e3p

Phase II Geoenvironmental Site Assessment
Goulden Street, Manchester

Reference:12-728-R2-2
Date: 5th February 2021

PHASE II GEOENVIRONMENTAL SITE ASSESSMENT

Goulden Street
Manchester
M4 5EH

Prepared for:

Mulbury City

Report Ref: 12-728-R2-2
Date Issued: 5th February 2021

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EXECUTIVE SUMMARY

Site Address	Goulden Street, Manchester, M4 5EH	
Grid Reference	E384710, N398890	
Site Area	0.13 Hectares	
Current Site Use	The subject site is currently unoccupied; however, relict structures indicate historical industrial development at the site including a brick chimney in the central sector of the site. In addition to relict structures hardstanding and stockpiles of demolition rubble are also present. The site boundary is marked by a high brick and stone wall, with metal sheeting on the northeast boundary.	
Proposed Development	Mulbury City are submitting a planning application to support the construction of an eight storey residential building (Use Class C3) comprising 73 residential units, with ground floor commercial use (Classes A1, A2, A3, B1 and D1 (excluding Places of Worship)); alterations to the retained perimeter wall and chimney including the introduction of a light box; disabled car parking, highways, landscaping and other associated works.	
Environmental Setting	**Drift Geology**	Glacial Till - BGS indicate the presence of Clay.
	Bedrock Geology	Chester Formation - Sandstone.
	Faults	None recorded within 250 m of the site.
	Hydrogeology	Superficial – Secondary Undifferentiated Aquifer; and Bedrock – Principal Aquifer.
	Hydrology	There are no surface watercourses within influencing distance of the site (<250 m radius).
	Flood Risk	The site is classified as being unaffected by flooding from rivers (Flood Zone 1).
Site History	The site has been occupied by amenity and industrial buildings throughout its mapped history, including police station, ambulance station and garage. Most of the former buildings have been demolished, however, a perimeter high wall remains and a chimney structure in the central sector.	
Utility Locations	The utility plans indicate the presence of service infrastructure for BT, Cadent Gas Ltd, United Utilities and Electricity NW are present immediately adjacent to the site.	
Landfill Sites and Ground Gases	No present or historic landfill sites are recorded within 250 m of the site.	
Radon	Unaffected – No special precaution required.	
Coal Mining/Land Stability	The site is not located within an area deemed to be at risk from ground instability arising from historic coal mining activities.	
Brine Workings	The site is not located within an area deemed to be at risk from ground instability arising from historic brine pumping activities and/or salt extraction.	
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential development have been identified within influencing distance of the subject site.	

SITE INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising mechanically excavated trial pits, trial trenches, window sample probeholes and a cable percussion borehole with rotary follow on. Selected window sample and cable percussion borehole locations were fitted with environmental monitoring installations to enable gas and groundwater monitoring.
Ground Conditions	**Made Ground – 0.0 m bgl to 4.6 m bgl** Made Ground deposits were encountered within all exploratory hole locations to depths of between 1.20 m and 4.60 m bgl, although, in general, Made Ground was encountered to a depth of between 1.00 m and 3.00 m bgl. Made Ground deposits generally comprise reworked clay with brick and concrete rubble from the demolition of historic structures. The base of the Made Ground was not encountered in TP101, TT101A, TT101B and TT102C due to instability and the presence of rubble.
	DRIFT – 1.20 m bgl to 26.50 m bgl Drift deposits were encountered within the majority of exploratory locations with the exception of TP101, TT101A, TT101B and TT102C where the full depth of Made Ground could not be proven. The drift deposits were encountered to 26.50 m bgl (RBH101) and generally comprise firm low strength to very stiff very high strength red brown gravelly CLAY with gravel of sandstone. Brown clayey fine to medium SAND was encountered in CP101 between 14.10 to 14.90 m bgl. This was underlain by very stiff very high strength CLAY. Soft black silty CLAY with an organic odour was identified in WS101 between 3.00 to 3.20 m bgl, directly beneath the Made Ground.
	SOLID A red brown SANDTONE was recorded at 26.50 m bgl to a proven termination depth of 35.50 m bgl.
	GROUNDWATER Groundwater level monitoring (to date) has recorded groundwater at depth of between 0.78 m bgl and 4.20 m bgl.

CONTAMINATED LAND ASSESSMENT

Human Health	A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria. This assessment has identified the presence of elevated heavy metals, polycyclic aromatic hydrocarbon (PAH), asbestos and total petroleum hydrocarbon (TPH) bands C16-C21. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH and TPH compounds can be mitigated through the capping of the material by the structure or hardstand, alternatively the installation of a suitable cover system in any landscaping and public open space to remove the potential for direct exposure to impacted soils. With regards to the elevated naphthalene concentrations, these present a potential volatilisation to indoor air risk. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity. The concentration of total mercury at TP105 is below the target values for methyl and inorganic mercury, however further analysis is required to confirm the concentration of elemental mercury. During remediation and enabling works, further samples should be submitted for speciated mercury analysis to assess whether elemental mercury is present which may pose a risk to future site users through vapour inhalation. If elemental mercury is identified, it may be necessary to delineate and excavate the soils as a localised hotspot for off-site disposal. Alternatively, if it is proven that there is no elemental mercury and no vapour risk exists, the soils can be retained on site if placed in an area of low sensitivity (such as beneath hardstand) or a clean cover system in areas of soft landscaping. Asbestos in the form of chrysotile has been identified within localised areas in Made Ground deposits. Asbestos quantification confirms that only trace fibres are present, and no visual signs of ACM were encountered during the ground investigation. Impacted soils can be retained on-site but these soils will require careful management.
Controlled Waters	The Tier I assessment has identified exceedances of the DWS for lead and selenium. The inorganic determinands identified above are of a general low solubility and therefore mobility, with their absence in the remaining leachate and groundwater samples suggesting that these will not migrate to controlled water receptors. Based on the laboratory analysis and low sensitivity of the site with respect to groundwater and surface water receptors, there is considered to be a low risk to controlled waters and the wider environ.
Ground Gas	Ground gas monitoring thus far has indicated the site would be classed as Characteristic Situation 1 or Green, suggesting no gas protection measures will be required. However, the final ground gas regime will be confirmed following the completion of the ground gas monitoring programme.
Potable Water Infrastructure	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation. Current indications suggest that barrier pipe will be required.

GEOTECHNICAL ASSESSMENT

Underground Obstructions	Significant concrete and brick obstructions have been encountered within the Made Ground, indicative of relict foundations from the former buildings. These features pose a constraint and will require grubbing out in their entirety to facilitate the installation of piled foundations.
Allowable Bearing Pressure	The underlying CLAY drift deposits have been assessed as being firm low strength to very stiff very high strength with a net allowable bearing pressure (ABP) in the order of 72–447 kN/m² between depths of 2.00–16.50 m bgl. The upper horizons of weathered bedrock at a depth >26.00 bgl provide an ABP in excess of 350 kN/m² (based on SPT data) which will likely increase with depth. The results of the UCS test indicate that at a depth of between 31.50-31.80m bgl the sandstone recorded a strength of 4.2 (MPa) which equates to 4200 kN/m².
Foundation Options	The Made Ground and underlying natural deposits are not considered a suitable target founding stratum. In respect of the proposed development; E3P consider it feasible to construct the proposed residential apartment blocks utilising piled foundations set within the very stiff cohesive soils or underlying bedrock. The final foundation solution will be dependent on the structural loadings, elevation and should be designed by a suitably qualified structural engineer with detailed designs from a specialist piling contractor.
Building Floor Slabs	A ground bearing slab will be viable, but it will need to be constructed on a granular sub-base with the thickness designed by a structural engineer to ensure that settlement tolerances are taken into consideration.
Heave Precautions	As the clay is deemed to be Medium Volume Change Potential, if a ground floor slab is constructed with a cast in-situ suspended floor slab, an engineered design will be required for the heave precautions.
Soakaway Drainage	The presence of shallow groundwater and deep Made Ground deposits would likely preclude the use of soakaway drainage systems in this instance.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
CBR Design %	It is considered that the shallow Made Ground soils can be re-engineered in accordance with Class 1 (a-c) material under favourable climatic conditions to achieve a CBR of 5%. 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. Where any compressible ground is present beneath proposed roads, adopted drainage infrastructure and hard stand consideration must be given to the potential for consolidation which will induce unacceptable degrees of total and differential settlement at the surface.
Cut/Fill	It is assumed that site levels will remain close to present for the proposed residential apartments, however, a programme of enabling works will be required to removal buried obstructions.
Civil Engineering Excavations	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
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: *Waste Classification – Guidance on the classification and assessment of waste*.

RECOMMENDATIONS

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

- Further assessment and delineation of naphthalene and mercury impact;
- Remediation & Enabling Works Strategy;
- Further geotechnical testing to determine the settlement characteristics for ground bearing floor slab (upon completion of the reduced level dig) and pavement design;
- Foundations to be designed by suitably qualified Structural Engineer; and
- Geotechnical Earthworks Compaction Specification (Infrastructure).

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DRAWING LIST

12-728-R1-001	Site Location Plan
12-728-R1-002	Proposed Development Plan
12-728-R1-003	Historical Features Plan
12-728-R1-004	Site Features Plan
12-728-R1-005	Exploratory Hole Location Plan
12-728-R1-006	Depth of Made Ground Plan
12-728-R1-010	Conceptual Site Model
12-728-R1-018	Contamination Exceedances Plan

1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Scott Hughes Design Ltd, on behalf of their client (Mulbury City) to undertake a detailed Phase II Geoenvironmental Site Assessment for a parcel of land located off Goulden Street, Manchester; herein referred to as the site.

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

The scope of work includes the following elements:

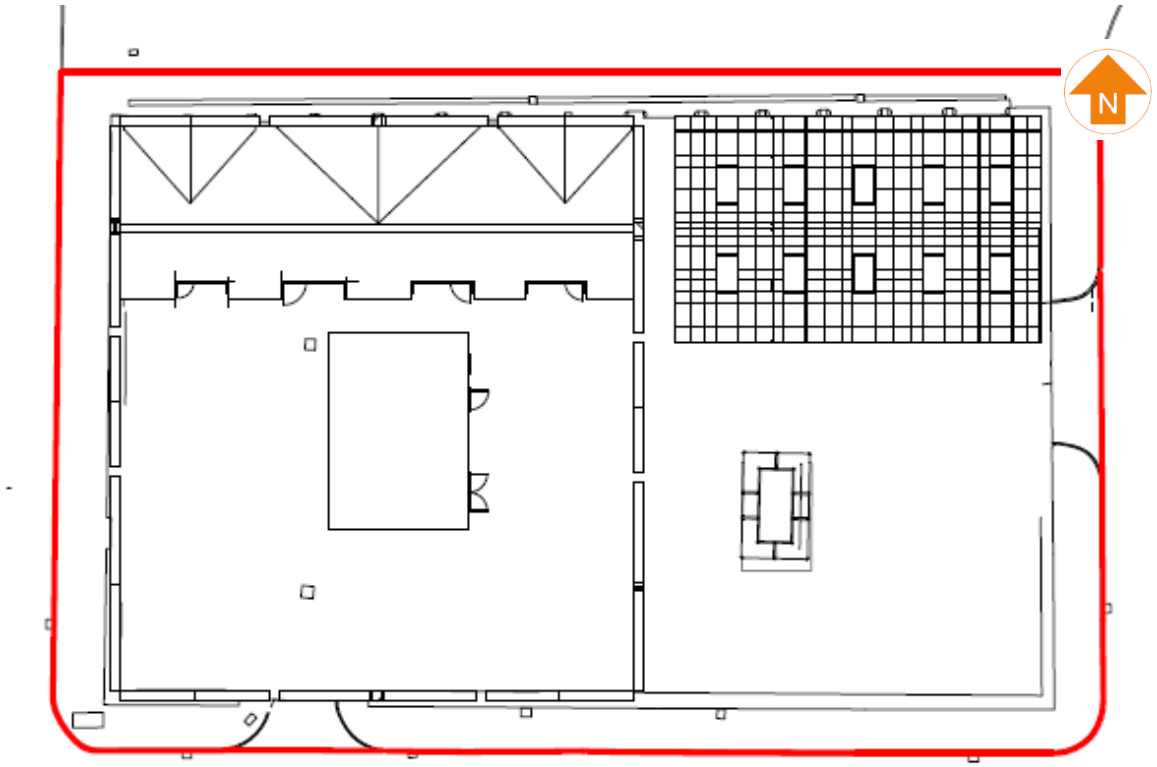
- Design of suitable intrusive ground investigation;
- Window sample probeholes with, and construction of, environmental monitoring installations;
- Deep cable percussive borehole with groundwater monitoring installation;
- Mechanically excavated trial pits and trial trenches;
- Deep rotary borehole to obtain rock cores of the bedrock strata;
- 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.

1.2. PROPOSED DEVELOPMENT

E3P understands that Mulbury City are to submit a planning application to support the erection of an 8-storey residential building (Use Class C3) comprising 73 residential units, with ground floor commercial use (Classes A1, A2, A3, B1 and D1 (excluding Places of Worship)); alterations to the retained perimeter wall and chimney including the introduction of a light box; disabled car parking, highways, landscaping and other associated works.

A snapshot of the Proposed Development Layout is presented in Figure 1.1 below and Appendix III.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT



1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

- Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified.
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors.
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- Provide recommendations regarding future works required.

1.4. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.5. 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. PHASE I DESK STUDY SUMMARY

E3P has previously completed a Phase I Geo-Environmental Assessment (Ref: 12-728-R1-1) dated November 2019. The pertinent point from the desk study report are summarised below:

- *The subject site is currently unoccupied; however, relict structures indicate historical development on the site. Hardstanding and stockpiles of demolition rubble is present across the site. Former site entrances are secured.*
- *A high brick and stone wall is present on the boundaries of the site and a high brick structure is present in the central sector of the site.*
- *The site and surrounding area is generally flat.*
- *No evidence of ACM was noted during the site walkover.*
- *No Above Ground Storage Tanks (AST) or Underground Storage Tanks (UST) were observed at the site during the preliminary site walkover. Due to the previous commercial land use hazardous materials storage may have occurred on the site.*
- *There is no equipment identified which may contain PCBs within the site boundary, however, an electrical substation is located approximately 50m southwest.*
- *No invasive plant species were identified during the site walkover; however, their presence cannot be ruled out.*
- *No landfills are identified within 250m of the site.*
- *According to the Coal Authority Interactive Map Viewer the site is not within a Development High Rick Area, and no mine entries are identified in the vicinity, therefore, no further action considered necessary.*
- *The Envirocheck Report indicates that the site is not located within a Groundwater Source Protection Zone.*
- *The closest groundwater abstraction is a potable supply, located 901m northwest.*
- *There is a Contemporary Trade Directory Entry identified on the site, associated with garage services, however, the entry is shown as inactive.*
- *Planning applications for the use of land as a car park has been approved immediately west of the site (ref: 104212/FO/2013/N1).*

2.2. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources summarised in Table 2.1.

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 20th August 2020 and 4th November 2020. The works are summarised in Table 2.1.

TABLE 2.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE / RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
General Ground Conditions Including the Presence / Nature of Obstructions	WS101	Window Sample Probehole	4.41	0.5–2.0
	WS103		4.42	1.5-4.0
	WS104		3.45	1.0–3.0
	WS105		3.42	1.0–2.0
General Ground Conditions Including the Presence / Geotechnical Properties	CP101	Cable Percussive Borehole	17.00	5.0-10.0
Investigate depth to Rockhead	RBH101	Rotary Borehole	35.50	N/A
General Ground Conditions Including the Presence / Nature of Obstructions	TP101–TP106	Mechanically Excavated Trial Pit	3.55	N/A
Investigation of Ground Conditions and Basement / Underground Structure Locations	TT101A–TT103B	Mechanically Excavated Trial Trench	3.30	N/A

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

Mechanically excavated trial trenches were advanced to investigate the presence and location of relict foundations and basement structures and to map their extent.

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

Cable percussive boreholes were advanced to investigate the deeper soil horizons, to provide detailed geotechnical testing and to permit the installation of a deep groundwater monitoring well.

The rotary borehole was advanced to investigate the depth to rockhead.

The sampling locations are illustrated in Drawing 12-728-005 (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 recovered for chemical analysis.

2.3. IN-SITU STANDARD PENETRATION TESTING (SPT)

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

The results are shown in the probehole logs in Appendix V and presented in Table 3.6 and discussed in Section 5.

2.4. LABORATORY ANALYSIS

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

- Metals.
- pH, total sulphate, water-soluble sulphate (2:1 extract).
- Sulphide.
- Cyanide.
- Phenols.
- Total and speciated polycyclic aromatic hydrocarbons (PAHs).
- Semi Volatile Organic Compounds (SVOC).
- Volatile Organic Compounds (VOC).
- Asbestos identification and quantification.
- Banded total petroleum hydrocarbon (TPH).

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

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

- Atterberg limits determinations.
- Particle size distribution.
- Compaction tests.
- Consolidation tests.
- Single-stage triaxial tests.

Laboratory analysis sheets are included in Appendix VIII 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 identifies the strata set out in Table 3.1.

TABLE 3.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)					
	MADE GROUND	SOFT CLAY	ORGANIC SILT	STIFF CLAY	SAND / GRAVEL	BEDROCK
TP101	0.00–1.60	–	–	–	–	–
TP102	0.00–1.50	–	–	1.50-3.50	–	–
TP103	0.00–1.20	–	–	1.20-3.00	–	–
TP104	0.00–2.80	–	–	2.80-3.00	–	–
TP105	0.00–2.50	–	–	2.50-3.55	–	–
TP106	0.00-1.80	–	–	1.80-3.50	–	–
TT101A	0.00-2.10	–	–	–	–	–
TT101B	0.00-1.50	–	–	–	–	–
TT102A	0.00-2.90	–	–	2.90-3.30	–	–
TT102B	0.00-3.00	–	–	3.00-3.20	–	–
TT102C	0.00-2.10	–	–	–	–	–
TT103A	0.00-3.00	–	–	3.00-3.30	–	–
TT103B	0.00-2.80	–	–	2.80-3.00	–	–
WS101	0.00-3.00	3.00-3.20	–	3.200-4.41	–	–
WS103	0.00-3.00	–	–	3.0-4.42	–	–
WS104	0.00-1.60	–	–	1.60-3.45	–	–
WS105	0.00-2.10	–	–	2.10-3.42	–	–
CP101	0.00-4.60	–	–	4.60-14.10 14.90-16.82	14.10-14.90	–
RBH101	0.00-4.60			4.60-20.00 25.50-26.50	20.00-25.50	26.50-36.50

3.2. MADE GROUND

Made Ground deposits were encountered within all exploratory hole locations to depths of between 1.20 m and 4.60 m bgl, although, in general, Made Ground was encountered to a depth of between 1.00 m and 3.00 m bgl.

Made Ground deposits generally comprise reworked clay with brick and concrete rubble from the demolition of historic structures. The base of the Made Ground was not encountered in TP101, TT101A, TT101B and TT102C due to instability and the presence of rubble.

A Depth of Made Ground Plan is presented as Drawing 12-728-006 in Appendix III.

3.3. DRIFT DEPOSITS

Drift deposits were encountered within the majority of exploratory locations with the exception of TP101, TT101A, TT101B and TT102C where the full depth of Made Ground could not be proven. The drift deposits were encountered to 26.50 m bgl (RBH101) and generally comprise firm low strength to very stiff very high strength red brown gravelly CLAY with gravel of sandstone.

Brown clayey fine to medium SAND was encountered in CP101 between 14.10 to 14.90 m bgl. This was underlain by very stiff very high strength CLAY.

Soft black silty CLAY with an organic odour was identified in WS101 between 3.00 to 3.20 m bgl, directly beneath the Made Ground.

3.4. SOLID GEOLOGY

A weak red brown SANDTONE was recorded at 26.50 m bgl to a proven termination depth of 35.50 m bgl.

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
TP102	0.6	Perched within Made Ground
TP103	1.2	Perched at base of Made Ground overlying natural strata
TP106	3.5	Slow ingress and rising from base or excavation
TT102C	2.1	Sidewall ingress collecting on concrete basement hardstanding
WS105	0.9	Strike in Made Ground.

Monitoring was undertaken using an electronic dip meter and interface probe to record the depth to groundwater and the thickness of any free-phase hydrocarbon product, if present.

These results are summarised in Table 3.11.

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
TP102	0.6	Made Ground	Strong hydrocarbon odour and sheen

3.7. SOIL CONSISTENCY

Undrained shear strength values were measured using laboratory undrained triaxial tests. In the field hand shear vane test could not be performed as representative samples could not be retrieved.

Results of the testing is presented in Table 3.4 below, which indicate the clay soils to vary between stiff and very stiff.

Strength test data is generally consistent with the field descriptions of the aforementioned soils.

TABLE 3.4 SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m^2)	CONSISTENCY
WS104	2.5-3.0	Stiff brown slightly gravelly sandy CLAY.	124	Stiff
CP101	5.0-5.45	Very stiff brown very sandy slightly clayey SILT.	218	Very Stiff

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

3.8. SIDE STABILITY AND EASE OF EXCAVATION

The sides of the exploratory trial pit excavations were generally unstable due to loosely compacted Made Ground with frequent brick and concrete cobbles.

The natural strata was excavated with relative ease.

TABLE 3.5 STANDARD / CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS101	1.2	MG: Gravelly Clay	11	10.79	N/A	Medium Strength	Stiff	53.97	110.96
	2.0	MG: Gravelly Clay	10	9.14	N/A	Medium Strength	Stiff	45.68	93.91
	3.0	Gravelly CLAY	27	23.48	N/A	High Strength	Very Stiff	117.40	241.38
	4.0	Gravelly CLAY	50	42.24	N/A	Very High Strength	Very Stiff	211.21	434.25
WS103	1.2	MG: Gravelly Clay	12	11.77	N/A	Medium Strength	Stiff	58.87	121.05
	2.0	MG: Gravelly Clay	5	4.57	N/A	Low Strength	Firm	22.84	46.96
	3.0	Gravelly CLAY	8	6.96	N/A	Low Strength	Firm	34.79	71.52
	4.0	Gravelly CLAY	50	42.24	N/A	Very High Strength	Very Stiff	211.21	434.25
WS104	1.2	MG: Gravelly Clay	13	12.76	N/A	Medium Strength	Stiff	63.78	131.13
	2.0	Gravelly CLAY	34	31.06	N/A	Very High Strength	Very Stiff	155.30	319.30
	3.0	Gravelly CLAY	48	41.74	N/A	Very High Strength	Very Stiff	208.72	429.12
WS105	1.2	MG: Gravelly Clay	2	1.96	N/A	Extremely Low Strength	Very Soft	9.81	20.17
	2.0	Gravelly CLAY	28	25.58	N/A	High Strength	Very Stiff	127.90	262.95
	3.0	Gravelly CLAY	50	43.48	N/A	Very High Strength	Very Stiff	217.41	447.00

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)*
CP101	1.2	MG: Silty Gravel	3	2.94	Very Loose	N/A	N/A	N/A	29.48
	2.0	MG: Gravelly Clay	9	8.22	N/A	Medium Strength	Stiff	41.11	84.52
	3.0	MG: Gravelly Clay	19	16.52	N/A	High Strength	Very Stiff	82.62	169.86
	4.0	MG: Gravelly Clay	22	18.59	N/A	High Strength	Very Stiff	92.93	191.07
	6.0	CLAY	14	11.48	N/A	Medium Strength	Stiff	57.39	118.00
	9.0	Gravelly CLAY	24	19.36	N/A	High Strength	Very Stiff	96.82	199.07
	12.0	Gravelly CLAY	30	22.33	N/A	High Strength	Very Stiff	111.64	229.53
	15.0	Gravelly CLAY	50	33.48	N/A	Very High Strength	Very Stiff	167.41	344.20
	16.5	Gravelly CLAY	50	31.89	N/A	Very High Strength	Very Stiff	159.44	327.81

NOTES

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

3.9. CONSOLIDATION

Two undisturbed samples of Glacial Till were submitted for oedometer analysis. The results are provided in Table 3.6.

TABLE 3.6 OEDOMETER CONSOLIDATION RESULTS

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	Mv (m^2/MN)	Cv (m^2/year)
WS104	2.50-3.00	Liner	18	0–55	0.124	22.275
				55–110	0.109	11.637
				110–220	0.095	6.480
				220–440	0.066	4.285
				440–55	0.047	1.978
CP101	5.00-5.45	U100	22	0-104.5	0.436	23.453
				104.5-209	0.075	19.064
				209-418	0.045	15.194
				418-836	0.027	13.159
				836-104.5	0.003	24.214

The results have determined that the clay soil is of low compressibility under a loading of 150 kN/m^2. It should be noted that if this material is excavated for use in a cut/fill operation, then careful consideration should be taken in the stabilisation of this material as it would appear that at depth, the cohesive deposits are wetter than the optimum.

The rate at which settlement is likely to occur is determined by the coefficient of consolidation (Cv). As shown in Table 3.8, the coefficient ranges from 1.978 m^2/yr to 23.453 m^2/yr. The rate at which settlement will occur is increased by the presence of sand within the Glacial Till and it is likely that settlement will occur over a period of months to years.

3.10. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of Made Ground and natural clay via wet sieve to obtain information on the soil fractions.

The results are included in Table 3.7 overleaf. The full results can be found in Appendix VIII.

TABLE 3.7 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
CP101	1.20-1.70 (Made Ground)	0	62	27	11
TP102	3.20 (Natural)	0	0	11	89
TP105	1.00 (Made Ground)	41	32	9	18

3.11. SOIL DENSITY / MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising a 2.5kg rammer.

The results of the tests have been summarised in Table 3.8 below. The full test results can be found in Appendix VIII.

TABLE 3.8 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/m³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
CP101	MADE GROUND brown very sandy silty gravel.	1.20	2.5kg	18	18	4	1.63	19
TP102	Brown mottled grey sandy CLAY.	3.20	2.5kg	19	19	0	1.75	0
TP105	MADE GROUND brown slightly sandy very clayey gravel of cobbles	1.00	2.5kg	19	17	63	1.53	6

The proctor compaction tests have indicated that the materials on site are variable with the material in TP105 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 liquid and plastic limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average plasticity index (PI) for each “type” of clay, although judgement is applied where variable results are reported.

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

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

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

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

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

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

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

The Atterberg limits determinations, summarised in Table 3.9, show the clay to be of predominantly moderate plasticity.

TABLE 3.9 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
CP101	1.2	17	19	40	21	97	20	Medium
WS101	2.0	18	21	45	24	93	22	Medium

The results of the Atterberg limits testing confirmed that the soils would be deemed to be 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 3.10), 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).

TABLE 3.10 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
TP101	0.5	0.053	9.1	DS-1. AC-1s
TP102	0.6	0.44	8.2	DS-1. AC-1s
TP102	1.5	0.12	8.4	DS-1. AC-1s
TP103	0.4	0.026	8.5	DS-1. AC-1s
TP103	1.2	0.29	8.1	DS-1. AC-1s
TP104	0.1	0.019	12.1	DS-1. AC-1s
TP105	0.5	0.037	8.5	DS-1. AC-1s
TP105	3.3	0.069	8.6	DS-1. AC-1s
TP106	0.4	0.056	9.2	DS-1. AC-1s
TP106	1.8	0.084	6.1	DS-1. AC-1s
TT102A	3.0	0.25	8.2	DS-1. AC-1s
TT102B	1.2	0.15	11.1	DS-1. AC-1s
TT102C	0.4	0.094	8.6	DS-1. AC-1s
TT103B	2.9	0.14	9.4	DS-1. AC-1s
WS101	0.7	0.039	8.1	DS-1. AC-1s
WS101	3.0	0.44	7.9	DS-1. AC-1s
WS104	0.3	0.16	10.4	DS-1. AC-1s

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
WS104	2.0	0.065	8.7	DS-1. AC-1s
WS105	1.5	0.094	8.8	DS-1. AC-1s
WS105	2.8	0.22	8.8	DS-1. AC-1s

3.14. GROUND GAS

A ground gas assessment has been completed in accordance with guidance provided within CIRIA 665 – *Assessing risk posed by hazardous ground gases to buildings*.

3.15. INVESTIGATION RATIONALE

The ICSM has identified that the underlying Made Ground may represent a potential source of ground gas generation. Based on the identification of these sources, E3P has determined that the site represents a low ground gas source generation potential.

Within the context of the proposed residential end use and ground gas generation potential, the gas assessment requires that six visits are required over three months, with at least two sets of readings at low or falling atmospheric pressure as set out within CIRIA 665 Tables 5.5a and 5.5b.

The spacing requirements for monitoring wells are detailed within CIRIA 665 Table 4.2, which indicates that for low gas hazard sites (Made Ground with limited degradable material, organic clay of limited thickness) and a high sensitivity development, nominal well spacing should be between 25 m and 50 m.

TABLE 3.11 GROUND GAS MONITORING LOCATION RATIONALE

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
WS101	Made Ground	0.5–2.0
WS103	Made Ground	1.5–4.0
WS104	Made Ground	1.0–3.0
WS105	Made Ground	1.0–2.0
CP101	Natural Drift	5.0–10.0

3.16. MONITORING METHODOLOGY

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

Gas measurements were recorded for a minimum of 60 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 3.11.

TABLE 3.11 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS101	06/10/20	Well Flooded.										0.50-2.00	-	
	22/10/20													
	06/11/20													
	19/11/20													
	10/12/20													
	08/01/21													
WS103	06/10/20	0.1	0.1	0.0001	0.7	0.7	0.0007	19.4	1004	Rising	0.1	1.50-4.00	2.76	Dry
	22/10/20	0.1	0.1	0.00013	0.6	0.6	0.00078	19.5	1001	Falling	0.13		2.75	Dry
	06/11/20	0.1	0.1	0.00026	0.4	0.4	0.00104	19.6	1009	Falling	0.26		2.71	Dry
	19/11/20	0.1	0.1	-0.00013	0.5	0.5	-0.00065	19.7	1020	Rising	-0.13		2.7	Dry
	10/12/20	0.1	0.1	0.00052	0.4	0.4	0.00208	19.5	1016	Falling	0.52		2.7	Dry
	08/01/21	0.1	0.1	0.00026	0.4	0.4	0.00104	19.5	1013	Rising	0.26		2.7	Dry
WS104	06/10/20	0.1	0.1	-0.00116	0.1	0.1	-0.00116	19.7	1004	Rising	-1.16	1.00–3.00	2.87	1.80
	22/10/20	0.1	0.1	-0.00052	0.1	0.1	-0.00052	19.8	1001	Falling	-0.52		2.87	1.82
	06/11/20	0.1	0.1	-0.00096	0.1	0.1	-0.00096	19.9	1009	Falling	-0.96		2.87	1.80
	19/11/20	0.1	0.1	-0.00154	0.1	0.1	-0.00154	19.9	1020	Rising	-1.54		2.88	1.80
	10/12/20	0.1	0.1	-0.00088	0.1	0.1	-0.00088	19.8	1016	Falling	-0.88		2.88	1.86
	08/01/21	0.1	0.1	-0.00013	0.1	0.1	-0.00013	19.9	1013	Rising	-0.13		2.87	1.80
WS105	06/10/20	0.1	0.1	-0.00271	0.1	0.1	-0.00271	19.8	1004	Rising	-2.71	1.00–2.00	1.39	0.78
	22/10/20	0.1	0.1	-0.00172	0.1	0.1	-0.00172	19.7	1001	Falling	-1.72		1.40	0.80

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
	06/11/20	0.1	0.1	-0.00133	0.1	0.1	-0.00133	20	1009	Falling	-1.33		1.4	0.98
	19/11/20	0.1	0.1	-0.00142	0.1	0.1	-0.00142	19.9	1020	Rising	-1.42		1.39	1.00
	10/12/20	0.1	0.1	-0.0017	0.1	0.1	-0.0017	19.9	1016	Falling	-1.7		1.4	0.96
	08/01/21	0.1	0.1	-0.0023	0.1	0.1	-0.0023	19.8	1013	Rising	-2.3		1.4	0.99
CP101	06/10/20	0.1	0.1	-0.00128	0.1	0.1	-0.00128	20.1	1004	Rising	-1.28	5.00-10.0	10.15	4.12
	22/10/20	0.1	0.1	0.00013	0.2	0.2	0.00026	20.0	1001	Falling	0.13		10.15	4.20
	06/11/20	Well Flooded.											-	
	19/11/20													
	10/12/20													
	08/01/21													

4. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

4.1. DEVIATING SAMPLES

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

Deviations were identified within one soil sample from TT102B relating to the use of an incorrect container for phenols, PAH and TPH. Compared to the overall number of samples tested, the deviations are not though to change the overall risk assessment or its conclusions.

Deviation is identified in the groundwater samples from CP101 and WS104, which relate to the use of an incorrect container for BTEX and MTBE and VOCs. The identified deviations are not considered to have impacted the overall risk assessment.

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).

The comparison has been made against the Residential End Use Without Plant Uptake thresholds.

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

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

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	40	21	61	WS101 0.7m	1	**Further Action**
Cadmium	mg/kg	85	21	0.5	N/A	1	No Further Action
Chromium (VI)	mg/kg	6	21	< 4.0	N/A	1	No Further Action
Lead	mg/kg	200	21	1500 1300 1100 1100 550 370 300 250	TT103B 2.9m WS105 1.5m TT102B 1.2m TT102C 0.4m TT102A 1.0m TP106 0.4m TP105 0.5m TP103 1.2m	1	**Further Action**
Mercury	mg/kg	1.2	21	1.3	TP105 0.5m	3	**Further Action**
Nickel	mg/kg	180	21	45	N/A	1	No Further Action
Selenium	mg/kg	430	21	< 1.0	N/A	1	No Further Action
Copper	mg/kg	7100	21	170	N/A	1	No Further Action
Zinc	mg/kg	40000	21	340	N/A	1	No Further Action
Cyanide – Total	mg/kg	791	21	< 1.0	N/A	1	No Further Action
Phenols – Total	mg/kg	210	21	< 1.0	N/A	1	No Further Action
Asbestos	Fibres	NFD	8	<0.001%	TT102C 0.4m WS103 1.5m	3	**Further Action**
Naphthalene	mg/kg	2.3	23	120 46 44 3.0	TP101 0.5m WS104 0.3m TP102 0.6m TT102C 0.4m	4	**Further Action**
Acenaphthylene	mg/kg	2900	23	2.2	N/A	2	No Further Action
Acenaphthene	mg/kg	3000	23	20	N/A	1	No Further Action
Fluorene	mg/kg	2800	23	25	N/A	1	No Further Action
Phenanthrene	mg/kg	1300	23	110	N/A	2	No Further Action
Anthracene	mg/kg	31000	23	24	N/A	2	No Further Action
Fluoranthene	mg/kg	1500	23	68	N/A	2	No Further Action
Pyrene	mg/kg	3700	23	70	N/A	2	No Further Action
Benzo(a)Anthracene	mg/kg	11	23	43 13	TP101 0.5m TP103 1.2m	2	**Further Action**
Chrysene	mg/kg	30	23	29	N/A	2	No Further Action
Benzo(b)Fluoranthene	mg/kg	3.9	23	33 11 9	TP101 0.5m TP104 0.1m TP103 1.2m	2	**Further Action**
Benzo(k)Fluoranthene	mg/kg	110	23	11	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	3.2	23	31 10	TP101 0.5m TP104 0.1m	2	**Further Action**

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
				9.6	TP103 1.2m		
Indeno(123-cd)Pyrene	mg/kg	45	23	9.7	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.31	23	3.7 1.7 1.7	TP101 0.5m TP103 1.2m TP104 0.1m	2	**Further Action**
Benzo(ghi)Perylene	mg/kg	360	23	12	N/A	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	20	< 1.0	N/A	4	No Further Action
TPH C6-C8 (aliphatic)*	mg/kg	100	20	< 0.1	N/A	4	No Further Action
TPH C8-C10 (aliphatic)*	mg/kg	27	20	1.0	N/A	4	No Further Action
TPH C10-C12 (aromatic)*	mg/kg	250	20	190	N/A	4	No Further Action
TPH C12-C16 (aromatic)*	mg/kg	1800	20	1400	N/A	4	No Further Action
TPH C16-C21 (aromatic)*	mg/kg	1900	20	2100	TP102 0.6m	1	**Further Action**
TPH C21-C35 (aromatic)*	mg/kg	1900	20	210	N/A	1	No Further Action

Notes
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation.
Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.
* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

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

- Arsenic;
- Lead;
- Total mercury;
- Naphthalene;
- Benzo(a)Anthracene;
- Benzo(b)Fluoranthene;
- Benzo(a)Pyrene;
- Dibenzo(a,h)Anthracene;
- Hydrocarbon Fractions C16-C21 (aromatic); and
- Chrysotile.

Asbestos in the form of loose chrysotile fibres has been identified in the Made Ground in TT102C and WS103 at <0.001%.

No significant concentrations of VOCs were identified in the soils submitted for chemical analysis. Sec-Butylbenzene was identified in TP102 at 0.60 m at a concentration of 0.094 mg/kg.

The laboratory analysis confirms the assessment within the initial conceptual site model that the main constituents of concern were likely to be asbestos, PAHs, hydrocarbon compounds and heavy metals.

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

- The main exposure pathways based on the Tier I exceedances are:
  - Soil ingestion;
  - Vapour inhalation (indoor);
  - Dermal contact and ingestion;
  - Consumption of homegrown vegetables; and
  - Fibre/dust inhalation.
- The exceedances for all determinands are associated with Made Ground deposits, with the exception of the lead exceedance in the natural clay in TT103B at 2.90 m bgl.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

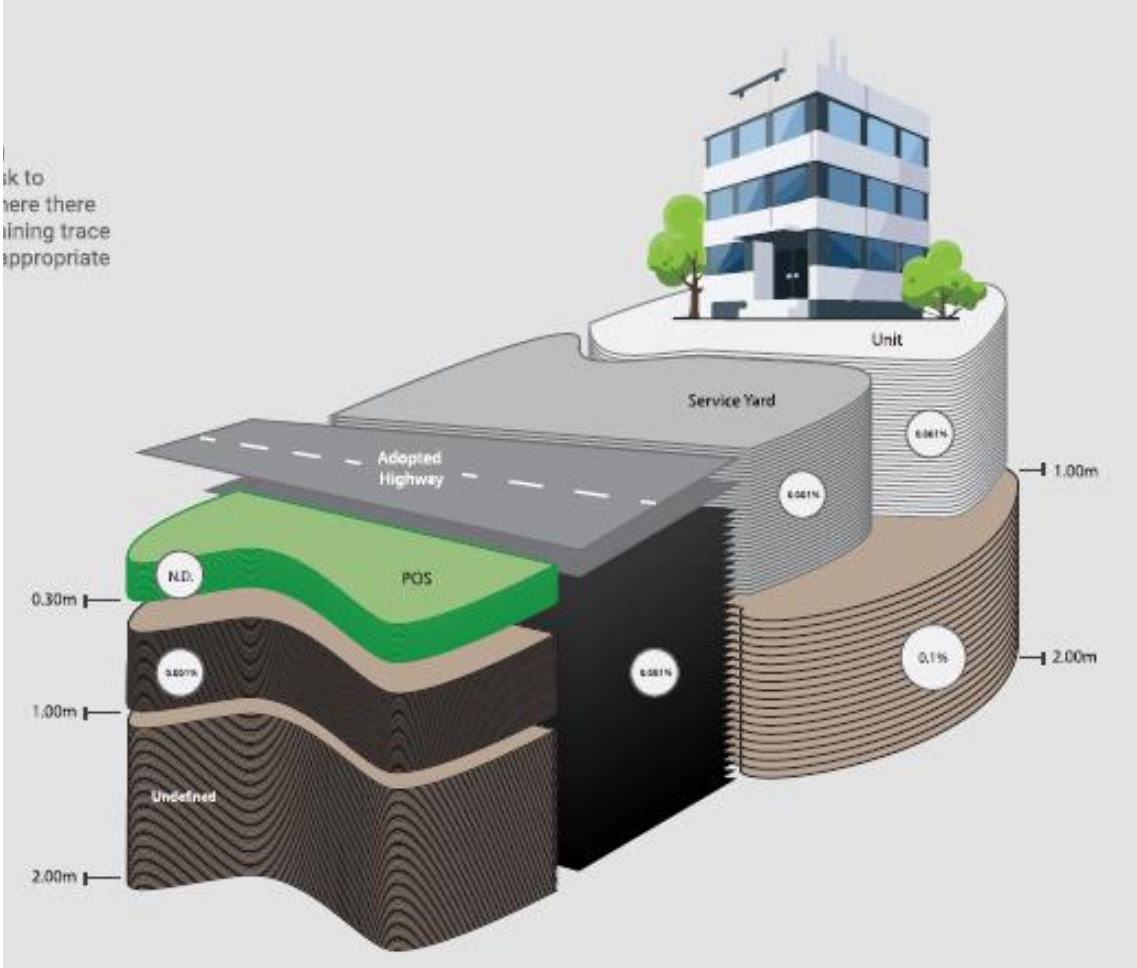
The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH and TPH compounds can be mitigated through the capping of the material by the structure or hardstand, alternatively the installation of a suitable cover system in any landscaping and public open space to remove the potential for direct exposure to impacted soils.

With regards to the elevated naphthalene concentrations, these present a potential volatilisation to indoor air risk. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity.

The concentration of total mercury at TP105 is below the target values for methyl and inorganic mercury, however further analysis is required to confirm the concentration of elemental mercury. During remediation and enabling works, further samples should be submitted for speciated mercury analysis to assess whether elemental mercury is present which may pose a risk to future site users through vapour inhalation. If elemental mercury is identified, it may be necessary to delineate and excavate the soils as a localised hotspot for off-site disposal. Alternatively, if it is proven that there is no elemental mercury and no vapour risk exists, the soils can be retained on site if placed in an area of low sensitivity (such as beneath hardstand) or a clean cover system in areas of soft landscaping.

Asbestos in the form of chrysotile has also been identified within localised areas in Made Ground deposits. Asbestos quantification confirms that only trace fibres are present, and no visual signs of ACM were encountered during the ground investigation. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model shown in Figure 4.1 overleaf.

FIGURE 4.1 ASBESTOS RISK MITIGATION CONCEPTUAL SITE MODEL



Notes
ND None Detect
0.001% Soils may contain ≤ 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 >1.00m 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.

With the exception of the natural clay in TT103B, chemical analysis of the natural clay drift deposits has identified these soils to be acceptable for use as subsoil within the proposed landscaped areas; however, further chemical validation samples will be required to confirm this.

There are no suitable sources of topsoil available on the site.

If sub-soil is to be removed from site, a U1 Exemption or a CL:AIRE MMP for the direct transfer of naturally occurring soils will be required.

If any material is removed for off-site disposal a WM-3 waste classification will be required.

4.3. CONTROLLED WATERS RISK ASSESSMENT

The site sensitivity with respect to controlled waters is summarised within Table 4.2.

TABLE 4.2 CONTROLLED WATERS SENSITIVITY PROFILE

RISK PROFILE	DISCUSSION	SENSITIVITY RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a Groundwater Source Protection Zone.	**Low**
Distance to the Closest Groundwater Abstraction Point	The closest groundwater abstraction is a potable supply, located 900 m northwest.	**Moderate**
Aquifer Classification in Superficial Drift Deposits	Glacial Till across most of the site is classified as a secondary aquifer - undifferentiated.	**Low**
Aquifer Classification in Bedrock	Underlying bedrock is classified as a principal aquifer.	**High**
Viability for Anthropogenic Soil in Direct Contact with Aquifer (Drift or Bedrock)	Variable Made Ground with low-level (predominantly low-solubility) hydrocarbon impact is present in the near surface. Significant depths of cohesive drift deposits in excess of 16.0 m are present overlying the bedrock.	**Low**
Is the Site Located Within 50 m of a Surface Watercourse?	The Rochdale Canal is located c. 410 m southeast and the River Irk is 480 m northwest of the site.	**Low**
SUMMARY The ICSM developed within the context of the site setting has only identified a single viable pollutant linkage, which would be the downward migration of potentially mobile phase-soluble contaminants towards the underlying principal aquifer. However, the overall sensitivity of this receptor is reduced given the presence of a significant thickness of low permeability drift deposits and the absence of any groundwater abstraction in the principal aquifer within 900m of the site.		

To further refine the ICSM, E3P has undertaken an initial qualitative assessment of the soil data analysis to assess the potential for a source of separate-phase or dissolved-phase contamination originating from either a defined on-site source or from impacted soils.

This assessment is summarised in Table 4.3.

TABLE 4.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

BTEX > 1 mg/kg	The soil data analysis has not identified any detectable concentrations of TPH C5 to C6 that might otherwise be indicative of VOC impact
Total VOC > 1 mg/kg	
Total SVOC > 1 mg/kg	PAH analysis recorded concentrations either below or only slightly elevated above the laboratory LOD
C5-C10 > 5 mg/kg	All concentrations are below the laboratory LOD
C10-C12 > 10 mg/kg	Concentrations of up to 190 mg/kg have bene identified.
C12-C16 > 50 mg/kg	Concentrations of up to 1400 mg/kg have been identified. Four out of twenty-two samples are above 50 mg/kg.
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD
Naphthalene > 2 mg/kg	Naphthalene has been identified at concentrations up to 120 mg/kg.
Total PAH > 10 mg/kg	Concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected in the soil analysis
PCB > 1 mg/kg	No potential sources of PCB have been identified
Heavy metals > 500 mg/kg	Concentrations of lead are above 500 mg/kg in five out of twenty-one samples.

In due consideration of the ICSM, which has identified a potential pollutant linkage associated with the migration towards the underlying principal aquifer, E3P has undertaken a Tier I controlled waters risk assessment.

The Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to drinking water standards in the first instance and in absence of environmental quality standards (EQS).

These are presented in Table 4.4.

TABLE 4.4 COMPARISON OF GROUNDWATER ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS SCREENING VALUE[1, 2, 3]	DWS [3,4,5]	N		MC	LOC. OF EX	ASSESSMENT
		AA		L	GW			
Arsenic	µg/l	50	10	1	2	9.0	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	1	2	<0.08	N/A	No Further Action
Chromium (VI)	µg/l	3.4	–	1	0	<5.0	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	1	2	6.3	N/A	No Further Action
Copper	µg/l	1	2000	1	2	23	N/A	No Further Action
Total Cyanide	µg/l	1	50	1	2	<1.0	N/A	No Further Action
Lead	µg/l	1.2	10	1	2	24	TT103A (L)	**Further Action**
Mercury	µg/l	–	1.0	1	2	<0.5	N/A	No Further Action
Nickel	µg/l	4	20	1	2	4.1	N/A	No Further Action
Selenium	µg/l	–	10	1	2	12	WS104	**Further Action**
Zinc	µg/l	10.9	–	1	2	10	N/A	No Further Action
pH		6–9		1	2	7.0 – 8.4	N/A	No Further Action
PAH								
Naphthalene	µg/l	2	10*	1	2	<0.01	N/A	No Further Action
Anthracene	µg/l	0.1		1	2	<0.01	N/A	No Further Action
Benzo[b]fluoranthene	µg/l	0.00017*		1	2	<0.01	N/A	No Further Action
Benzo[k]fluoranthene	µg/l	0.00017*		1	2	<0.01	N/A	No Further Action
Benzo(a)pyrene	µg/l	0.00017*		1	2	<0.01	N/A	No Further Action
Indeno(123-cd)pyrene	µg/l	0.00017*		1	2	<0.01	N/A	No Further Action
Benzo(ghi)pyrene	µg/l	0.00017*		1	2	<0.01	N/A	No Further Action
Fluoranthene	µg/l	0.0063		1	2	<0.01	N/A	No Further Action
Benzo(ghi)perylene	µg/l	1.7–4		1	2	<0.01	N/A	No Further Action
TPH-Aromatic								
TPH C5-C6 (benzene)	µg/l	10	1	1	2	<1.0	N/A	No Further Action
TPH C6-C8 (toluene)	µg/l	74	700	1	2	<1.0	N/A	No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	1	2	<1.0	N/A	No Further Action
TPH C10-C12 (xylene)	µg/l	30	500	1	2	<10	N/A	No Further Action
TPH C12-C16	µg/l	2	90[5]	1	2	<10	N/A	No Further Action
TPH C16-C35	µg/l	50#	90[5]	1	2	<10	N/A	No Further Action
TPH Aliphatic[5]								
TPH C5-C6	µg/l	–	15000	1	2	<1.0	N/A	No Further Action
TPH C6-C8	µg/l	–	15000	1	2	<1.0	N/A	No Further Action
TPH C8-C10	µg/l	–	300	1	2	<1.0	N/A	No Further Action

DETERMINAND	UNIT	EQS SCREENING VALUE[1, 2, 3]	DWS [3,4,5]	N		MC	LOC. OF EX	ASSESSMENT
		AA		L	GW			
TPH C10-C12	µg/l	–	300	1	2	<10	N/A	No Further Action
TPH C12-C16	µg/l	–	300	1	2	<10	N/A	No Further Action
TPH C16 – C21	µg/l	–	300**	1	2	<10	N/A	No Further Action
TPH C21-C35	µg/l	–	300**	1	2	<10	N/A	No Further Action
VOC								
Tetrachloroethylene	µg/l	0.4	10	0	2	<1.0	N/A	No Further Action
Trichloroethylene	µg/l	10	10	0	2	<1.0	N/A	No Further Action
Trichlorobenzene	µg/l	0.4	–	0	2	<1.0	N/A	No Further Action
Trichloromethane	µg/l	2.5	–	0	2	<1.0	N/A	No Further Action
Dichloromethane	µg/l	20	200	0	2	<1.0	N/A	No Further Action
Carbon Tetrachloride	µg/l	12	3	0	2	<1.0	N/A	No Further Action
Vinyl Chloride	µg/l	–	0.3	0	2	<1.0	N/A	No Further Action

Notes
Solubility <0.01µg/l
AA – Annual Average
* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water
** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.
1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
3. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
4. WHO Guidelines for Drinking Water Quality. Third edition (2004)

CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

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

- Lead; and
- Selenium.

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

Inorganic determinands identified above are of a general low solubility and therefore mobility, suggesting that these will not migrate to controlled water receptors. Furthermore, they may be representative of suspended solids within the water samples obtained rather, than the true dissolved phase.

The lead exceedance is from a leachate sample from TT103A. Leachate analysis is generally considered to be more aggressive and can overstate the risk.

Given that the site is underlain by low-permeability, predominantly cohesive glacial till deposits to depths in excess of 20.0 m bgl, which will afford protection to the underlying principal aquifer in the bedrock, there is considered to be a low risk to controlled waters and the wider environ as there exists no complete pollutant linkage.

4.4. GROUND GAS

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 – *Assessing risks posed by hazardous ground gases to buildings* (2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

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

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

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

The thresholds for GSVs based upon NHBC and CIRIA guidance are provided within Table 4.5.

TABLE 4.5 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665 AND NHBS REPORT NO 10627-R01 – RESIDENTIAL END USE

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

4.4.1. SOURCES OF GROUND GAS

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

- Made Ground deposits to a proven depth of 4.60m bgl.

4.4.2. GROUNDWATER

Monitoring well WS101 was flooded during the initial monitoring visits and cannot therefore be included within the gas assessment. CP101 was under standing water on four occasions.

Groundwater levels were recorded between depths of 0.78 m bgl (WS105) and 4.20 m bgl (CP101). WS103 was recorded as dry.

4.4.3. GAS FLOW

During the monitoring a positive flow was noted in WS103 and CP101 at rates of between 0.10-0.52 l/hr. The measure of the low-level positive flow in this instance is likely to be a result of groundwater fluctuations – as opposed to gas generation.

Negative flows were recorded in WS104, WS105 and CP101. Negative flows may be indicative of back pressure from wind being greater than the active flow from the wells.

4.4.4. GAS CONCENTRATIONS

No elevated concentrations of methane or carbon dioxide have been recorded during the initial monitoring visits.

The maximum concentration of methane was 0.1 % v/v and the maximum concentration of carbon dioxide was 0.7 % v/v.

4.4.5. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P has utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV).

The GSVs for the monitoring positions are summarised in Table 4.6.

TABLE 4.6 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CH_4 (% v/v)	GSV (l/hr)	MAX CO_2 (% v/v)	GSV (l/hr)	CLASSIFICATION
WS103	0.1	0.00052	0.7	0.00208	CS1
WS104	0.1	-0.00013	0.1	-0.00013	CS1
WS105	0.1	-0.00133	0.1	-0.00133	CS1
CP101	0.1	-0.00128	0.1	-0.00128	CS1

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

Preliminary ground gas monitoring (to date) suggests that the site can be classified as CS1, and it is considered that gas protection measures will not be required, however, this is an interim assessment and will be confirmed on completion of the full gas monitoring programme.

4.5. 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 4.7 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at Current pipeline depth (mg/kg)
Total VOC	0.5	<1.0
Total BTEX And MTBE	0.1	<0.001
Total SVOCs (Excluding PAH and those substances marked with an *)	2	>10
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	1.0
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	1400
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	2100
Phenols (From SVOC Analysis)*	2	>2.0
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	>2.0
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?	Yes, there are a number of exceedances.	
Is free product present in soil and groundwater?	A hydrocarbon sheen was noted in TP102.	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	Yes, shallow groundwater strikes have been identified.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	Currently unknown.	
Will soils be imported to site as part of any future earth works	Currently unknown. The importation of materials may affect the WIR Risk Assessment which should be updated after completion.	

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

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

4.6. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 4.8 has been prepared for the site.

TABLE 4.8 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 **PL2**	Heavy Metals, Non-volatile PAH	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	High	**LOW**
Assessment: Heavy metals and non-volatile PAH have been identified throughout Made Ground across the site. **Recommendation:** Cover system to landscaped areas will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						
PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off-site land users.	Likely	Low	**LOW**
Assessment: Trace fibres of asbestos (<0.001 %) have been identified in TT102C and WS103, however asbestos fibres must be assumed to be present throughout the Made Ground. **Recommendation:** Cover system to landscaped areas and placement of the soils in accordance the asbestos CSM will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Volatile Contaminants such as Naphthalene, Mercury (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Likely	Moderate	**TBC**
Assessment: Elevated concentrations of naphthalene have been identified in the Made Ground in TP101, TP102, TT102C and WS104. Marginally elevated total mercury has been identified in the Made Ground at TP105. **Recommendation:** Delineation, excavation and validation is required for the identified naphthalene hotspots. Further mercury speciation analysis is required to determine if a vapour risk has been identified. If elemental mercury is identified, it may be necessary to delineate and excavate the soils as a hotspot for off-site disposal. Alternatively, if it is proven that there is no elemental mercury, placement under hardstand or a clean cover system will be sufficient.						
PL4	Methane, carbon dioxide (Made Ground)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Moderate	**LOW**
Assessment: Monitoring completed to date suggests CS1 / Green. **Recommendation:** Completion of ground gas monitoring and allowance for CS2 measures due to deep Made Ground.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL5	Mobile contaminants (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (principal aquifer).	Low Likelihood	Low	**LOW**
Assessment: Selenium and lead exceed the DWS standards. However, given that the site is underlain by low-permeability, predominantly cohesive glacial till deposits to depths in excess of 20.0 m bgl, which will afford protection to the underlying principal aquifer in the bedrock, there is considered to be a low risk to controlled waters and the wider environ as no complete pollutant linkage can be determined. **Recommendation:** No further action is required.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Low	**LOW**
Assessment: The soils at the site meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005). **Recommendation:** No further assessment is required.						
PL7	Organic contaminants such as hydrocarbons (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	**LOW**
Assessment: Likely probability as significant contamination has been identified at pipeline depth across the site (0.75–1.35 m).						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
Recommendation: Barrier pipe is likely to be required, however this should be confirmed following a post remediation assessment.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Moderate	**LOW**
Assessment: Contamination has been encountered within shallow Made Ground across the site which may be taken up by flora in soft landscaping. **Recommendation:** Installation of a clean cover system within areas of soft landscaping to prevent plant uptake of contaminants.						

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

5. GEOTECHNICAL ASSESSMENT

5.1. PROPOSED DEVELOPMENT

E3P understands that Mulbury City are to submit a planning application to support the erection of an 8-storey residential building (Use Class C3) comprising 73 residential units, with ground floor commercial use (Classes A1, A2, A3, B1 and D1 (excluding Places of Worship)); alterations to the retained perimeter wall and chimney including the introduction of a light box; disabled car parking, highways, landscaping and other associated works.

5.2. SUMMARY OF GROUND CONDITIONS

Made Ground

Made Ground deposits were encountered within all exploratory hole locations to depths of between 1.20 m and 4.60 m bgl, although, in general, Made Ground was encountered to a depth of between 1.00m and 3.00 m bgl.

Made Ground deposits generally comprise reworked clay with brick and concrete rubble from the demolition of historic structures. The base of the Made Ground was not encountered in TP101, TT101A, TT101B and TT102C due to instability and the presence of rubble.

Drift

Drift deposits were encountered within the majority of exploratory locations with the exception of TP101, TT101A, TT101B and TT102C where the full depth of Made Ground could not be proven. The drift deposits were encountered to depths in excess of 16.82 m bgl (CP101) and generally comprise firm low strength to very stiff very high strength red brown gravelly CLAY with gravel of sandstone.

Brown clayey fine to medium SAND was encountered in CP101 between 14.10 to 14.90 m bgl. This was underlain by very stiff very high strength CLAY.

Soft black silty clay with an organic odour was identified in WS101 between 3.00 to 3.20 m bgl, directly beneath the Made Ground.

Solid Geology

A red brown SANDTONE was recorded at 26.50m bgl to a proven termination depth of 35.50m bgl.

Groundwater

Groundwater level monitoring has recorded groundwater at depth of between 0.78m bgl and 4.20m bgl.

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;
- Removal of all concrete and asphalt hardstanding;
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill; and
- 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 ABPS

COHESIVE SOILS			
Description	**Depth (range m bgl)**	**Undrained Shear Strength (Cu) (kN/m²)**	**Allowable Bearing Pressure (kN/m²)**
Firm Gravelly CLAY	3.00	35	72
Stiff Gravelly CLAY	6.00	57	118
Very Stiff Gravelly CLAY	2.00–16.50	97–217	199–447
GRANULAR SOILS			
Description	**Depth (range mbgl)**	**Relative Density**	**Allowable Bearing Pressure (kN/m2)**
SANDSTONE	>26.50	Dense	>350

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying stiff to very stiff glacial clays or sandstone bedrock.

The underlying natural clay drift deposits have been assessed as being firm low strength to very stiff very high strength with a net allowable bearing pressure (ABP) in the order of 72–447 kN/m² between depths of 2.00–16.50 m bgl. The upper horizons of weathered bedrock at a depth >26.00 bgl off an ABP in excess of 350kN/m² (based on SPT data) which will likely increase with depth.

Due to the highly fractured nature of the bedrock only one Unconfined Compressive Strength (UCS) test could be undertaken from the core recovered. The results indicate that at a depth of between 31.50-31.80m bgl the sandstone recorded a strength of 4.2 (MPa) which equates to 4200 kN/m².

As the proposed building will be 8 storeys, the structural loads will necessitate the use of piled foundations. All obstructions would need to be removed as part of the enabling works prior to any piling.

While a detailed assessment of pile depths and bearing capacity is beyond the scope of this report, it is likely that piles would achieve a 'set' within the very stiff clay strata. Consideration of the effects of negative skin friction due to variability on the Made Ground and natural drift strata will be required.

A specialist piling contractor should be contacted to obtain detailed designs and costs for a specialist piling technique and to allow them to reduce the factor of safety based on their extensive pile testing data.

Table 5.2 outlines the anticipated depth to suitable founding strata from existing levels at each E3P location.

TABLE 5.2 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	>5.00-	N/A	Very stiff CLAY	N	Piled	DS-1 AC-1s
WS103	>5.00	>2.75	Very stiff CLAY	N	Piled	DS-1 AC-1s
WS104	>5.00	1.80-1.82	Very stiff CLAY	N	Piled	DS-1 AC-1s
WS105	>5.00	0.80	Very stiff CLAY	N	Piled	DS-1 AC-1s
CP101	>5.00	4.12-4.20	Stiff CLAY	N	Piled	DS-1 AC-1s

5.5. GROUND FLOOR SLABS

Given the nature of the proposed high-rise residential development is it recommended that a ground bearing floor slab be utilised.

In order to accommodate for differential settlement and slab failure it is recommended further Plate Load Testing is undertaken on the sub-grade following the breaking out of hardstand and reduced level dig to understand settlement characteristics and inform a geotechnical design specification in order to engineer to the required level to support a proposed ground bearing slab.

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 Potential, if a ground floor slab is constructed with a cast in-situ suspended floor slab, an engineered design will be required for the heave precautions.

A summary of heave precautions is presented in Table 5.3 below.

TABLE 5.3 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 3-5% if works are completed in favourable climatic conditions.

Following excavation, the sub formation should be proof rolled and any soft material inspected and removed during favourable climatic conditions to prevent exposure to precipitation.

5.8. DRAINAGE

The presence of a deep Made Ground across the site may result in settlement and would therefore preclude the use of soakaway drainage.

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.

5.9. CONCRETE DURABILITY

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

5.10. EXCAVATIONS

Trial pits were generally unstable due to deep Made Ground deposits. The boreholes were advanced with relative ease through the natural soils and generally excavations should be feasible as part of future works with normal plant.

Relict foundations and underground obstructions have been encountered which will require grubbing out in their entirety during the reduced level dig for the sub structure works.

Groundwater has been encountered at depths of between 0.78m-4.20m bgl based on the monitoring completed to date.

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. Consideration should be given for the potential for dewatering gravels in the surrounding areas to the subject site that may cause structural damage to buildings sub-structures in close proximity to the site.

TABLE 5.4 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sand has been identified.
Minor Water Ingress	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure.
Shallow Bedrock	No	Drift deposits were identified to depths in excess of 25.0 m bgl.

5.11. FURTHER WORKS

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

- Further assessment of naphthalene or mercury, if required (retained on-site);
- Remediation & Enabling Works Strategy;
- Further geotechnical testing to determine the settlement characteristics for ground bearing floor slab (upon completion of the reduced level dig) and pavement design;
- Foundations to be designed by suitably qualified Structural Engineer; and
- Geotechnical Earthworks Compaction Specification (Infrastructure).

5.12. CONSTRUCTION ACTIVITY AND INSPECTION

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

- Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and subformations 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).

5.13. GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of Contaminated Soils	Site	10	The identified naphthalene hotspots will require delineation and excavation. The mercury at TP105 may require hotspot removal following the speciation of mercury, resulting the requirement to backfill the resulting void. Should significant backfill be needed deeper or specialist foundations may be required in those areas.
Obstructions	All	100	Subsurface obstruction from relict foundations, chimney and slabs remain.
Trench Collapse	All	100	Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse.
Mature Trees	N/A	N/A	No trees within influencing distance of the site.
Volume Change Potential Clay	Site	80	The cohesive soils have been assessed to be medium volume change potential and therefore precautions may be required at the site.
Peat	Site	5	Local organic materials were identified in a thin horizon in WS101 between 3.0-3.2 m bgl.
Running Sands	N/A	N/A	Data searches indicate Low Risk.
Ground Dissolution	N/A	N/A	Data searches indicate No Hazard.
Concrete Design	Site	100	The soils meet the classification for DS-1, AC-1s.
Low-Permeability Ground	Site	100	Soakaways unlikely to be effective in areas where low permeability cohesive deposits are present or where hydrocarbon impacted soils are present.
Services / Sensitive Structures	Site Boundaries	100	Utilities are present throughout the surrounding highways. Piling may not be possible within immediate proximity of any sensitive infrastructure.
Abnormal Foundation Solutions	Site	100	A piled foundation will be required due to the imposed loads, presence of deep Made Ground and obstructions.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONTAMINATED LAND ASSESSMENT

Human Health	A Tier I human health risk assessment has been undertaken using the chemical analysis results of the soils and comparing to the relevant Tier I criteria. This assessment has identified the presence of elevated heavy metals, PAH, asbestos and total petroleum hydrocarbon (TPH) bands C16-C21. The risk to chronic human health associated with the elevated concentrations on inorganic heavy metals and non-volatile PAH and TPH compounds can be mitigated through the installation of a suitable cover system in all proposed landscaping and public open space to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. With regards to the elevated naphthalene concentrations, these present a potential volatilisation to indoor air risk. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity. The concentration of total mercury at TP105 is below the target values for methyl and inorganic mercury, however further analysis is required to confirm the concentrations of elemental mercury. During remediation and enabling works, further samples should be submitted for speciated mercury analysis to assess whether elemental mercury is present which may pose a risk to future site users through vapour inhalation. If elemental mercury is identified, it may be necessary to delineate and excavate the soils as a localised hotspot and place in an area of low sensitivity or off-site disposal may be required. Alternatively, if it is proven that there is no elemental mercury and no vapour risk, a clean cover system will be sufficient. Asbestos in the form of chrysotile has also been identified within localised areas in Made Ground deposits. Asbestos quantification confirms that only trace fibres are present, and no visual signs of ACM were encountered during the ground investigation. Impacted soils should be managed according to the asbestos risk mitigation conceptual site model.
Controlled Waters	The Tier I assessment has identified exceedances of the DWS for lead and selenium. The inorganic determinands identified above are of a general low solubility and therefore mobility, with their absence in the remaining leachate and groundwater samples suggesting that these will not migrate to controlled water receptors. Based on the laboratory analysis and low sensitivity of the site with respect to groundwater and surface water receptors, there is considered to be a low risk to controlled waters and the wider environ

Ground Gas	Characteristic Situation 1/Green (pending completion of gas monitoring).
Potable Water	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. Current indications suggest that barrier pipe will be required.

6.2. GEOTECHNICAL ASSESSMENT

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying stiff to very stiff glacial clays or sandstone bedrock.

It is therefore recommended that piled foundations are installed capable of transferring structural loads to competent stratum for the residential blocks.

It is assumed that site levels will remain close to present for the proposed residential development, however a programme of cut and fill works may be required to remove the buried obstructions.

The final foundation solution will be dependent on the structural loadings and elevation and should be designed by a suitably qualified structural engineer.

It is considered the Made Ground and underlying soils (excluding any organic soils at the near surface) may provide a sub-grade formation to support proposed roads and infrastructure with a likely CBR of >5%.

The site is not located in an area of historic mine workings or ground instability and the risk of future subsidence is considered to be very low; and

The presence of shallow groundwater and deep Made Ground deposits would likely preclude the use of soakaway drainage systems in this instance.

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

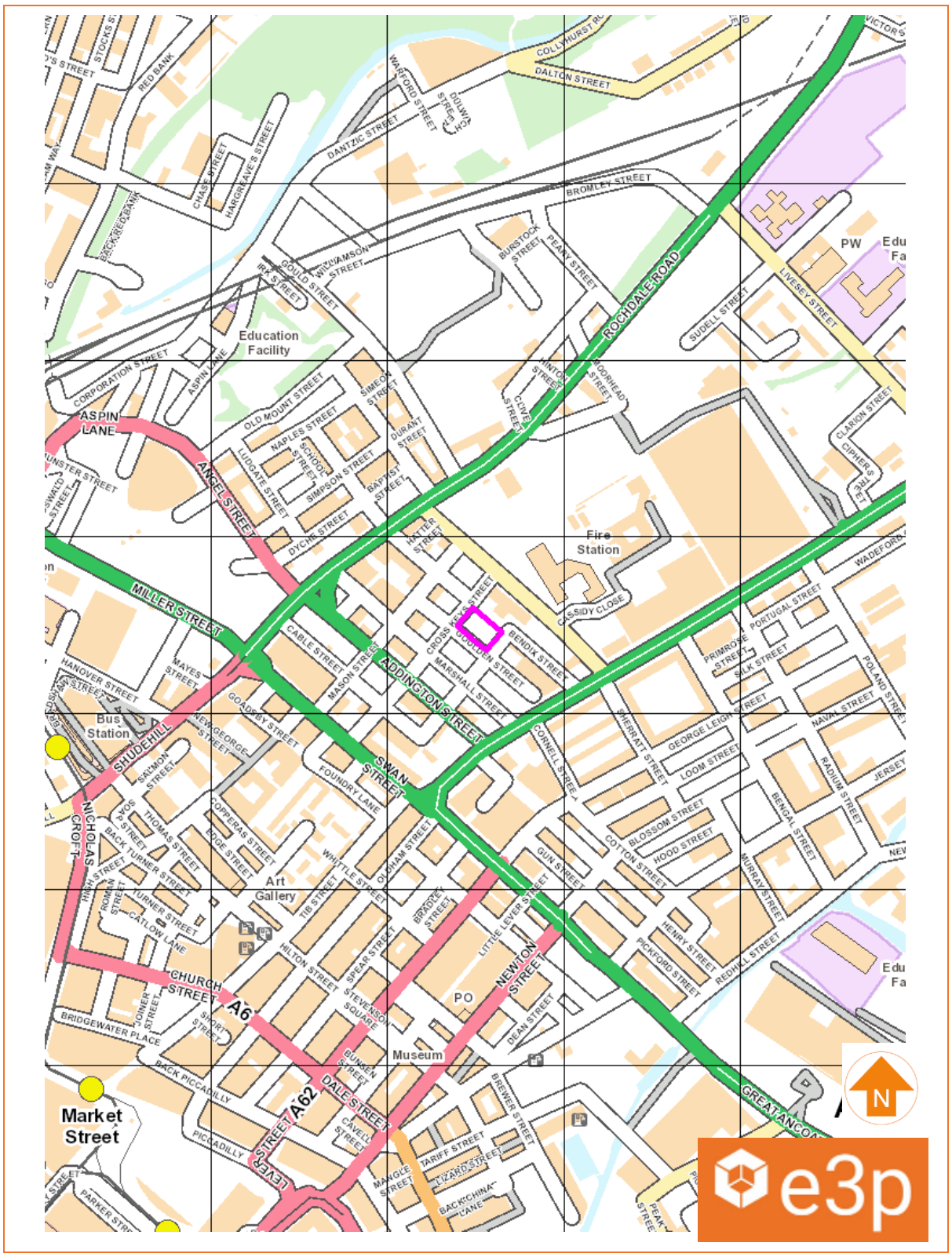
TERMS

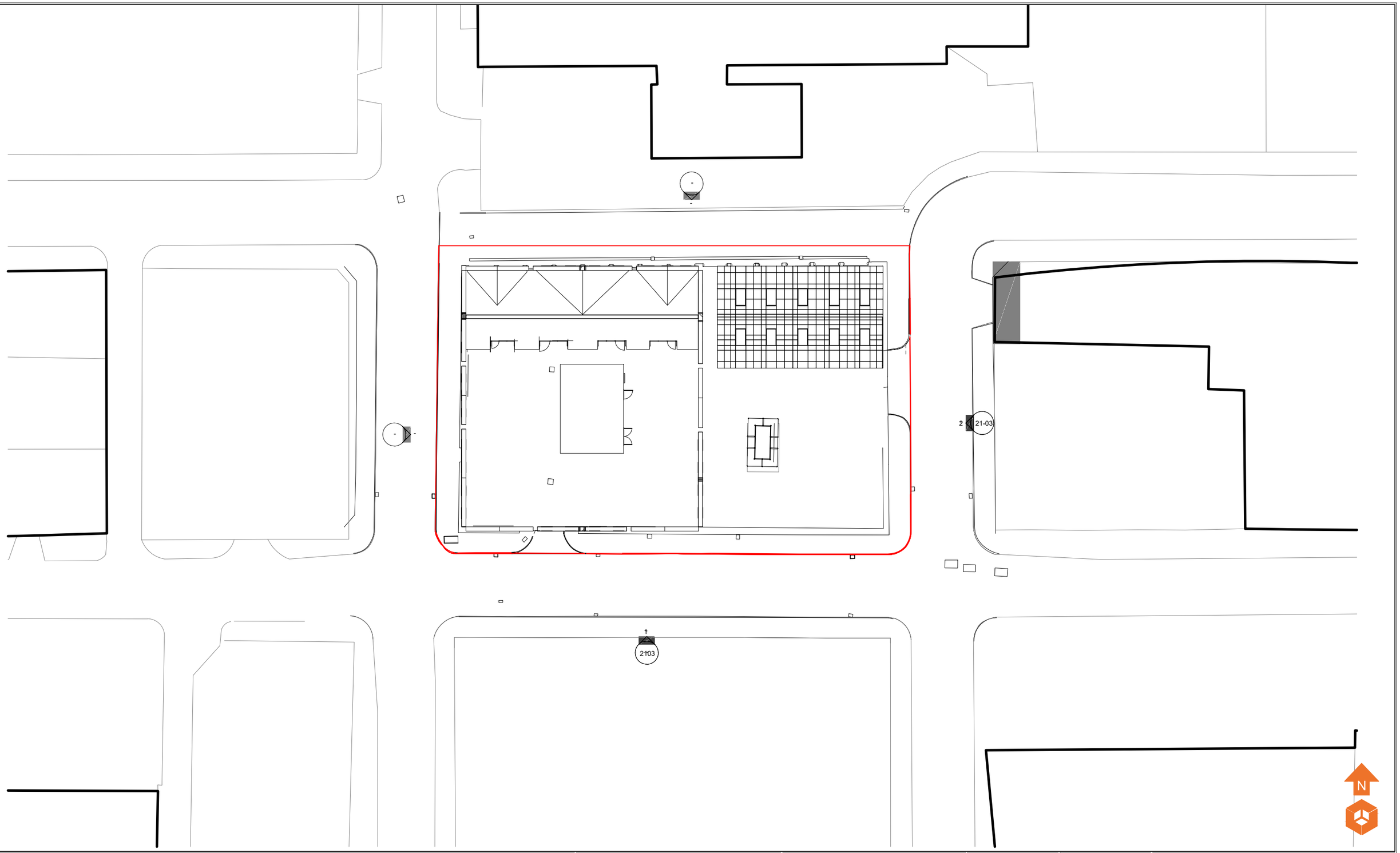
ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement 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/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection

APPENDIX III
DRAWINGS

DRAWING 12-728-001 – SITE LOCATION PLAN





Notes:	Client:	Job No:	Date:
	Scott Hughes Design	12-728	06.11.2020
		Drawing No: 002	Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVA	06.11.2020	LM	NS

Job Title: Goulden Street

Drawing Title: Proposed Development Plan

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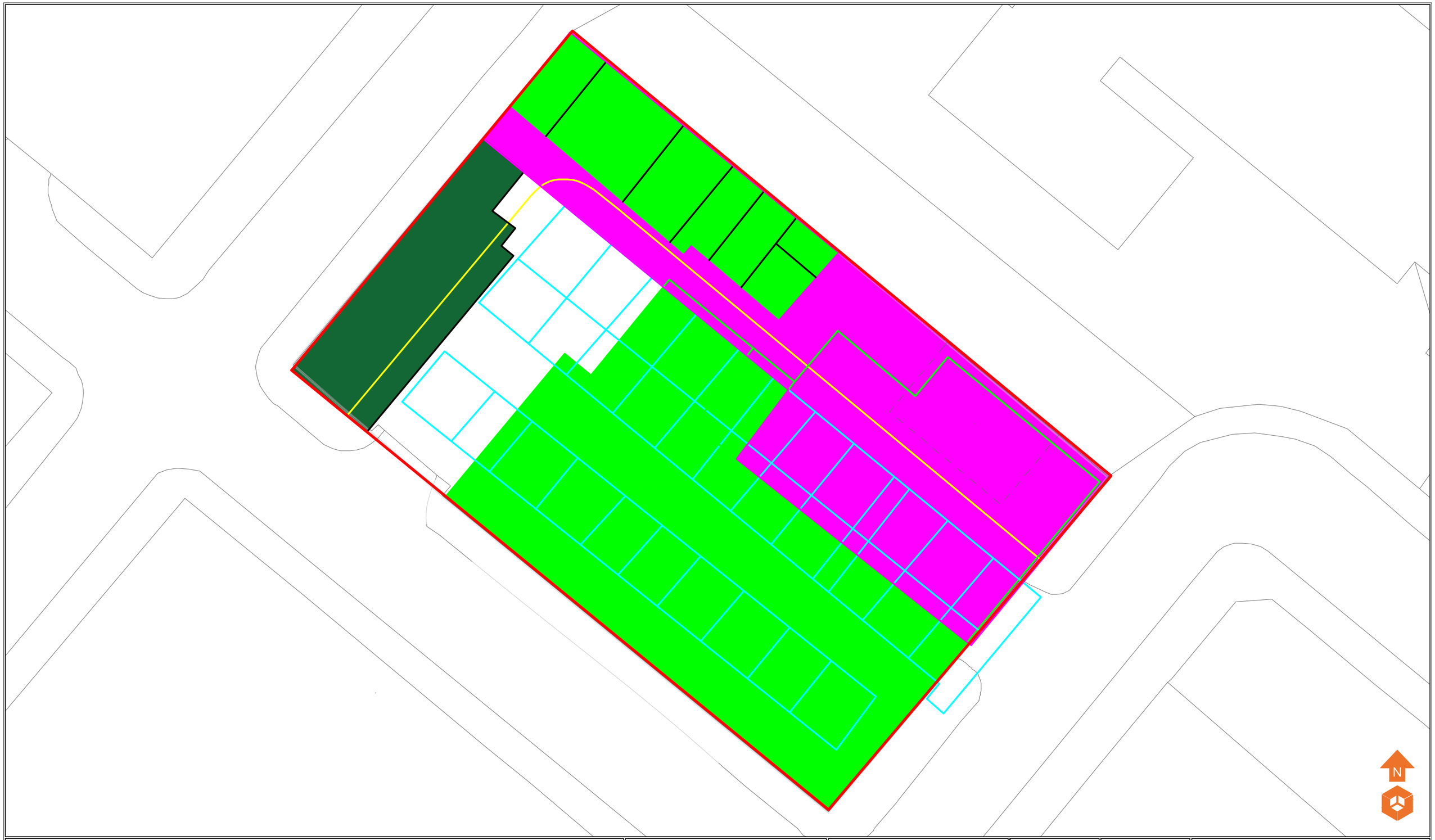

Historical Features

- Former Buildings (Pre 1850 - Pre 1891)
- Former Pavement (Pre 1850 - Pre 1891)
- Former Police Station Buildings (Pre 1891 - Present)
- Former Ambulance Station Building (Pre 1891 - Present)
- Former Police Station Building (Pre 1891 - Pre 1968)

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	03.11.2020	LM	MJ
P1	REVA	18.07.2018	HM	MD

Client: Scott Hughes Design

Job No: 12-728

Date: 03.11.2020

Drawing No: 003

Scale: NTS

Job Title: Goulden Street

Drawing Title: Historical Features Plan

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Site Features

- Main Entrance
- Old Wooden Doors
- Historic Chimney
- Rubble
- Asphalt
- Red Concrete Hardcore
- Old Shutter Doors

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	18.09.2020	HM	EM
P1	REVA	24.08.2020	HM	MJ

Client: Scott Hughes Design

Job No: 12-728

Date: 03.11.2020

Drawing No: 004

Scale: NTS

Job Title: Goulden Street

Drawing Title: Site Features Plan

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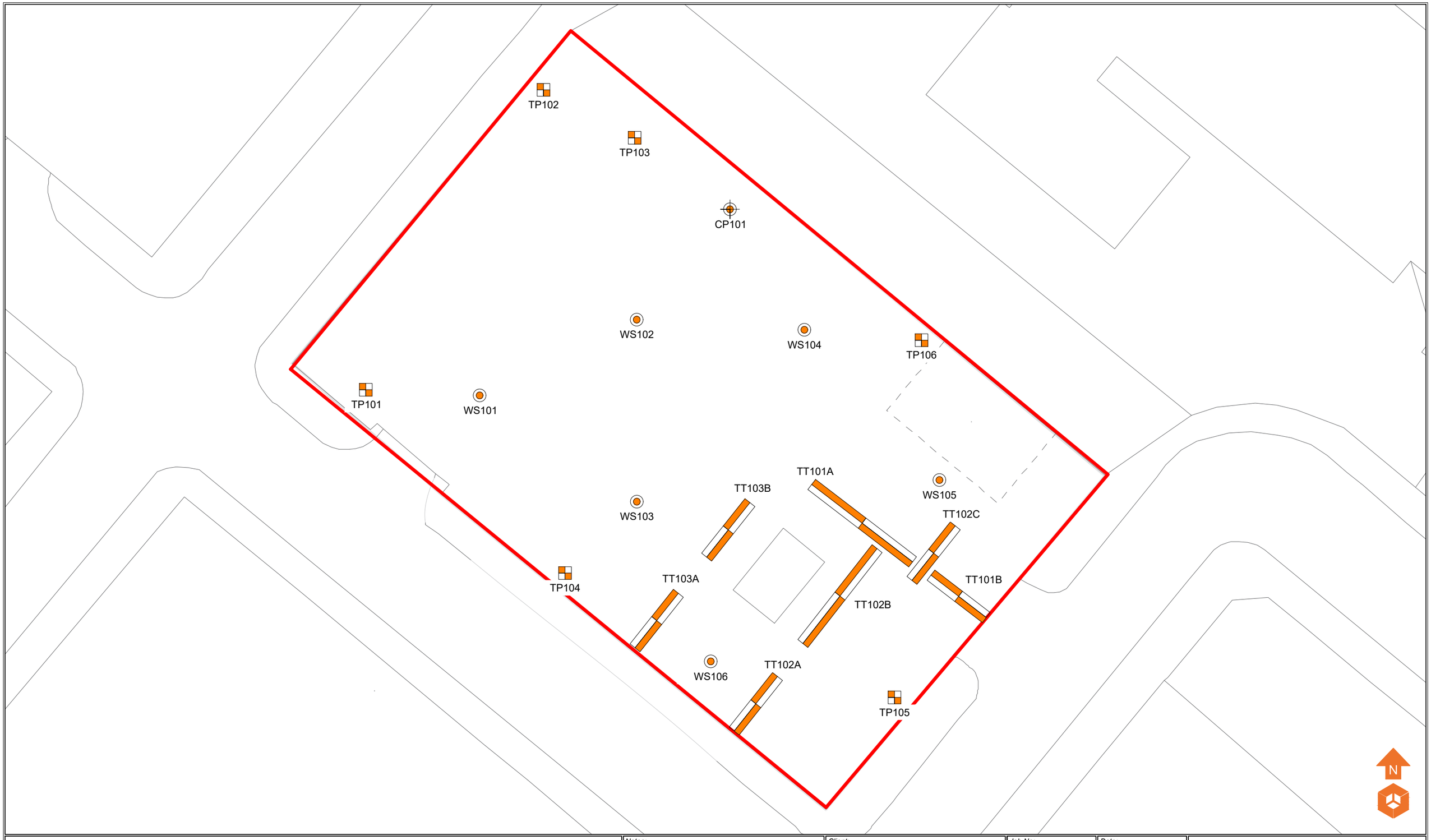

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Trial Pit Location
- Approximate Cable Percussive Borehole Location

Notes:

P1	REVA	24.08.2020	HM	MJ
Phase	Issue	Date	Drawn	Checked

Client: Scott Hughes Design

Job No: 12-728

Date: 24.08.2020

Drawing No: 005

Scale: NTS

Job Title: Goulden Street

Drawing Title: Exploratory Hole Location Plan

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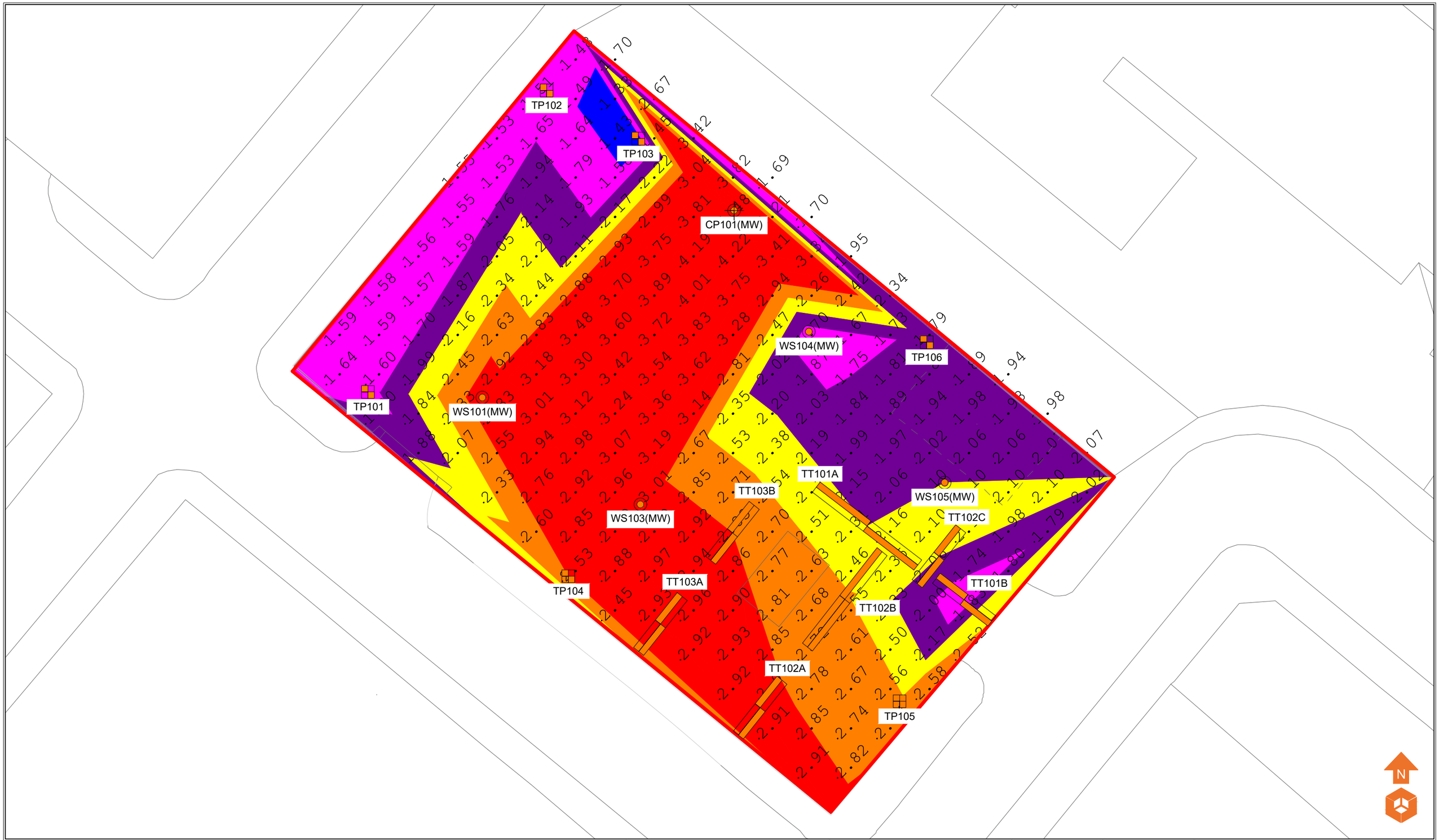

Location Symbols

- WS101(MW) Approximate Window Sample Probehole Location With Install
- TP101 Approximate Trial Pit Location
- CP101(MW) Approximate Cable Percussive Borehole Location With Install

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.34m
- Depth of Made Ground 0.35 - 0.69m
- Depth of Made Ground 0.70 - 1.04m
- Depth of Made Ground 1.05 - 1.39m
- Depth of Made Ground 1.40 - 1.74m
- Depth of Made Ground 1.75 - 2.09m
- Depth of Made Ground 2.10 - 2.44m
- Depth of Made Ground 2.45 - 2.79m
- Depth of Made Ground >2.80m

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVA	02.11.2020	HM	LM

Client: Scott Hughes Design

Job No: 12-728

Date: 02.11.2020

Drawing No: 006

Scale: NTS

Job Title: Goulden Street

Drawing Title: Depth of Made Ground Plan

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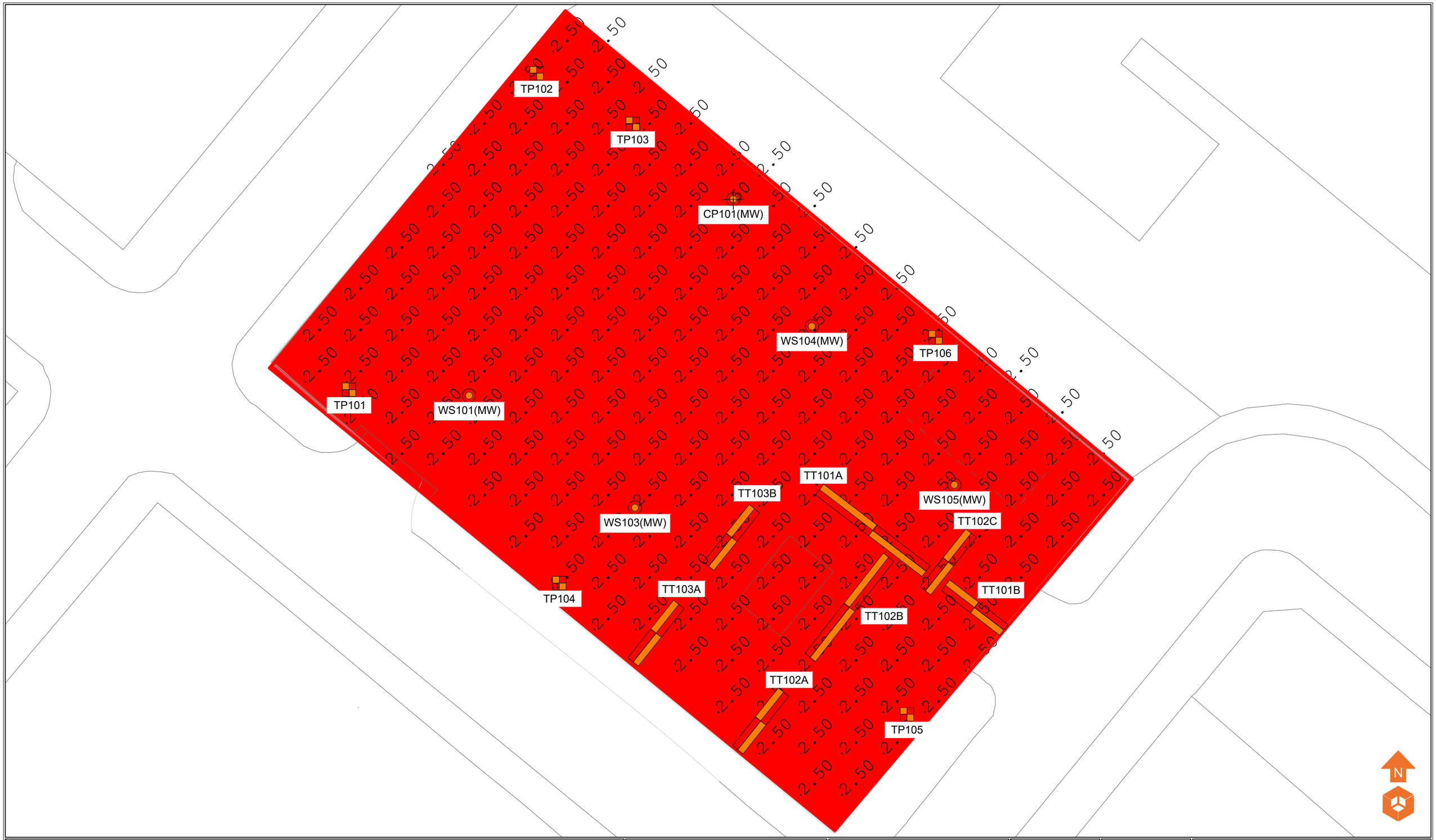

Location Symbols

- Approximate Window Sample Probehole Location With Install
- Approximate Trial Pit Location
- Approximate Cable Percussive Borehole Location With Install

Shallow Spread Footings

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

Mass Trench Fill Footings

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

Engineered Footings

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

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVA	02.11.2020	HM	LM

Client: Scott Hughes Design

Job No: 12-728

Date: 02.11.2020

Drawing No: 008

Scale: NTS

Job Title: Goulden Street

Drawing Title: Depth to Founding Strata Plan

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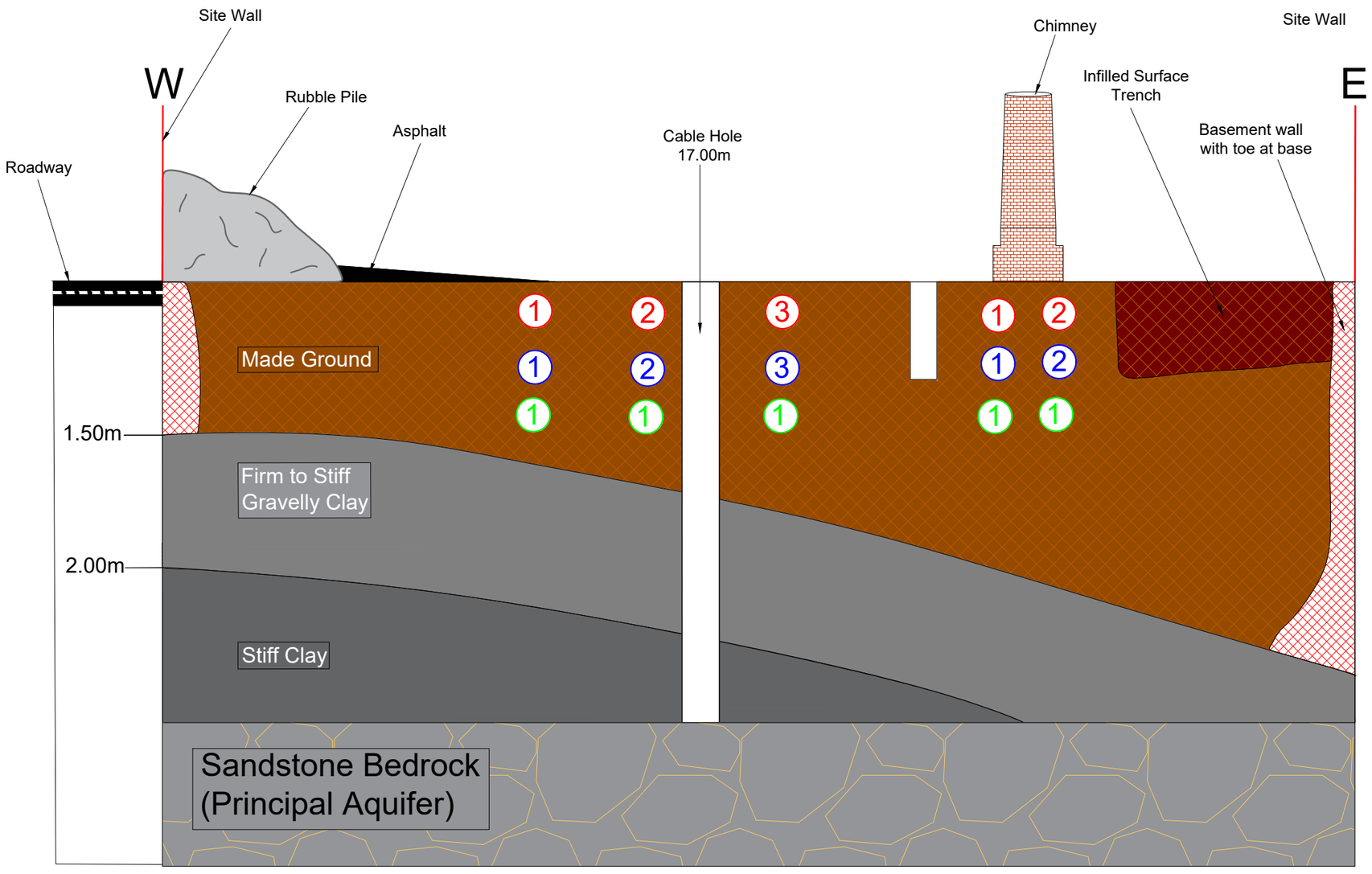

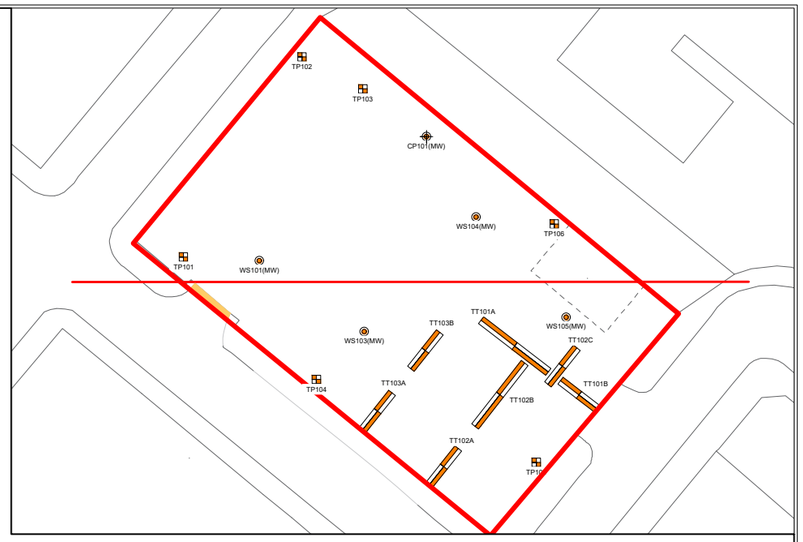

Geology Key

- Made Ground
- Firm to Stiff Gravelly Clay
- Stiff Clay
- Infilled Surface Trench
- Rubble Pile
- Asphalt
- Roadways
- Cable Holes
- Basement
- Sandstone Bedrock

Sources

1. Heavy Metal ,Non Volatile PAH, Heavy end Hydrocarbons
2. Semi Volatile PAH
3. Asbestos

Pathways

1. Dermal Contact / Ingestion
2. Vapour Inhalation
3. Fibre / Dust Inhalation

Receptors

1. Future Site Users / Commercial Employees

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	16.11.2020	LM	NS
P1	REVA	02.11.2020	LM	MJ

Client: Scott Hughes Design

Job No: 12-728

Date: 16.11.2020

Drawing No: 010

Scale: NTS

Job Title: Goulden Street

Drawing Title: Conceptual Site Model

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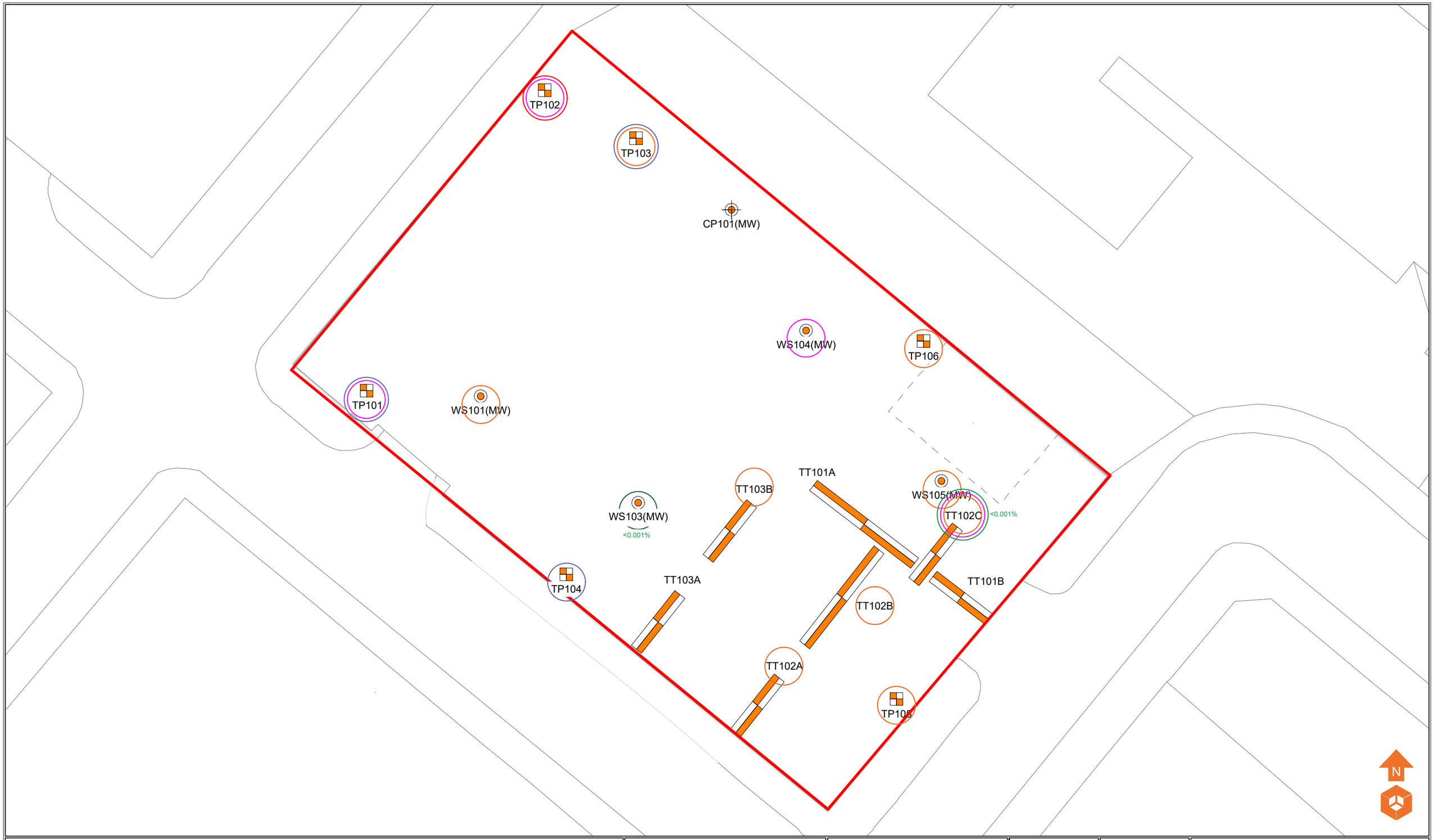

Location Symbols

- Approximate Window Sample Probehole Location With Install
- Approximate Trial Pit Location
- Approximate Cable Percussive Borehole Location With Install

Contamination Exceedances

- Heavy Metals
- Non Volatile PAH
- TPH C16-C21
- Asbestos
- Napthalene

Notes:

P1	REVA	06.11.2020	LM	NS
Phase	Issue	Date	Drawn	Checked

Client: Scott Hughes Design

Job No: 12-728

Date: 06.11.2020

Drawing No: 018

Scale: NTS

Job Title: Goulden Street

Drawing Title: Contamination Exceedances Plan

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APPENDIX IV
PHOTOGRAPHS

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APPENDIX V
E3P EXPLORATORY HOLE LOGS

Trial Pit Log

TrialPit No
TP101
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384683.00 - 398902.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 3.00 × 2.00 Depth 1.60	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Light grey concrete with rebar.
				0.30			MADE GROUND: Yellowish brown very sandy gravel. Gravel is medium subangular of sandstone.
	0.50	ES		0.50			MADE GROUND: Firm to stiff brown gravelly clay. Gravel is medium subangular of brick and sandstone.
				1.60			End of Pit at 1.60m

1
2
3
4

Trial Pit Photographs

Trial Pit 101

Trial Pit 101 Spoil

Remarks: Complete.

Stability: Unstable with sides collapsing.

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP102 Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384694.00 - 398920.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 4.00 × 2.00	Scale 1:30
Client: Mulbury City		Depth 3.50	Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			MADE GROUND: Light grey concrete.
0.60	0.60	ES		0.50			MADE GROUND: Soft to firm gravelly clay with frequent cobbles. Gravel is fine to coarse sub-angular to sub rounded of brick. Cobbles are sub-angular of brick. (Reworked clay)
							MADE GROUND: Firm brown gravelly clay with frequent cobbles. Gravel is fine to coarse sub-angular to sub-rounded of sandstone and brick. Cobbles are sub-angular of sandstone, (Reworked clay, strong hydrocarbon odour and sheen at 0.60m bgl)
	1.50	ES		1.50			Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
				2.00			Stiff brown mottled grey sandy CLAY.
	3.20	B					
				3.50			End of Pit at 3.50m

1 2 3 4

Trial Pit Photographs

Trial Pit 102

Trial Pit 102 Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Water strike at 0.60m bgl.

Stability: Unstable with building rubble.

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP103 Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384704.00 - 398916.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 3.00 × 1.50 Depth 3.00	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Light grey concrete.
	0.40	ES		0.40			MADE GROUND: Red gravel with frequent cobbles. Gravel is fine to coarse sub-angular to sub rounded of concrete and brick. Cobbles are sub angular of brick and concrete.
							MADE GROUND: Soft to firm silty gravelly clay with frequent cobbles. Gravel is fine to coarse sub-angular to subrounded of brick. Cobbles are sub-angular of brick. (reworked clay, brick fill)
1.20	1.20	ES		1.20			Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
				3.00			End of Pit at 3.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 103

Trial Pit 103 Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Water strike at 1.20m bgl. 4. Lots of rubble from existing structure.

Stability: Very unstable with sides collapsing.

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP104 Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384694.00 - 398890.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 4.00 × 2.00 Depth 3.00	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.10	ES		0.05			MADE GROUND: Firm brown to black silty gravelly clay with rootlets. Gravel is fine to coarse angular of brick.
							MADE GROUND: Soft to firm silty, gravelly, sandy clay with metal and timber. Gravel is fine to coarse sub-angular to subrounded of brick and sandstone. Cobbles are sub-angular of brick and sandstone. (reworked clay)
	2.00	ES					
				2.80			Stiff to very stiff brown slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
				3.00			End of Pit at 3.00m

1 2 3 4

Trial Pit Photographs

Trial Pit 104

Trial Pit 104 Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Lots of rubble from existing structure.

Stability: Very unstable with sides collapsing.

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP105 Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384717.00 - 398883.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 4.00 × 3.00 Depth 3.55	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Firm brown to black silty gravelly clay with rootlets. Gravel is fine to coarse angular of brick.
	0.50	ES					MADE GROUND: Firm dark brown silty gravelly clay with frequent cobbles, pipes, timber and plastic. Gravel is fine to coarse sub-angular to subrounded of brick and sandstone. Cobbles are sub-angular of brick and sandstone. (reworked clay.)
	1.00	B		1.00			MADE GROUND: Brown slightly sandy very clayey gravel with frequent cobbles. Gravel is fine to coarse sub-angular to subrounded of brick and sandstone. Cobbles are sub-angular of brick and sandstone.
				2.50			Stiff to very stiff brown mottled grey slightly gravelly CLAY. Gravel is fine rounded to subrounded to rounded of sandstone and coal traces.
	3.30	ES		3.30			Stiff to very stiff brown slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
				3.55			End of Pit at 3.55m

1 2 3 4

Trial Pit Photographs

Trial Pit 105

Trial Pit 105 Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Lots of rubble from existing structure and pipework on walls of building.

Stability: Very unstable with sides collapsing. Lots of rubble from existing structure and pipework on walls of building.

e3p

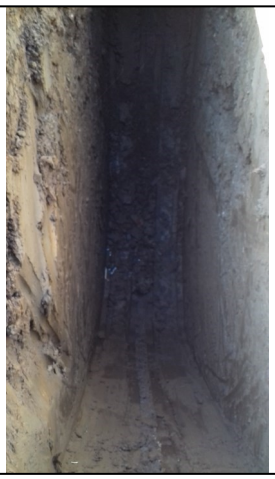
Trial Pit Log

e3p	Trial Pit Log		TrialPit No TP106 Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384719.00 - 398904.00 Level:	Date 20/08/2020
Location: Manchester		Dimensions (m): 4.00 × 2.00 Depth 3.50	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			MADE GROUND: Light grey concrete.
	0.40	ES		0.40			MADE GROUND: Red gravel with frequent cobbles. Gravel is fine to coarse sub-angular to sub rounded of concrete and brick. Cobbles are sub angular of brick and concrete.
				0.70			MADE GROUND: Firm brown very gravelly clay with ashy layers and coal traces. Gravel is fine to coarse sub-angular to subrounded of sandstone and brick. (Brick Fill. Reworked clay)
							MADE GROUND: Firm to stiff clay with brick and pipe work debris. (reworked clay)
	1.80	ES		1.80			Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is fine to medium subrounded of sandstone.
				2.50			Stiff grey with mottled brown CLAY.
	3.00	B		3.00			Stiff to very stiff brown slightly gravelly CLAY. Gravel is fine subrounded sandstone.
3.50				3.50			End of Pit at 3.50m

1 2 3 4

Trial Pit Photographs



Trial Pit 106

Trial Pit 106 Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Water strike at 3.50m bgl. 4. Lots of rubble from existing structure.

Stability: Very unstable with sides collapsing.

e3p

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TT101A Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384714.00 - 398896.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 5.00 × 1.50 Depth 2.10	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Firm dark brown silty gravelly clay with frequent cobbles, timber, pipes and plastic. Gravel is fine to coarse sub angular to subrounded of brick and sandstone. (remains of fire engine servicing pit) Cobbles are subangular of brick and concrete.
				2.10			End of Pit at 2.10m

1 2 3 4

Trial Pit Photographs

Trial Trench 101A

Trial Trench 101A Spoil

Remarks: Complete

Stability: Stable.

e3p

Trial Pit Log

TrialPit No: TT101B

Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384722.00 - 398887.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 3.00 × 1.00 Depth 1.50	Scale 1:24
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Firm brown to black silty clay with rootlets and brick debris.
							MADE GROUND: Firm brown silty gravelly clay with frequent cobbles, pipes, plastic and timber. Gravel is fine to coarse angular to subrounded of sandstone and brick. Cobbles are sub-angular of sandstone and brick.
				0.50			MADE GROUND: Light grey concrete.
				0.60			MADE GROUND: Firm brown silty gravelly clay with frequent cobbles, pipes, plastic and timber. Gravel is fine to coarse angular to subrounded of sandstone and brick. Cobbles are sub-angular of sandstone and brick.
				1.50			End of Pit at 1.50m

Remarks: Complete

Stability: Sides unstable with building rubble.

Trial Pit Log

TrialPit No
TT102A
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384707.00 - 398882.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 6.00 × 1.50	Scale 1:30
Client: Mulbury City		Depth 3.30	Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Firm brown to black gravelly clay with rootlets. Gravel is fine to medium angular of brick.
	1.00	ES					MADE GROUND: Firm brown silty gravelly clay with bricks. large carved sandstone blocks, pipes both clean and blunt & burnt timbers, glass, roofing tiles and plastic. Gravel is coarse angular to subrounded of sandstone and brick.
	3.00	ES		2.90			Firm to stiff brown mottled grey slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
				3.30			End of Pit at 3.30m

1 2 3 4

Trial Pit Photographs

Trial Trench 102A

Trial Trench 102A Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample

Stability: Sides are unstable and prone to collapse.

Trial Pit Log

TrialPit No
TT102B
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384710.00 - 398890.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 3.00 × 1.50	Scale 1:30
Client: Mulbury City		Depth 3.20	Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							MADE GROUND: Firm brown to black silty gravelly clay with bricks, large carved sandstone blocks, pipes both clean and burnt timbers, glass, roofing tiles and plastic. Gravel is coarse angular to subrounded of sandstone and brick.
				3.00			Firm to stiff brown mottled grey CLAY.
				3.20			End of Pit at 3.20m

1
2
3
4

Trial Pit Photographs

Trial Trench 102B

Trial Trench 102B Spoil

Remarks: 1. Complete. 2. Brick layer at 2.80m which is historic basement floor.

Stability: Sides are unstable and prone to collapse.

Trial Pit Log

TrialPit No
TT102C
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384718.00 - 398897.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 10.00 × 1.00	Scale 1:24
Client: Mulbury City		Depth 2.10	Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.40	ES					MADE GROUND: Firm dark brown silty gravelly clay with frequent cobbles, timber, pipes and plastic. Gravel is fine to coarse sub angular to subrounded of brick and sandstone. Cobbles are angular to sub-angular of brick and concrete. (remains of fire engine servicing pit) (reworked clay)
2.10				2.10			End of Pit at 2.10m

1
2
3
4
5

Remarks: 1. Complete. 2. Brick layer at 2.80m which is historic basement floor. 3. Water strike at 2.10m bgl.

Stability: Stable

Trial Pit Log

TrialPit No
TT103A
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384697.00 - 398889.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 3.00 × 1.00 Depth 3.30	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			MADE GROUND: Firm brown to black silty clay with rootlets and brick debris.
	0.50	ES					MADE GROUND: Firm brown to black silty gravelly clay with bricks, large carved sandstone blocks, pipes ,timbers, rags and plastic. Gravel is coarse angular to subrounded of sandstone and brick.
				3.00			Firm to stiff brown mottled CLAY.
				3.30			End of Pit at 3.30m

1
2
3
4

Trial Pit Photographs

Trial Trench 103A

Trial Trench 103A Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Historical electric input into the building at 0.5m.

Stability: Unstable digging with sides prone to collapse.

Trial Pit Log

e3p	Trial Pit Log		TrialPit No TT103B Sheet 1 of 1
Project Name: Goulden Street	Project No. 12728	Co-ords: 384701.00 - 398897.00 Level:	Date 21/08/2020
Location: Manchester		Dimensions (m): 6.00 × 2.00 Depth 3.00	Scale 1:30
Client: Mulbury City			Logged M. Jackson

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.01			MADE GROUND: Firm brown to black silty clay with rootlets and brick debris.
							MADE GROUND: Firm brown to black silty gravelly clay with rootlets. Gravel is fine to medium angular of brick. (reworked clay)
	2.90	ES		2.80			Firm to stiff brown mottled grey CLAY.
				3.00			End of Pit at 3.00m

1 2 3 4

Trial Pit Photographs

Trial Trench 103B

Trial Trench 103B Spoil

Remarks: 1. Complete. 2. No HSV as couldn't get representative sample. 3. Historic arch way structure that formed the basement.

Stability: Sides are unstable and prone to collapse.

e3p

Borehole Log

Borehole No.
WS101
Sheet 1 of 1

Project Name: Goulden Street	Project No. 12728	Co-ords: 384692E - 398908N	Hole Type WS
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
								MADE GROUND: Light grey concrete.
					0.50			MADE GROUND: Firm brown silty clay with frequent cobbles. Cobbles are angular of whole brick.
		0.70	ES		0.70			MADE GROUND: Firm red clay with frequent cobbles. Cobbles are angular of whole bricks.
		1.20	SPT	N=11 (1,2/5,1,2,3)	1.20			MADE GROUND: Stiff yellowish brown sandy slightly gravelly clay. Gravel is fine sub-angular of brick. (reworked clay)
		2.00	SPT	N=10 (1,1/0,1,3,6)				
		3.00	ES		3.00			Soft black silty clay.
		3.00	SPT	N=27 (3,6/7,7,6,7)	3.20			Very stiff high to very high strength brown slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
		4.00	SPT	50 (7,10/50 for 260mm)				
					4.41			End of Borehole at 4.41m

Remarks
1. Refusal on very stiff clay at 4.4m bgl. 2. Monitoring Well installed

Borehole Log

Borehole No. **WS103** Sheet 1 of 1			
Project Name: Goulden Street	Project No. 12728	Co-ords: 384698E - 398897N	Hole Type WS
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			MADE GROUND: Brown to black silty fine gravel. Gravel is fine sub-angular of asphalt. MADE GROUND: Firm silty slightly gravelly clay. Gravel is fine to medium angular of brick. (reworked clay brick fill)
		1.20	SPT	N=12 (2,5/4,5,2,1)				
		1.50	ES					
		2.00	SPT	N=5 (1,2/2,1,1,1)				
		3.00	SPT	N=8 (1,0/1,2,2,3)	3.00			Firm low strength brown slightly gravelly CLAY. Gravel is fine subrounded sandstone. (becoming very stiff high strength at 4.00m bgl)
		3.60	ES					
		4.00	SPT	50 (6,9/50 for 265mm)				
					4.42			End of Borehole at 4.42m

Remarks

1. Refusal on stiff clay at 4.42m bgl. 2. Monitoring Well installed

Borehole Log

Borehole No. **WS104** Sheet 1 of 1			
Project Name: Goulden Street	Project No. 12728	Co-ords: 384710E - 398906N	Hole Type WS
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			MADE GROUND: Light grey concrete
		0.30	ES					MADE GROUND: Light grey concrete with crushed brick within the matrix.
					0.50			MADE GROUND: Firm brown very gravelly clay. Gravel is fine to medium angular to rounded of brick, sandstone, mudstone and coal.
		1.20	SPT	N=13 (2,3/3,3,3,4)				
					1.60			Very stiff very high strength brown slightly gravelly CLAY. Gravel is fine subrounded of sandstone.
		2.00	ES					
		2.00	SPT	N=34 (5,5/6,8,10,10)				
		3.00	SPT	N=48 (5,8/8,12,12,16)				
					3.45			End of Borehole at 3.45m

Remarks

1. Refusal at 3.45m bgl on stiff clay.

Borehole Log

Borehole No. **WS105** Sheet 1 of 1			
Project Name: Goulden Street	Project No. 12728	Co-ords: 384725E - 398891N	Hole Type WS
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.05			MADE GROUND: Light grey concrete.
								MADE GROUND: Light grey concrete with crushed brick within the matrix.
					0.50			MADE GROUND: Soft to firm silty gravelly clay. Gravel is fine to medium angular of brick. (Brick fill)
					0.70			MADE GROUND: Very soft brown very gravelly clay. Gravel is fine to medium angular to rounded of brick, sandstone, mudstone and coal.
	0.90	1.20	SPT	N=2 (0,0/0,1,1,0)				
		1.50	ES					
		2.00	SPT	N=28 (3,5/5,6,7,10)	2.10			Very stiff high strength brown slightly gravelly CLAY. Gravel is fine subrounded of sandstone. Very stiff very high strength at 3.00m bgl.
		2.80	ES					
		3.00	SPT	50 (11,11/50 for 265mm)				
					3.42			End of Borehole at 3.42m

Remarks

1. Refusal on stiff clay at 3.42m bgl. 2. Monitoring well installed.

Borehole Log

Borehole No. **CP101** Sheet 1 of 2			
Project Name: Goulden Street	Project No. 12728	Co-ords: 384710E - 398906N	Hole Type CP
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.20			MADE GROUND: Light grey concrete.	
								MADE GROUND: Soft brown gravelly clay. Gravel is fine to medium sub-angular of brick and concrete.	
		1.00	B						1
		1.20	B		1.20				
		1.20	SPT	N=3 (2,1/1,1,0,1)				MADE GROUND: Brown very sandy silty gravel. Gravel is fine to medium sub-angular of brick and concrete.	
					1.70			MADE GROUND: Soft brown gravelly clay. Gravel is fine to medium sub-angular of brick and concrete. (Stiff at 2.00mbgl very stiff at 3.0m bgl)	
		2.00	B						2
		2.00	SPT	N=9 (2,2/1,3,2,3)					
		3.00	B						3
		3.00	SPT	N=19 (2,3/2,9,6,2)					
		4.00	B						4
		4.00	SPT	N=22 (3,2/4,6,5,7)					
		4.60	D		4.60			Stiff brown gravelly CLAY. Gravel is fine subrounded of sandstone.	
		5.00	U						5
					5.10			Firm brown very sandy silty CLAY.	
		5.50	D						
		6.00	B		6.00			Stiff medium strength brown CLAY.	6
		6.00	SPT	N=14 (2,2/3,4,4,3)					
									7
		7.50	U						
		8.00	D						8
		9.00	B		9.00			Very stiff high strength gravelly CLAY. Gravel is fine subrounded of sandstone.	9
		9.00	SPT	N=24 (3,2/3,7,6,8)					
									10

Remarks

1. Refusal on very stiff clay at 16.82m bgl.

Borehole Log

Borehole No. **CP101** Sheet 2 of 2			
Project Name: Goulden Street	Project No. 12728	Co-ords: 384710E - 398906N	Hole Type CP
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 20/08/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
								Very stiff high strength gravelly CLAY. Gravel is fine subrounded of sandstone.	
		11.00	D						11
		12.00 12.00	B SPT	N=30 (4,4/7,6,8,9)					12
									13
		13.50	U						
		14.00	D		14.10				14
								Brown clayey fine to medium SAND. Clay is found in bands.	
		14.90 15.00 15.00	D B SPT	50 (9,10/50 for 210mm)	14.90 15.10			Very stiff very high strength brown gravelly CLAY. Gravel is fine subrounded of sandstone.	15
								Very stiff very high strength brown sandy gravelly CLAY. Gravel is fine subrounded of sandstone.	
									16
		16.50 16.50 16.50	B U SPT	50 (11,11/50 for 170mm)	16.82			End of Borehole at 16.82m	17
									18
									19
									20

Remarks

1. Refusal on very stiff clay at 16.82m bgl.

Borehole Log

Borehole No. **RB101** Sheet 1 of 4			
Project Name: Goulden Street	Project No. 12728	Co-ords:	Hole Type BH
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 02/11/2020	Logged By TDS

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			MADE GROUND: Light grey concrete.
					1.20			MADE GROUND: Soft brown gravelly clay. Gravel is fine to medium sub-angular of brick and concrete.
					1.70			MADE GROUND: Brown very sandy silty gravel. Gravel is fine to medium sub-angular of brick and concrete.
					4.60			MADE GROUND: Soft brown gravelly clay. Gravel is fine to medium sub-angular of brick and concrete.
								SAND and GRAVEL.

Remarks
Complete.

Borehole Log

Borehole No. **RB101** Sheet 2 of 4			
Project Name: Goulden Street	Project No. 12728	Co-ords:	Hole Type BH
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 02/11/2020	Logged By TDS

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SAND and GRAVEL.	11 12 13 14 15 16 17 18 19 20

Remarks
Complete.

Borehole Log

Borehole No. **RB101** Sheet 3 of 4			
Project Name: Goulden Street	Project No. 12728	Co-ords:	Hole Type BH
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 02/11/2020	Logged By TDS

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								SAND and GRAVEL.
					25.50			Brown silty CLAY.
					26.50			Red brown SANDSTONE.

21 22 23 24 25 26 27 28 29 30

Remarks
Complete.

Borehole Log

Borehole No. **RB101** Sheet 4 of 4			
Project Name: Goulden Street	Project No. 12728	Co-ords:	Hole Type BH
Location: Manchester		Level:	Scale 1:50
Client: Mulbury City		Dates: 02/11/2020	Logged By TDS

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Red brown SANDSTONE.
					35.50			End of Borehole at 35.50m

31
32
33
34
35
36
37
38
39
40

Remarks
Complete.

APPENDIX VI
CHEMICAL TESTING RESULTS

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i2 Analytical Ltd.
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Analytical Report Number : 20-26866

Replaces Analytical Report Number: 20-26866, issue no. 1

Additional analysis undertaken.

Project / Site name:	Goulden Street	**Samples received on:**	24/08/2020
Your job number:	12-728	**Samples instructed on/ Analysis started on:**	25/08/2020
Your order number:	PO 12728 EM-I	**Analysis completed by:**	30/10/2020
Report Issue Number:	2	**Report issued on:**	02/11/2020
Samples Analysed:	1 leachate sample - 24 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

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

Analytical Report Number: 20-26866
Project / Site name: Goulden Street

Your Order No: PO 12728 EM-I

Lab Sample Number				1604305
Sample Reference				TT103A
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				21/08/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	

General Inorganics

pH	pH Units	N/A	ISO 17025	8.3
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0

Total Phenols

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

Speciated PAHs

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

Total PAH

Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2

Heavy Metals / Metalloids

Arsenic (dissolved)	µg/l	1	ISO 17025	9
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	6.3
Copper (dissolved)	µg/l	0.7	ISO 17025	7.3
Lead (dissolved)	µg/l	1	ISO 17025	24
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.9
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	10

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

TPH1 (C10 - C40)	µg/l	10	NONE	< 10

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street

Your Order No: PO 12728 EM-I

Lab Sample Number				1604305
Sample Reference				TT103A
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				21/08/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604281	1604282	1604283	1604284
Sample Reference				TT102A	TT102A	TT102B	TT102C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	1.20	0.40
Date Sampled				21/08/2020	21/08/2020	21/08/2020	21/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	14	10	13
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.5	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	< 0.001

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	8.2	11.1	8.6
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	740	4400	2100
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	500	310	190
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.25	0.15	0.094
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	251	155	94.2
Sulphide	mg/kg	1	MCERTS	-	< 1.0	93	28
Total Sulphur	mg/kg	50	MCERTS	-	300	1700	1100
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.5	-	-	-

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	3
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.12
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.68
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.75
Phenanthrene	mg/kg	0.05	MCERTS	1.6	< 0.05	2.6	4.6
Anthracene	mg/kg	0.05	MCERTS	0.45	< 0.05	0.79	0.94
Fluoranthene	mg/kg	0.05	MCERTS	1.8	< 0.05	4.6	4.2
Pyrene	mg/kg	0.05	MCERTS	1.8	< 0.05	4.3	4.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.98	< 0.05	2.1	2.5
Chrysene	mg/kg	0.05	MCERTS	0.77	< 0.05	2	1.9
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.72	< 0.05	1.7	2.5
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.48	< 0.05	1.2	0.78
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.79	< 0.05	1.8	2.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.49	< 0.05	0.98	0.92
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.28
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.58	< 0.05	1.3	1.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	10.5	< 0.80	23.2	30.6

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	7.2	14	18
Barium (aqua regia extractable)	mg/kg	1	MCERTS	650	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.99	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	0.5	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604281	1604282	1604283	1604284
Sample Reference				TT102A	TT102A	TT102B	TT102C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	1.20	0.40
Date Sampled				21/08/2020	21/08/2020	21/08/2020	21/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	34	21	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	81	29	81	51
Lead (aqua regia extractable)	mg/kg	1	MCERTS	550	22	1100	1100
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	< 0.3	0.4	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	36	16	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	29	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	340	66	250	220

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

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

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	5.6
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	7.9	7.2
TPH (C16 - C21)	mg/kg	1	MCERTS	9.7	< 1.0	24	37
TPH (C21 - C35)	mg/kg	1	MCERTS	22	< 1.0	76	170
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	20	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	34	< 10	130	230

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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604281	1604282	1604283	1604284
Sample Reference				TT102A	TT102A	TT102B	TT102C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	1.20	0.40
Date Sampled				21/08/2020	21/08/2020	21/08/2020	21/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604281	1604282	1604283	1604284
Sample Reference				TT102A	TT102A	TT102B	TT102C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	1.20	0.40
Date Sampled				21/08/2020	21/08/2020	21/08/2020	21/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604281	1604282	1604283	1604284
Sample Reference				TT102A	TT102A	TT102B	TT102C
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	3.00	1.20	0.40
Date Sampled				21/08/2020	21/08/2020	21/08/2020	21/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604285	1604286	1604287	1604288
Sample Reference				TT103B	TP105	TP105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	0.50	3.30	1.50
Date Sampled				21/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	15	22	13	20
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.4	8.5	8.6	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	2300	1200	450	2200
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	280	75	140	190
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.14	0.037	0.069	0.094
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	139	37.4	69	93.8
Sulphide	mg/kg	1	MCERTS	31	1.4	< 1.0	23
Total Sulphur	mg/kg	50	MCERTS	900	700	220	960
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	-	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.5	0.78	< 0.05	1.5
Anthracene	mg/kg	0.05	MCERTS	0.74	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	3	0.92	< 0.05	2.3
Pyrene	mg/kg	0.05	MCERTS	3.3	0.9	< 0.05	2.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.5	0.35	< 0.05	0.91
Chrysene	mg/kg	0.05	MCERTS	0.98	0.52	< 0.05	0.78
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.2	0.31	< 0.05	0.7
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.51	0.25	< 0.05	0.55
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.1	0.34	< 0.05	0.81
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.62	< 0.05	< 0.05	0.45
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.66	< 0.05	< 0.05	0.6

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	16.1	4.37	< 0.80	10.8

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	19	28	7.6	13
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	0.3	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604285	1604286	1604287	1604288
Sample Reference				TT103B	TP105	TP105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	0.50	3.30	1.50
Date Sampled				21/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	21	27	30	18
Copper (aqua regia extractable)	mg/kg	1	MCERTS	67	62	25	33
Lead (aqua regia extractable)	mg/kg	1	MCERTS	1500	300	88	1300
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	1.3	< 0.3	0.5
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	28	33	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	1.5
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	290	100	58	55

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

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

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	5.3	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	28	< 1.0	< 1.0	16
TPH (C21 - C35)	mg/kg	1	MCERTS	68	< 1.0	< 1.0	24
TPH (C35 - C40)	mg/kg	10	MCERTS	26	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	130	< 10	< 10	42

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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604285	1604286	1604287	1604288
Sample Reference				TT103B	TP105	TP105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	0.50	3.30	1.50
Date Sampled				21/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604285	1604286	1604287	1604288
Sample Reference				TT103B	TP105	TP105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	0.50	3.30	1.50
Date Sampled				21/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604285	1604286	1604287	1604288
Sample Reference				TT103B	TP105	TP105	WS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.90	0.50	3.30	1.50
Date Sampled				21/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604289	1604290	1604291	1604292
Sample Reference				WS105	TP106	TP106	TP104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	1.80	0.10
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	19	23	5.2
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.5	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.8	9.2	6.1	12.1
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	760	1500	580	3700
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	450	110	170	38
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.22	0.056	0.084	0.019
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	224	56.4	83.7	19.2
Sulphide	mg/kg	1	MCERTS	2.9	59	1.5	59
Total Sulphur	mg/kg	50	MCERTS	350	1400	330	2000
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	-	-	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.38
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	1
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	0.8
Phenanthrene	mg/kg	0.05	MCERTS	-	-	< 0.05	9.4
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	3
Fluoranthene	mg/kg	0.05	MCERTS	-	-	0.28	21
Pyrene	mg/kg	0.05	MCERTS	-	-	0.27	21
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	11
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	7.7
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	11
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	5.7
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	10
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	5.4
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	1.7
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	6.4

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	< 0.80	116

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.8	32	14	6
Barium (aqua regia extractable)	mg/kg	1	MCERTS	190	-	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	-	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.2	-	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	< 0.2	< 0.2	0.3
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604289	1604290	1604291	1604292
Sample Reference				WS105	TP106	TP106	TP104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	1.80	0.10
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	34	22	38	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	170	33	32
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	370	68	88
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.6	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	33	31	18
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	74	110	67	72

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

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

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	20
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	20	< 1.0	160
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	26	< 1.0	1300
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	420
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	48	< 10	1900

VOCs

Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604289	1604290	1604291	1604292
Sample Reference				WS105	TP106	TP106	TP104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	1.80	0.10
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604289	1604290	1604291	1604292
Sample Reference				WS105	TP106	TP106	TP104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	1.80	0.10
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	1.3	-	-
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	2.7	-	-
Pyrene	mg/kg	0.05	MCERTS	-	3	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.6	-	-
Chrysene	mg/kg	0.05	MCERTS	-	1.3	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	1.1	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.8	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604289	1604290	1604291	1604292
Sample Reference				WS105	TP106	TP106	TP104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.80	0.40	1.80	0.10
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1.1	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.64	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.76	-	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604293	1604294	1604295	1604296
Sample Reference				TP104	WS104	WS104	TP101
Sample Number				None Supplied	None Supplied	None Supplied	NW
Depth (m)				2.00	0.30	2.00	0.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	9.9	11	6.5
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	-
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	-	10.4	8.7	-
Total Cyanide	mg/kg	1	MCERTS	-	< 1	< 1	-
Total Sulphate as SO4	mg/kg	50	MCERTS	-	1800	400	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	-	310	130	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.16	0.065	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	158	65.2	-
Sulphide	mg/kg	1	MCERTS	-	3.7	< 1.0	-
Total Sulphur	mg/kg	50	MCERTS	-	740	240	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	-	-	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Fluorene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Chrysene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	< 0.05	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	-	< 0.80	-

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	-	11	8.6	-
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	-	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	-	< 4.0	< 4.0	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604293	1604294	1604295	1604296
Sample Reference				TP104	WS104	WS104	TP101
Sample Number				None Supplied	None Supplied	None Supplied	NW
Depth (m)				2.00	0.30	2.00	0.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	29	34	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	-	36	27	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	-	67	30	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	-	0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	-	27	36	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	-	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	-	61	63	-

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

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

TPH (C5 - C6)	mg/kg	1	NONE	-	< 1.0	< 1.0	-
TPH (C6 - C8)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-
TPH (C8 - C10)	mg/kg	0.1	MCERTS	-	< 0.1	< 0.1	-
TPH (C10 - C12)	mg/kg	2	MCERTS	-	52	< 2.0	-
TPH (C12 - C16)	mg/kg	4	MCERTS	-	65	< 4.0	-
TPH (C16 - C21)	mg/kg	1	MCERTS	-	170	< 1.0	-
TPH (C21 - C35)	mg/kg	1	MCERTS	-	270	< 1.0	-
TPH (C35 - C40)	mg/kg	10	MCERTS	-	< 10	< 10	-
TPH Total C5 - C40	mg/kg	10	MCERTS	-	610	< 10	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604293	1604294	1604295	1604296
Sample Reference				TP104	WS104	WS104	TP101
Sample Number				None Supplied	None Supplied	None Supplied	NW
Depth (m)				2.00	0.30	2.00	0.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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
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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604293	1604294	1604295	1604296
Sample Reference				TP104	WS104	WS104	TP101
Sample Number				None Supplied	None Supplied	None Supplied	NW
Depth (m)				2.00	0.30	2.00	0.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	3.4	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	4.9	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	8.9	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	4.8	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	46	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	20	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	1	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	12	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	9.1	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	12	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	64	-	-
Anthracene	mg/kg	0.05	MCERTS	-	14	-	-
Carbazole	mg/kg	0.3	MCERTS	-	6.6	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	2.4	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	45	-	-
Pyrene	mg/kg	0.05	MCERTS	-	45	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	24	-	-
Chrysene	mg/kg	0.05	MCERTS	-	21	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	21	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	6.6	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604293	1604294	1604295	1604296
Sample Reference				TP104	WS104	WS104	TP101
Sample Number				None Supplied	None Supplied	None Supplied	NW
Depth (m)				2.00	0.30	2.00	0.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	19	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	6.6	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	2.4	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	8.2	-	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604297	1604298	1604299	1604300
Sample Reference				TP101	WS101	WS101	TP102
Sample Number				NE	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	3.00	0.70	0.60
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	22	16	26
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.1	7.9	8.1	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	390	920	520	1200
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	880	77	880
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.053	0.44	0.039	0.44
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	52.9	438	38.5	441
Sulphide	mg/kg	1	MCERTS	1.5	130	6.2	110
Total Sulphur	mg/kg	50	MCERTS	230	2500	350	2400
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	0.5	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	120	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	2.2	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	20	< 0.05	-	-
Fluorene	mg/kg	0.05	MCERTS	25	< 0.05	-	-
Phenanthrene	mg/kg	0.05	MCERTS	110	1.4	-	-
Anthracene	mg/kg	0.05	MCERTS	24	0.47	-	-
Fluoranthene	mg/kg	0.05	MCERTS	68	1.8	-	-
Pyrene	mg/kg	0.05	MCERTS	70	2	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	43	0.87	-	-
Chrysene	mg/kg	0.05	MCERTS	29	0.75	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	33	0.59	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	11	0.56	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	31	0.67	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	9.7	0.3	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	3.7	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	12	0.34	-	-

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	612	9.72	-	-

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	23	61	13
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	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604297	1604298	1604299	1604300
Sample Reference				TP101	WS101	WS101	TP102
Sample Number				NE	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	3.00	0.70	0.60
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32	29	29	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31	100	72	40
Lead (aqua regia extractable)	mg/kg	1	MCERTS	91	93	67	110
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	0.7	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	34	27	27	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	70	67	64	57

Monoaromatics & Oxygenates

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

Petroleum Hydrocarbons

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

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	18	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	13	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	31	-

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	1
TPH (C10 - C12)	mg/kg	2	MCERTS	190	< 2.0	-	91
TPH (C12 - C16)	mg/kg	4	MCERTS	180	< 4.0	-	1400
TPH (C16 - C21)	mg/kg	1	MCERTS	400	13	-	2100
TPH (C21 - C35)	mg/kg	1	MCERTS	450	28	-	610
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	-	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	1400	43	-	4300

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604297	1604298	1604299	1604300
Sample Reference				TP101	WS101	WS101	TP102
Sample Number				NE	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	3.00	0.70	0.60
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	< 1.0	< 1.0
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	94
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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604297	1604298	1604299	1604300
Sample Reference				TP101	WS101	WS101	TP102
Sample Number				NE	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	3.00	0.70	0.60
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	-	-	< 0.1	< 0.1
Phenol	mg/kg	0.2	ISO 17025	-	-	< 0.2	1.2
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	3.4
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	4.1
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	3.6
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	-	-	< 0.05	44
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	-	-	< 0.1	24
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	-	-	< 0.05	1.2
Acenaphthene	mg/kg	0.05	MCERTS	-	-	< 0.05	16
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	< 0.2	< 0.2
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	< 0.2	8.4
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	-	-	< 0.05	16
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	-	-	1.5	91
Anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	16
Carbazole	mg/kg	0.3	MCERTS	-	-	< 0.3	7.3
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	< 0.2	< 0.2
Anthraquinone	mg/kg	0.3	MCERTS	-	-	< 0.3	7.6
Fluoranthene	mg/kg	0.05	MCERTS	-	-	1.8	54
Pyrene	mg/kg	0.05	MCERTS	-	-	2	61
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	< 0.3	< 0.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	0.81	29
Chrysene	mg/kg	0.05	MCERTS	-	-	0.74	23
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	0.51	24
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	0.64	8.3

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604297	1604298	1604299	1604300
Sample Reference				TP101	WS101	WS101	TP102
Sample Number				NE	None Supplied	None Supplied	None Supplied
Depth (m)				0.50	3.00	0.70	0.60
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	0.74	21
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	0.36	7.5
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	< 0.05	2.8
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	0.43	9.7

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604301	1604302	1604303	1604304
Sample Reference				TP102	TP103	TP103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.40	1.20	1.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	15	17	11
Total mass of sample received	kg	0.001	NONE	0.4	0.5	0.47	0.43

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	Chrysotile
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	< 0.001
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	< 0.001

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.4	8.5	8.1	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	-
Total Sulphate as SO4	mg/kg	50	MCERTS	410	790	1200	-
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	240	52	590	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.12	0.026	0.29	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	118	25.9	294	-
Sulphide	mg/kg	1	MCERTS	2	19	66	-
Total Sulphur	mg/kg	50	MCERTS	270	370	2700	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-	2	-

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	-	< 0.05	3.9	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	3.7	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	0.75	22	0.58
Anthracene	mg/kg	0.05	MCERTS	-	0.21	5.4	0.16
Fluoranthene	mg/kg	0.05	MCERTS	-	2.2	25	0.74
Pyrene	mg/kg	0.05	MCERTS	-	2.1	27	0.73
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	1.6	13	0.48
Chrysene	mg/kg	0.05	MCERTS	-	1	11	0.4
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	1.8	9	0.55
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	0.42	6.2	0.26
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	1.4	9.6	0.46
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	0.64	4.8	0.32
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	0.2	1.7	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	0.79	5.4	0.34

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	13	149	5.02

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6	14	13	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	140	-	130	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	-	0.86	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	-	0.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	-
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604301	1604302	1604303	1604304
Sample Reference				TP102	TP103	TP103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.40	1.20	1.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	34	20	16	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	29	28	52	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	34	140	250	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.4	0.5	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	35	19	17	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	32	-	22	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	61	43	52	-

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

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

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	3.8	17	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	540	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	8.7	1000	8.9
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	22	370	31
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	25	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	40	2000	43

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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604301	1604302	1604303	1604304
Sample Reference				TP102	TP103	TP103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.40	1.20	1.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604301	1604302	1604303	1604304
Sample Reference				TP102	TP103	TP103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.40	1.20	1.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-
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	-	-	-	-

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Lab Sample Number				1604301	1604302	1604303	1604304
Sample Reference				TP102	TP103	TP103	WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50	0.40	1.20	1.50
Date Sampled				20/08/2020	20/08/2020	20/08/2020	20/08/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
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	-	-	-	-

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

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Analytical Report Number: 20-26866
Project / Site name: Goulden Street
Your Order No: PO 12728 EM-I

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006-PL based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
1604284	TT102C	0.40	170	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**
1604304	WS103	1.50	166	Loose Fibres	**Chrysotile**	< 0.001	**< 0.001**

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

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Analytical Report Number : 20-26866
Project / Site name: Goulden Street

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1604281	TT102A	None Supplied	1	Brown loam and sand with gravel and vegetation.
1604282	TT102A	None Supplied	3	Brown clay.
1604283	TT102B	None Supplied	1.2	Brown loam and sand with gravel.
1604284	TT102C	None Supplied	0.4	Brown loam and sand with gravel.
1604285	TT103B	None Supplied	2.9	Brown loam and sand with gravel.
1604286	TP105	None Supplied	0.5	Brown clay and sand.
1604287	TP105	None Supplied	3.3	Brown clay and sand.
1604288	WS105	None Supplied	1.5	Brown clay and sand with gravel.
1604289	WS105	None Supplied	2.8	Brown clay and sand.
1604290	TP106	None Supplied	0.4	Brown loam and sand.
1604291	TP106	None Supplied	1.8	Brown loam and clay with gravel and vegetation.
1604292	TP104	None Supplied	0.1	Brown loam and sand with gravel and vegetation.
1604293	TP104	None Supplied	2	Brown loam and sand with gravel.
1604294	WS104	None Supplied	0.3	Brown clay and sand with gravel.
1604295	WS104	None Supplied	2	Brown clay.
1604296	TP101	NW	0.5	Brown loam and sand with gravel.
1604297	TP101	NE	0.5	Brown clay.
1604298	WS101	None Supplied	3	Brown clay and sand with gravel.
1604299	WS101	None Supplied	0.7	Brown clay and sand with gravel.
1604300	TP102	None Supplied	0.6	Brown clay and sand.
1604301	TP102	None Supplied	1.5	Brown clay and sand.
1604302	TP103	None Supplied	0.4	Brown clay and sand with gravel.
1604303	TP103	None Supplied	1.2	Brown clay and sand with gravel.
1604304	WS103	None Supplied	1.5	Brown clay and sand with gravel.

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Analytical Report Number : 20-26866
Project / Site name: Goulden Street

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS

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Analytical Report Number : 20-26866
Project / Site name: Goulden Street

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
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
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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Sulphate, water soluble, in soil	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

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.

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Sample Deviation Report

Analytical Report Number : 20-26866
Project / Site name: Goulden Street

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
TT102B	None Supplied	S	1604283	b	Monohydric phenols in soil	L080-PL	b
TT102B	None Supplied	S	1604283	b	Speciated EPA-16 PAHs in soil	L064-PL	b
TT102B	None Supplied	S	1604283	b	TPH in (Soil)	L076-PL	b

Key: **a** - No sampling date **b** - Incorrect container
c - Holding time **d** - Headspace **e** - Temperature

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Analytical Report Number : 20-30678

Project / Site name:	Goulden St - Thompson St	**Samples received on:**	17/09/2020
Your job number:	12728-12730	**Samples instructed on/ Analysis started on:**	17/09/2020
Your order number:		**Analysis completed by:**	23/09/2020
Report Issue Number:	1	**Report issued on:**	23/09/2020
Samples Analysed:	4 water samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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

Analytical Report Number: 20-30678
Project / Site name: Goulden St - Thompson St

Lab Sample Number				1623183	1623184	1623185	1623186
Sample Reference				Goulden CP101	Goulden WS104	Thompson WS101	Thompson WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				17/09/2020	17/09/2020	17/09/2020	17/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
General Inorganics							
pH	pH Units	N/A	ISO 17025	7.9	7.9	7.2	7.4
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	4.01	4.12	19.1	2.93
Total Phenols							
Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Heavy Metals / Metalloids							
Calcium (dissolved)	mg/l	0.012	ISO 17025	57	81	130	93
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.37	< 0.15	8.22	< 0.15
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.03	0.02	0.13	0.05
Chromium (dissolved)	µg/l	0.2	ISO 17025	5.6	2.3	7.3	4.6
Copper (dissolved)	µg/l	0.5	ISO 17025	2.1	1.8	7.8	1.5
Lead (dissolved)	µg/l	0.2	ISO 17025	1.1	< 0.2	4.3	1.6
Manganese (dissolved)	µg/l	0.05	ISO 17025	0.56	200	2400	44
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.6	2.2	12	3.3
Selenium (dissolved)	µg/l	0.6	ISO 17025	3.6	12	1.2	2.7
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.1	2.3	8.6	4.8
Monoaromatics & Oxygenates							
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons							
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10

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Analytical Report Number: 20-30678
Project / Site name: Goulden St - Thompson St

Lab Sample Number				1623183	1623184	1623185	1623186
Sample Reference				Goulden CP101	Goulden WS104	Thompson WS101	Thompson WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				17/09/2020	17/09/2020	17/09/2020	17/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10

VOCs

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

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Analytical Report Number: 20-30678
Project / Site name: Goulden St - Thompson St

Lab Sample Number				1623183	1623184	1623185	1623186
Sample Reference				Goulden CP101	Goulden WS104	Thompson WS101	Thompson WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				17/09/2020	17/09/2020	17/09/2020	17/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

SVOCs

Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

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Analytical Report Number: 20-30678
Project / Site name: Goulden St - Thompson St

Lab Sample Number				1623183	1623184	1623185	1623186
Sample Reference				Goulden CP101	Goulden WS104	Thompson WS101	Thompson WS103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				17/09/2020	17/09/2020	17/09/2020	17/09/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

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

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 20-30678
Project / Site name: Goulden St - Thompson St

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

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

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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

Sample Deviation Report

Analytical Report Number : 20-30678
Project / Site name: Goulden St - Thompson St

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
Goulden CP101	None Supplied	W	1623183	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
Goulden CP101	None Supplied	W	1623183	b	Volatile organic compounds in water	L073B-PL	b
Goulden WS104	None Supplied	W	1623184	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
Goulden WS104	None Supplied	W	1623184	b	Volatile organic compounds in water	L073B-PL	b
Thompson WS101	None Supplied	W	1623185	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
Thompson WS101	None Supplied	W	1623185	b	Volatile organic compounds in water	L073B-PL	b
Thompson WS103	None Supplied	W	1623186	b	BTEX and MTBE in water (Monoaromatics)	L073B-PL	b
Thompson WS103	None Supplied	W	1623186	b	Volatile organic compounds in water	L073B-PL	b

Key: **a** - No sampling date **b** - Incorrect container Iss No 20-30678-1 Goulden St - Thompson St 12728-12730.XLSM
c - Holding time **d** - Headspace **e** - Temperature

APPENDIX VII
ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

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

LABORATORY REPORT

4043

Contract Number: PSL21/0251

Report Date: 02 February 2021

Client's Reference: 12-728

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Alex Smith

Contract Title: Goulden Street

Date Received: 6/1/2021
Date Commenced: 6/1/2021
Date Completed: 2/2/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	H Daniels (Senior Technician)

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awatkins@prosoils.co.uk

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
BH1		C	31.50	31.80	74	161	2.2	1348	1.95	8.3	1.80	18.2	4.2	Brittle	01/02/21	

PSL Professional Soils Laboratory	Goulden Street	Contract No:
		PSL21/0251
		Client Ref:
		12-728

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH1	27.20		A	Perp	74	45	3330	4239.89	65.11	-	0.23	0.05	1.126	0.06	Valid	
BH1	29.00		A	Perp	74	62	4588	5841.62	76.43	-	1.06	0.18	1.210	0.22	Valid	
BH1	32.75		A	Perp	74	60	4440	5653.18	75.19	-	0.73	0.13	1.202	0.16	Valid	
BH1	34.90		A	Perp	74	47	3478	4428.33	66.55	-	0.87	0.20	1.137	0.22	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Goulden Street

Contract No:
PSL21/0251
Client Ref:
12-728

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
BH1	27.20		D	Par	-	74	5476	74.00	-	0.12	0.022	1.193	0.03	Valid	

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

Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Goulden Street

Contract No:
PSL21/0251
Client Ref:
12-728

LABORATORY REPORT

4043

Contract Number: PSL20/4878

Report Date: 06 October 2020

Client's Reference: 12-728

Client Name: E3P
Heliport Business Park
Liverpool Road
Eccles
Manchester
M30 7RU

For the attention of: Alex Smith

Contract Title: Goulden Street

Date Received: 15/9/2020
Date Commenced: 15/9/2020
Date Completed: 6/10/2020

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:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	S Royle (Laboratory Manager)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
CP101		SPT	1.20	1.65	Brown slightly gravelly sandy CLAY.
CP101		U100	5.00	5.45	Very stiff brown very sandy slightly clayey SILT.
CP101		Bulks	1.20	1.70	MADE GROUND brown very sandy silty gravel.
TP102		Bulks	3.20		Brown mottled grey sandy CLAY.
TP105		Bulks	1.00		MADE GROUND brown slightly sandy very clayey gravel of cobbles.
WS104		Liner	2.50	3.00	Stiff brown slightly gravelly sandy CLAY.
WS101		SPT	2.00	2.45	Brown slightly gravelly sandy CLAY.

SUMMARY OF SOIL CLASSIFICATION TESTS

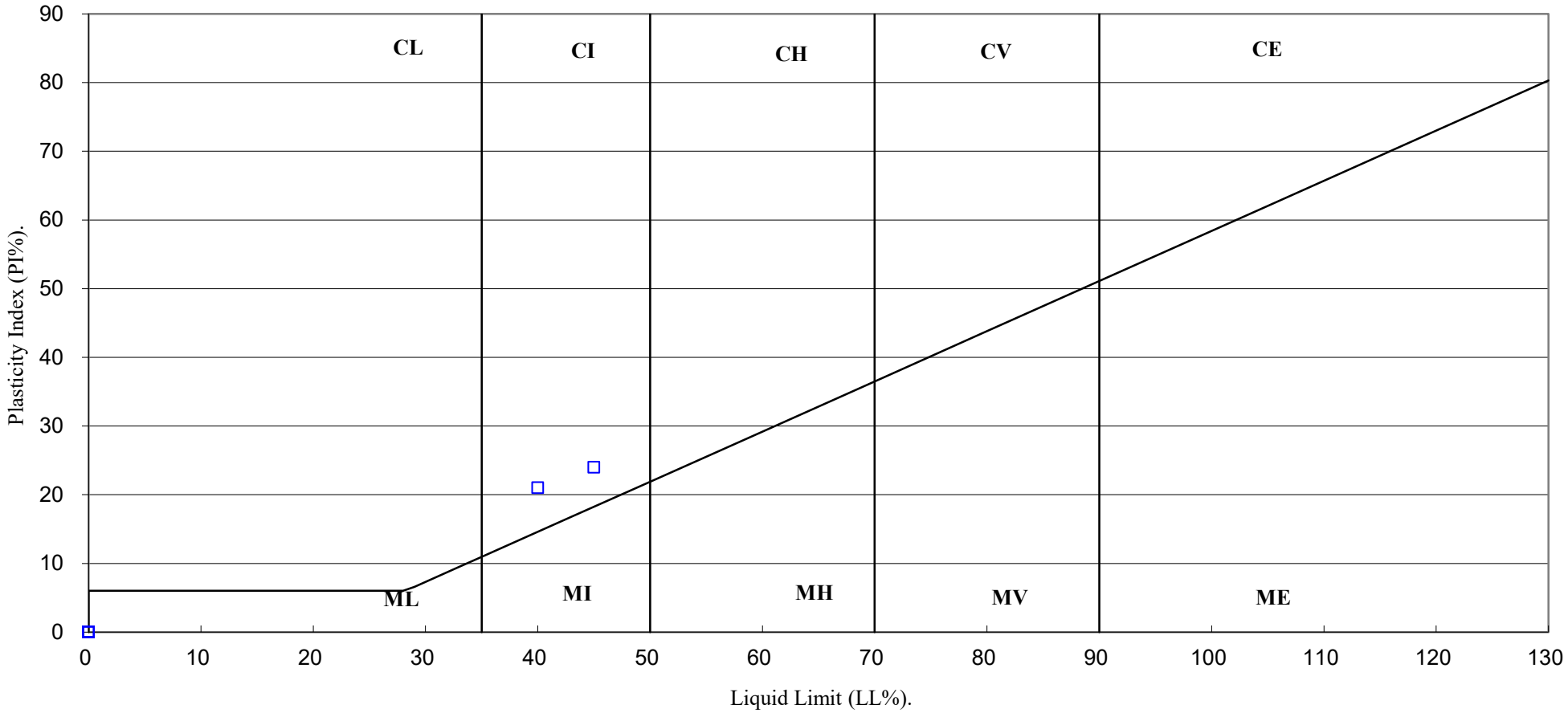
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
CP101		SPT	1.20	1.65	17			40	19	21	97	Intermediate plasticity CI.
WS101		SPT	2.00	2.45	18			45	21	24	93	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract No: PSL20/4878
			Client Ref: 12-728

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract No:
			PSL20/4878
			Client Ref:
			12-728

PARTICLE SIZE DISTRIBUTION TEST

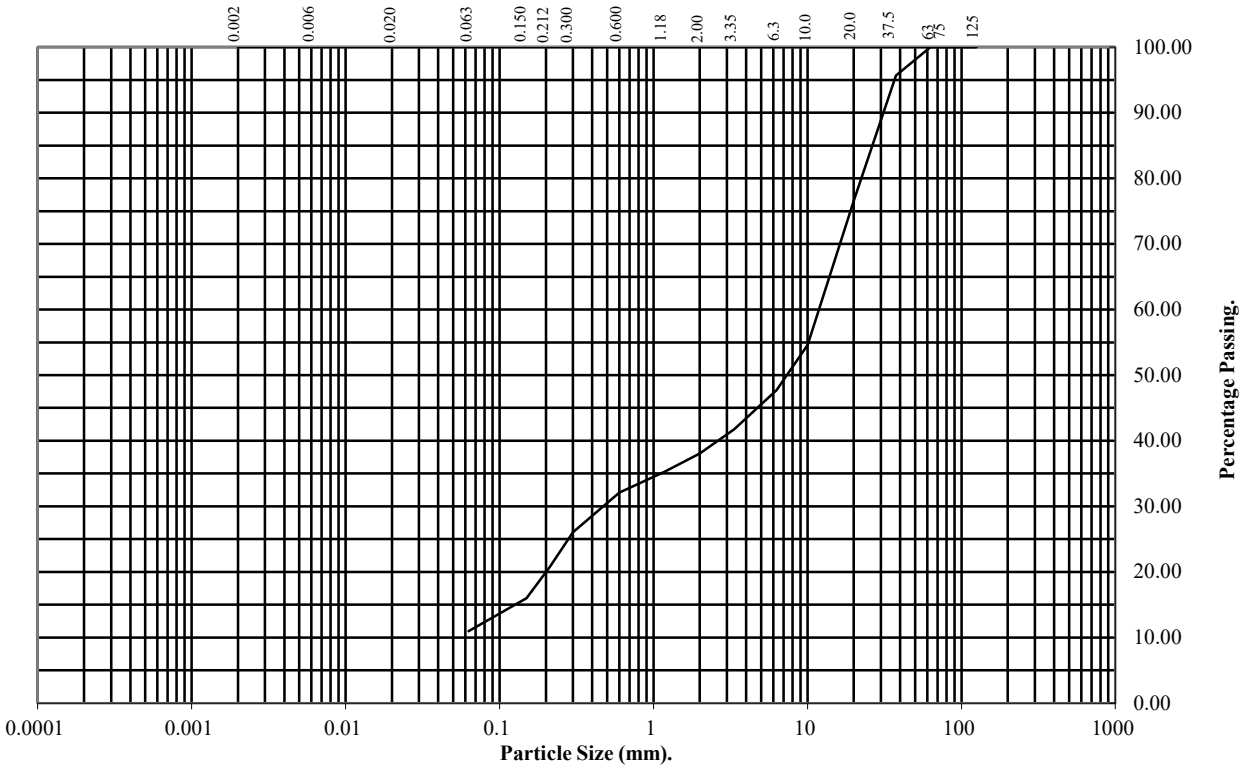
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **CP101** **Top Depth (m):** **1.20**

Sample Number: **Base Depth(m):** **1.70**

Sample Type: **Bulks**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	96
20	77
10	55
6.3	48
3.35	42
2	38
1.18	35
0.6	32
0.3	26
0.212	21
0.15	16
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	62
Sand	27
Silt/Clay	11

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Goulden Street**	**Contract No:** PSL20/4878 **Client Ref:** 12-728

PARTICLE SIZE DISTRIBUTION TEST

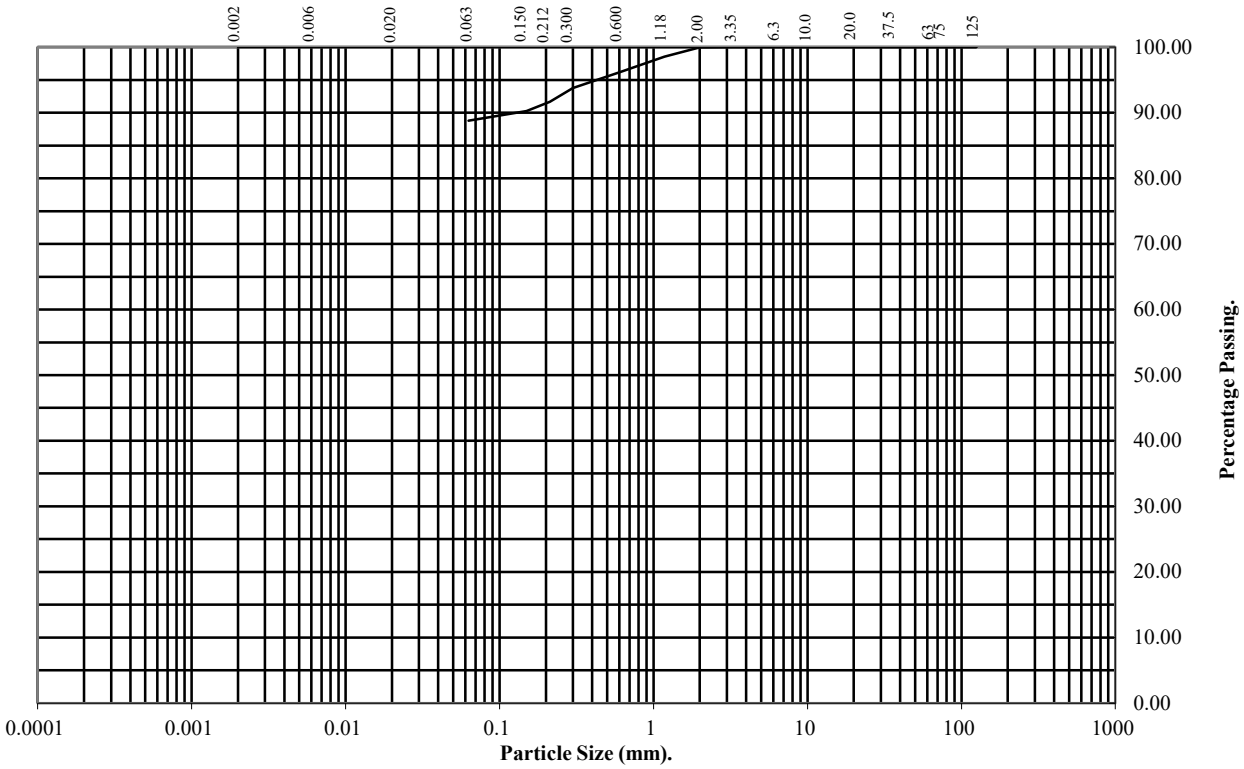
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP102** **Top Depth (m):** **3.20**

Sample Number: **Base Depth(m):**

Sample Type: **Bulks**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	96
0.3	94
0.212	92
0.15	90
0.063	89

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	11
Silt/Clay	89

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Goulden Street**	**Contract No:** PSL20/4878 **Client Ref:** 12-728

PARTICLE SIZE DISTRIBUTION TEST

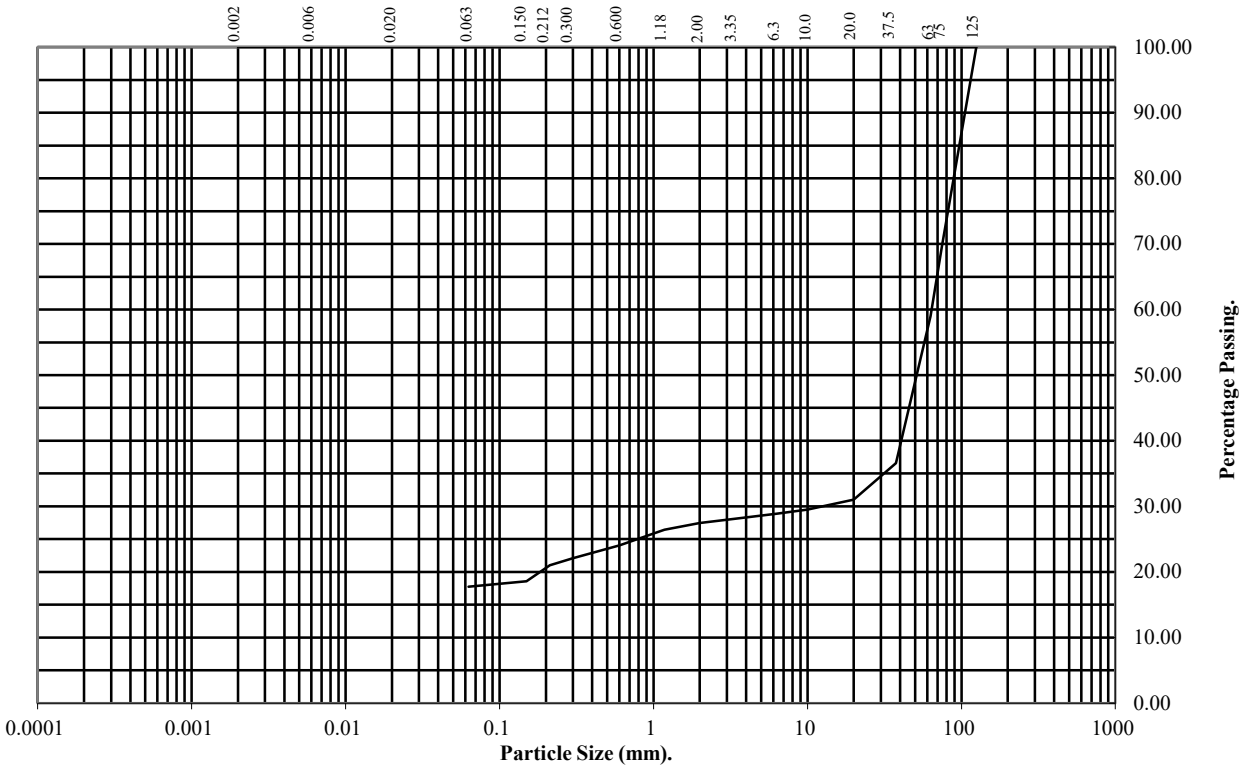
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP105** **Top Depth (m):** **1.00**

Sample Number: **Base Depth(m):**

Sample Type: **Bulks**



BS Test Sieve (mm)	Percentage Passing
125	100
75	70
63	59
37.5	37
20	31
10	29
6.3	29
3.35	28
2	27
1.18	26
0.6	24
0.3	22
0.212	21
0.15	19
0.063	18

Soil Fraction	Total Percentage
Cobbles	41
Gravel	32
Sand	9
Silt/Clay	18

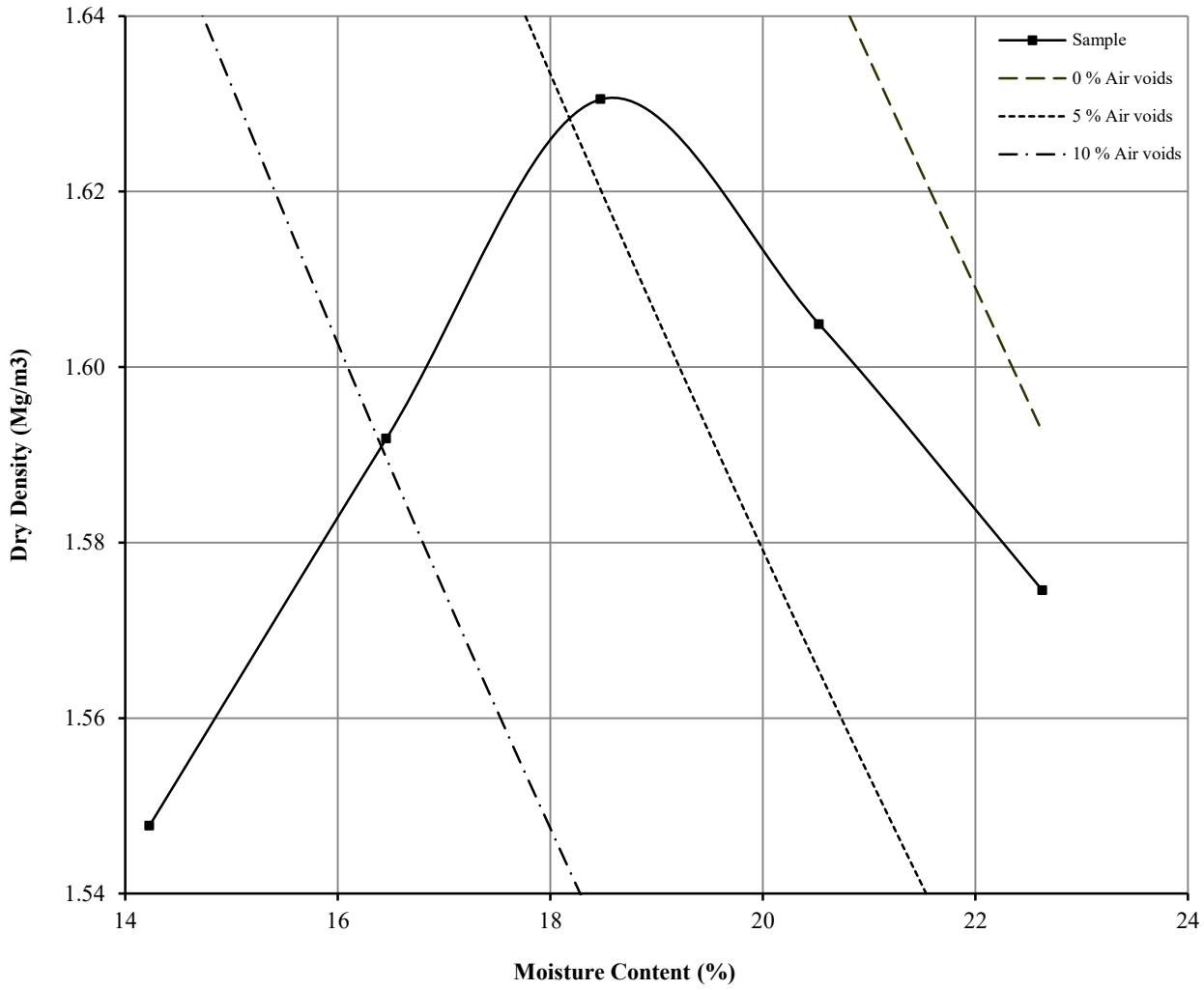
Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Goulden Street**	**Contract No:** PSL20/4878 **Client Ref:** 12-728

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.4 : 1990

Hole Number:	**CP101**	**Top Depth (m) :**	**1.20**
Sample Number:		**Base Depth (m) :**	**1.70**
Sample Type:	**Bulks**		



Initial Moisture Content:		18	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.49	Assumed	Material Retained on 37.5 mm Test Sieve (%):		4
Maximum Dry Density (Mg/m3):		1.63	Material Retained on 20.0 mm Test Sieve (%):		19
Optimum Moisture Content (%):		18			
Remarks See summary of soil descriptions.					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Goulden Street**	**Contract**
			PSL20/4878
			Client Ref
			12-728

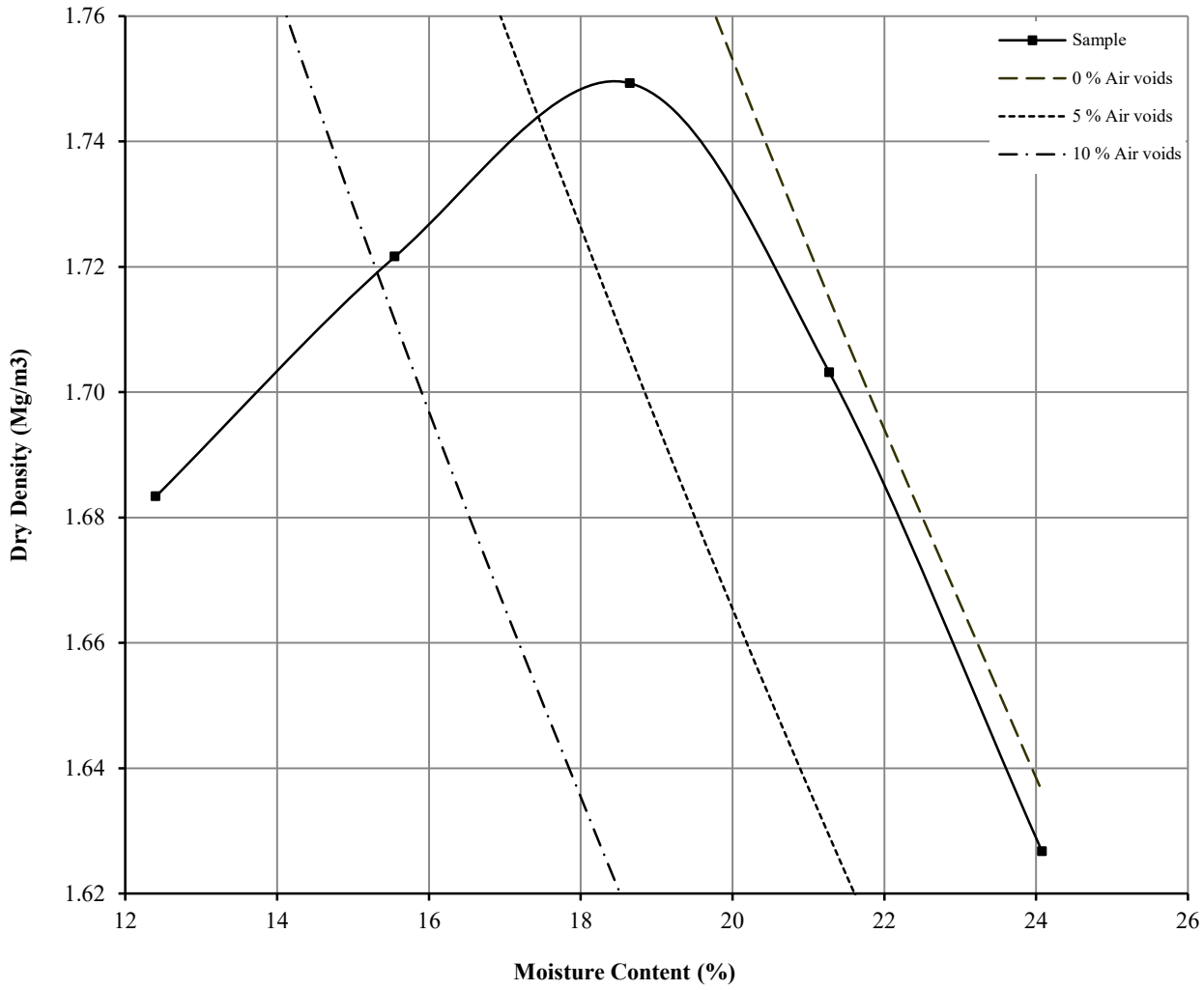
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number: TP102 **Top Depth (m) :** 3.20

Sample Number: **Base Depth (m) :**

Sample Type: B



Initial Moisture Content:		19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.70	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.75	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		19			
Remarks See summary of soil descriptions.					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract PSL20/4878 Client Ref 12-728

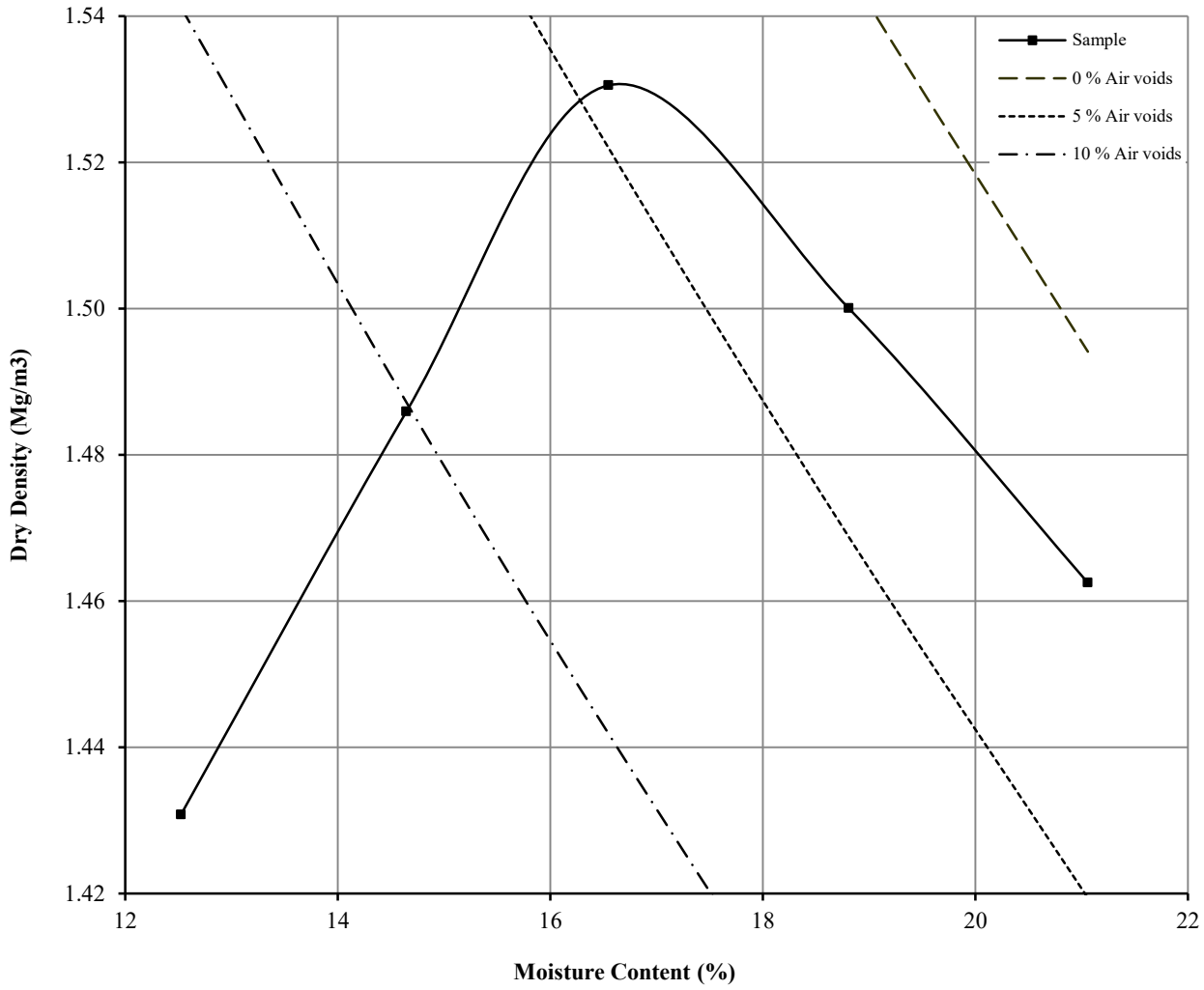
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.4 : 1990

Hole Number: TP105 **Top Depth (m) :** 1.00

Sample Number: **Base Depth (m) :**

Sample Type: Bulks



Initial Moisture Content:		19	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.18	Assumed	Material Retained on 37.5 mm Test Sieve (%):		63
Maximum Dry Density (Mg/m3):		1.53	Material Retained on 20.0 mm Test Sieve (%):		6
Optimum Moisture Content (%):		17			
Remarks See summary of soil descriptions.					

UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract PSL20/4878 Client Ref 12-728

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

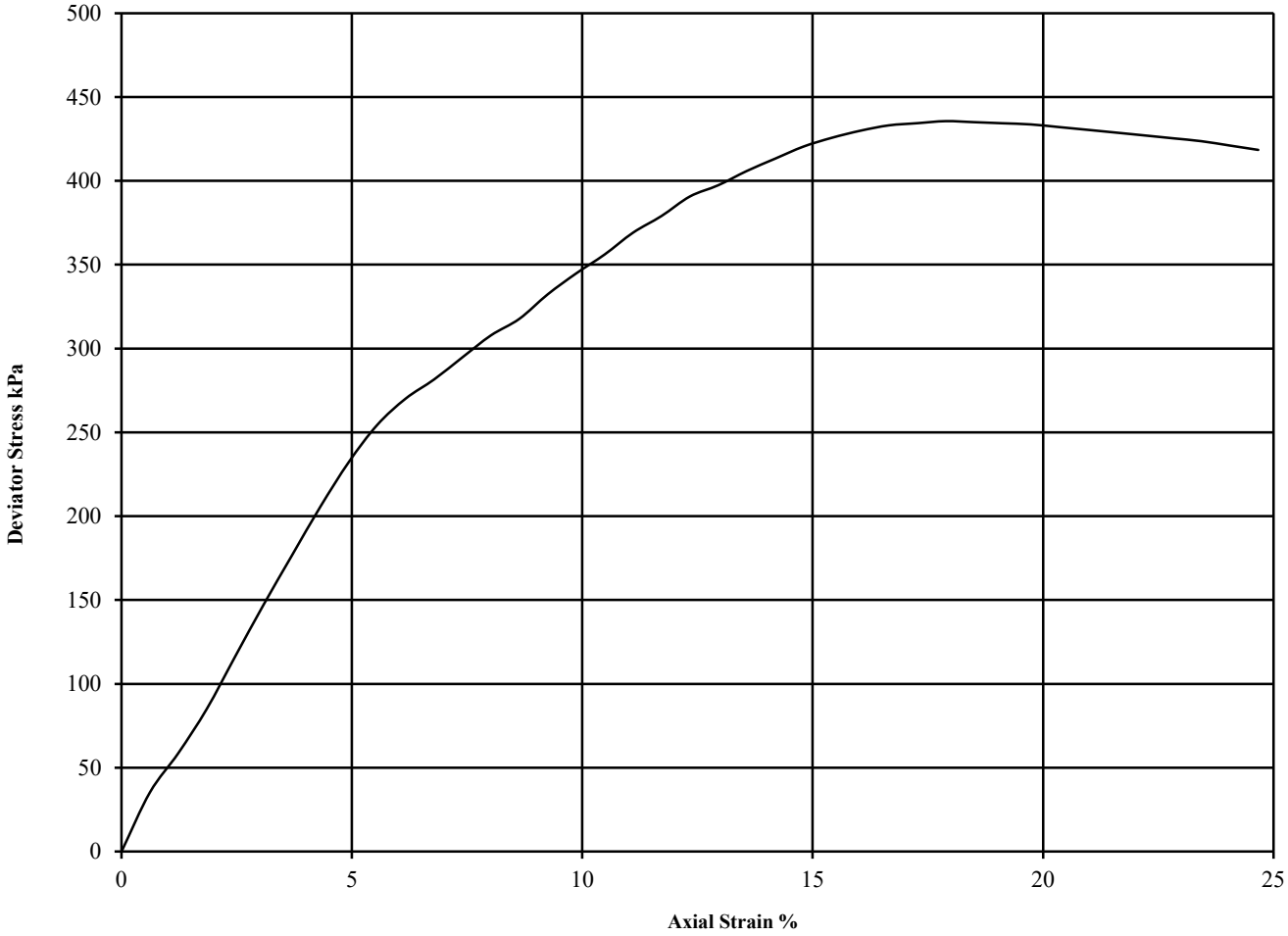
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: CP101 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m):** 5.45

Sample Type U100



Diameter (mm):		103	Height (mm):		167	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.34
1	22	2.08	1.71	104.5	436	218	17.9	Intermediate	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract No: PSL20/4878 Client Ref: 12-728

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

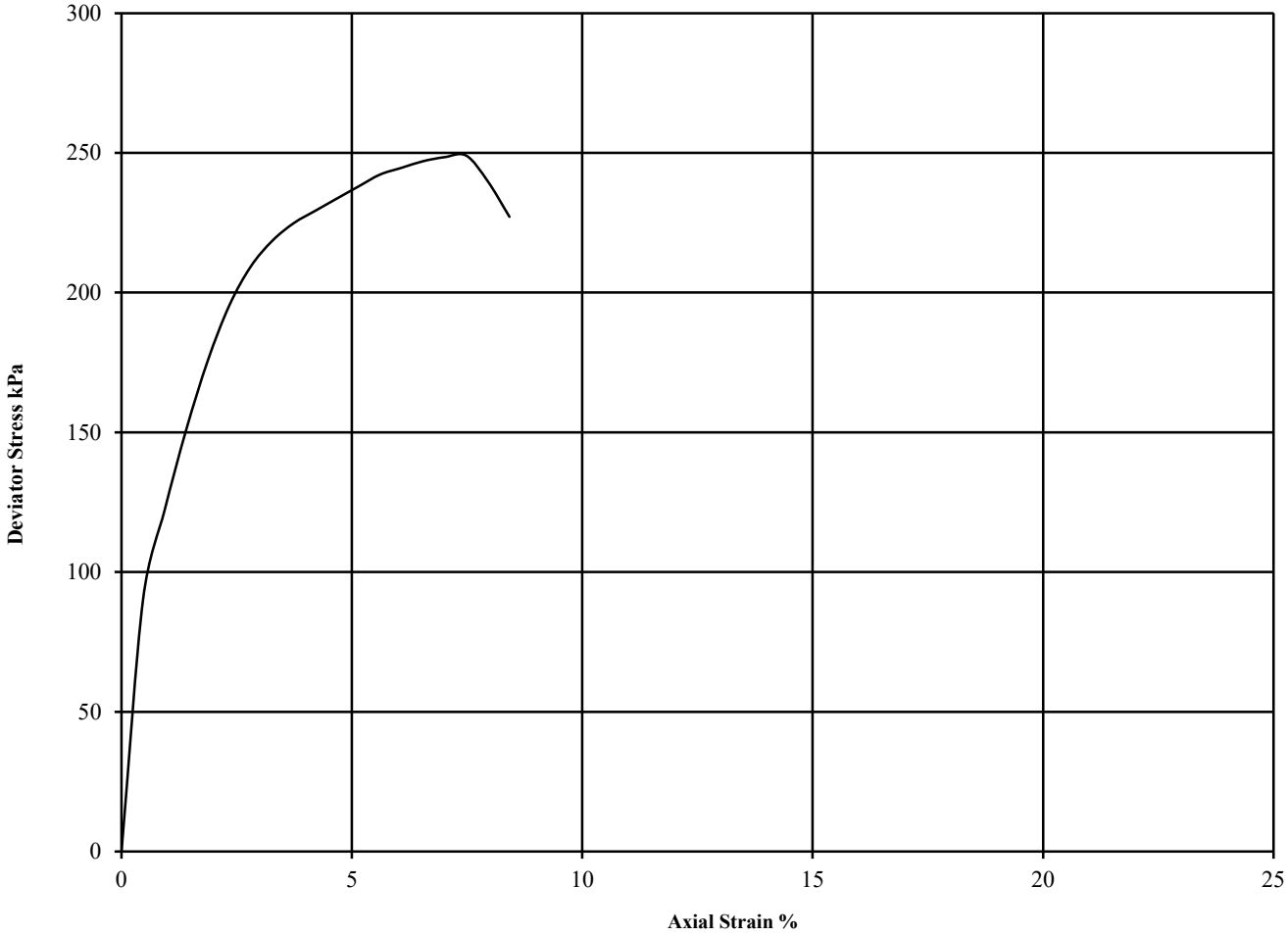
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: WS104 **Top Depth (m):** 2.50

Sample Number: **Base Depth (m):** 3.00

Sample Type Liner



Diameter (mm):		73	Height (mm):		155	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	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
1	18	2.14	1.81	55	249	124	7.5	Brittle	See summary of soil descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract No: PSL20/4878 Client Ref: 12-728

ONE DIMENSIONAL CONSOLIDATION TEST

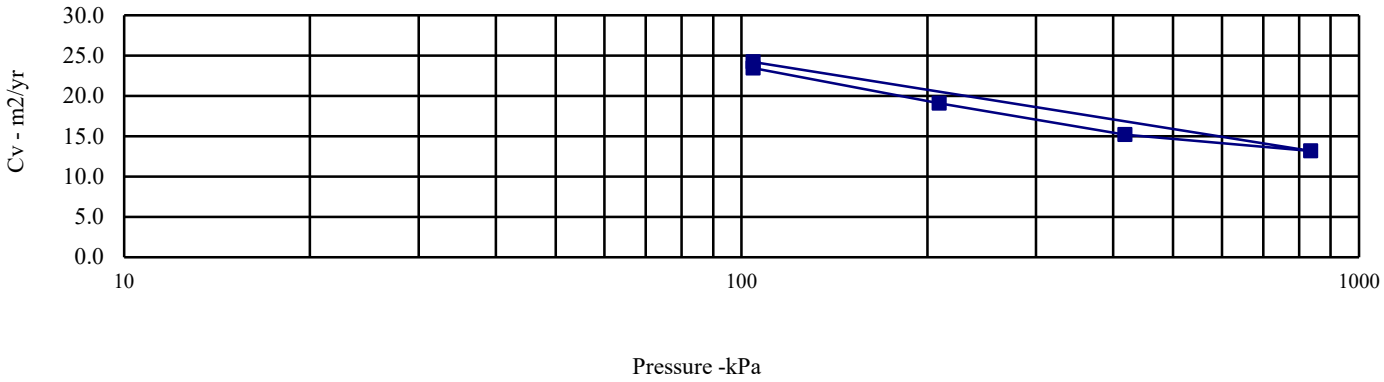
BS 1377: Part 5: 1990: Clause 3

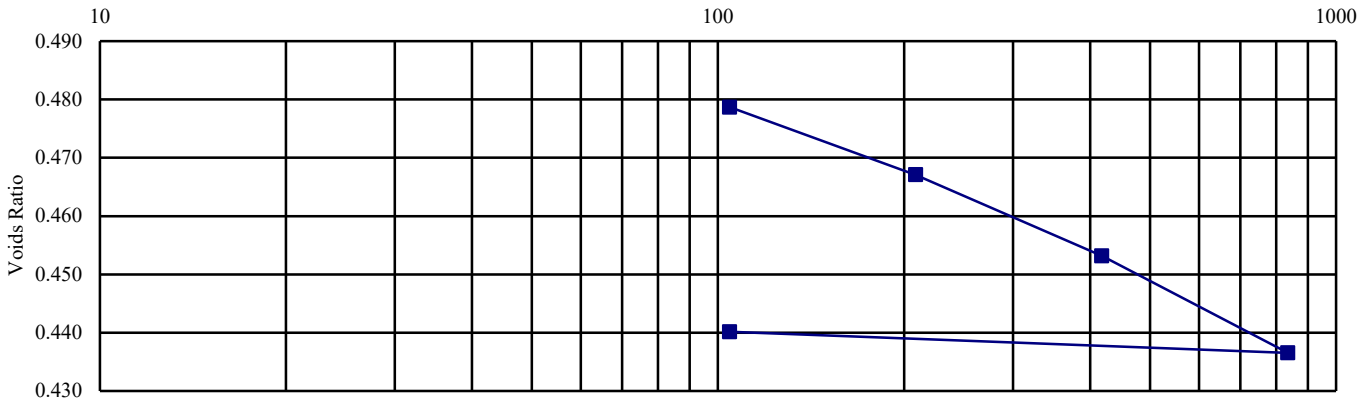
Hole Number: CP101 **Top Depth (m):** 5.00

Sample Number: **Base Depth (m) :** 5.45

Sample Type: U100

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	22						
Bulk Density (Mg/m3):	2.09	0	104.5	0.436	23.453	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.71	104.5	209	0.075	19.064		
Voids Ratio:	0.549	209	418	0.045	15.194	Nominal temperature during test ' C:	20
Degree of saturation:	106.7	418	836	0.027	13.159		
Height (mm):	20.028	836	104.5	0.003	24.214	Remarks: See summary of soil descriptions	
Diameter (mm)	75.03						
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	Goulden Street	Contract No: PSL20/4878
			Client Ref: 12-728

ONE DIMENSIONAL CONSOLIDATION TEST

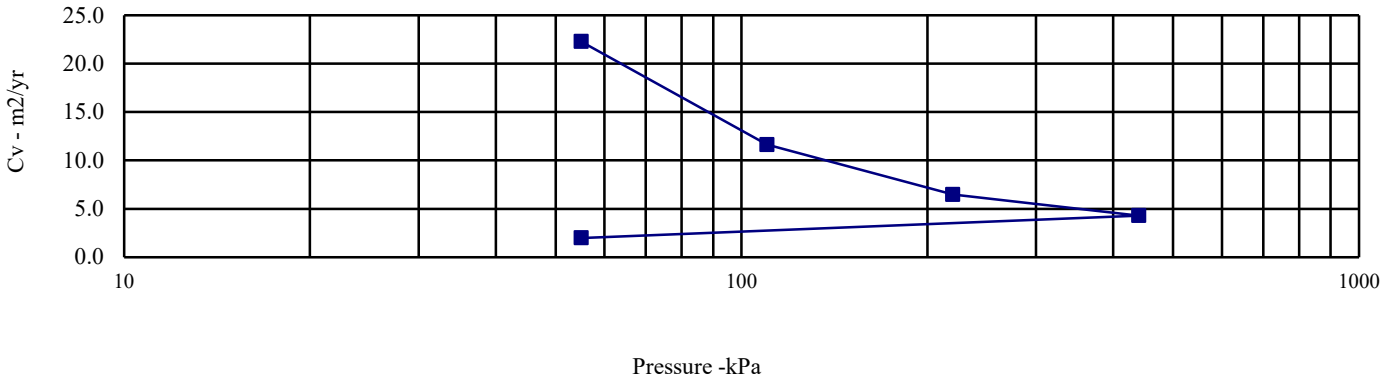
BS 1377: Part 5: 1990: Clause 3

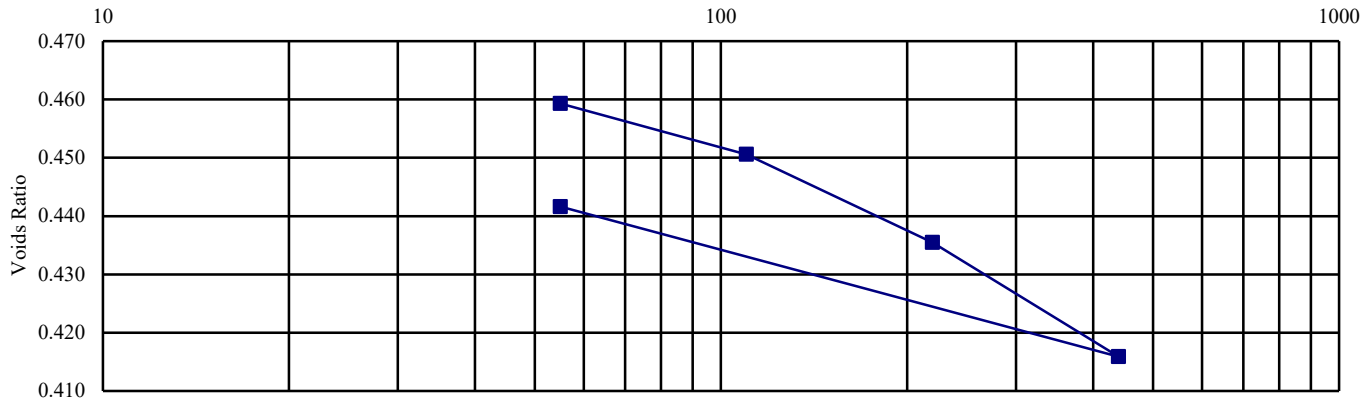
Hole Number: WS104 **Top Depth (m):** 2.50

Sample Number: **Base Depth (m) :** 3.00

Sample Type: Liner

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	18						
Bulk Density (Mg/m3):	2.12	0	55	0.124	22.275	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.80	55	110	0.109	11.637		
Voids Ratio:	0.469	110	220	0.095	6.480	Nominal temperature during test ' C:	20
Degree of saturation:	100.4	220	440	0.062	4.285		
Height (mm):	20.032	440	55	0.047	1.978	Remarks: See summary of soil descriptions	
Diameter (mm)	50.04						
Particle Density (Mg/m3): Assumed	2.65						





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