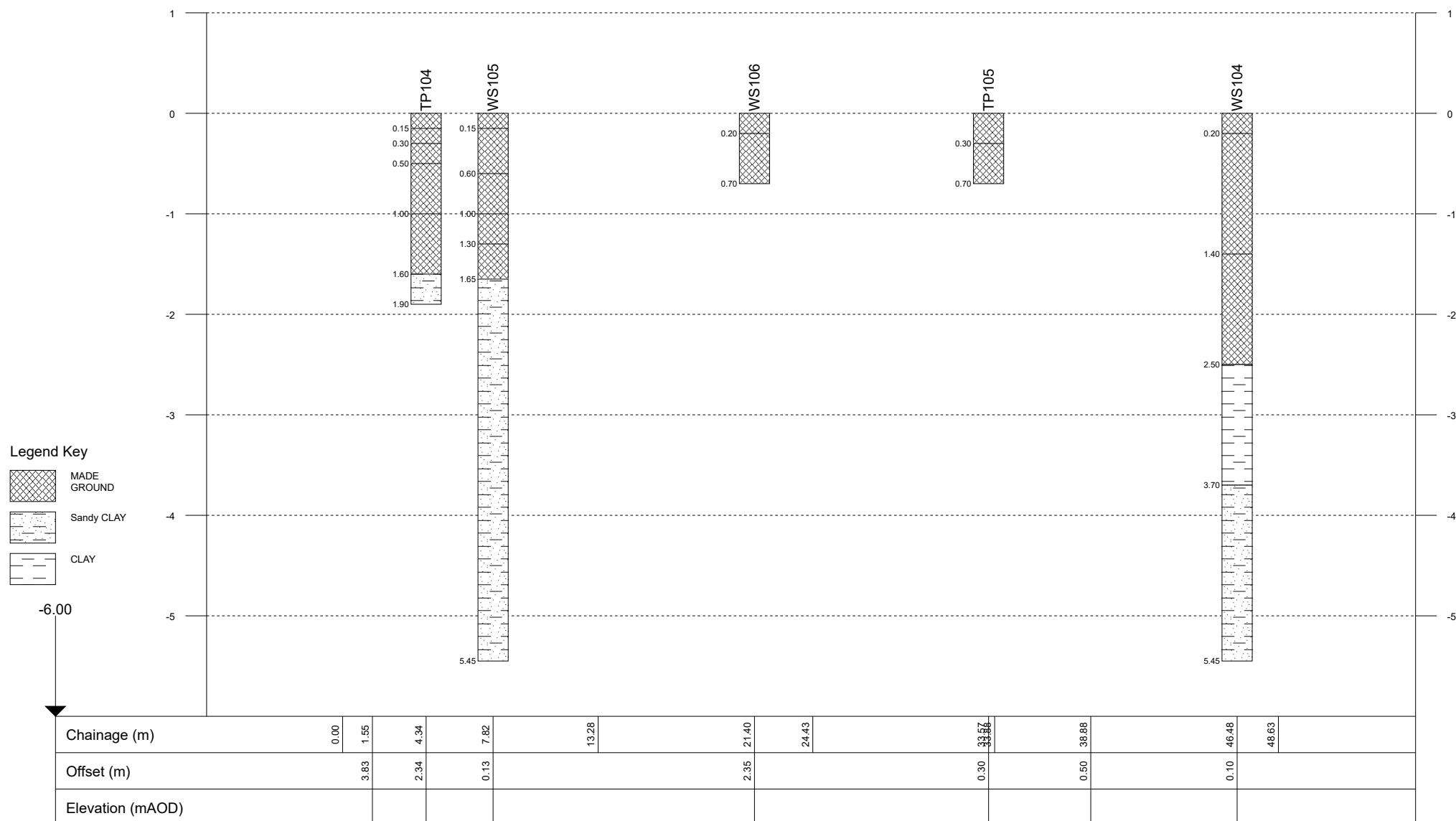


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Horizontal Scale: 1:282

Engineer:

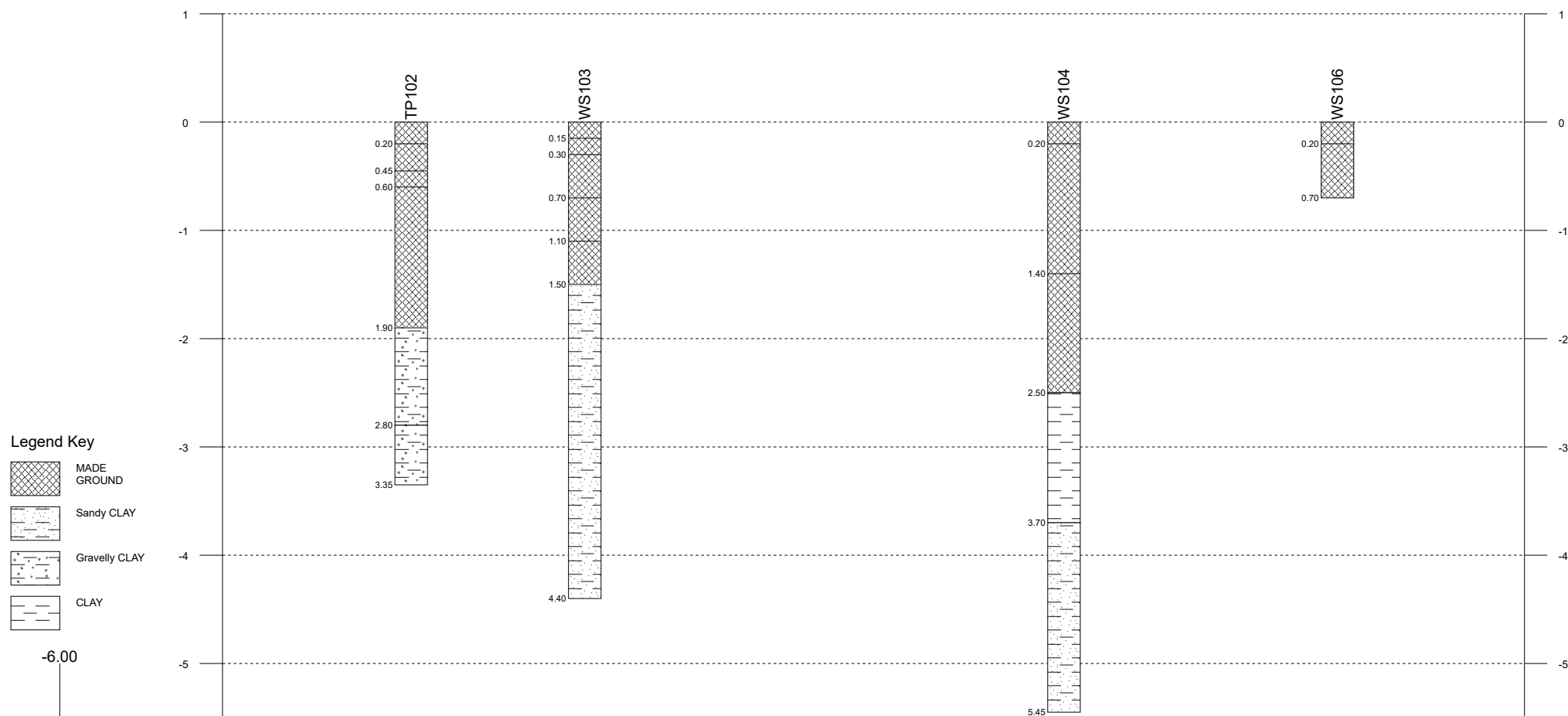


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Engineer:

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