

GROUNDTECH
CONSULTING

BRUNSWICK MILL

SUPPLEMENTARY INVESTIGATION APPRAISAL

ARROWSMITH INVESTMENTS LTD

NOVEMBER 2023

Document Control Form	
PROJECT	*BRUNSWICK MILL*
REPORT NAME	*SUPPLEMENTARY INVESTIGATION APPRAISAL*
REPORT REFERENCE	*GRO-22462-4862*
STATUS	*FINAL*
ISSUE DATE	*31 OCTOBER 2023*
REVISION	
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Plans		
Plan Reference	*Revision*	*Title*
GRO-22462-P01	-	*Project Location Plan*
GRO-22462-P02	-	*Exploratory Hole Location Plan*
GRO-22462-P08	-	*Stockpile Sample Locations Plan*

1.0 INTRODUCTION

Groundtech Consulting Limited have been instructed by Arrowsmith Investment Ltd to undertake a Supplementary Ground Investigation for a site at Brunswick Mill, Manchester. Below is a supplementary Investigation Appraisal in accordance with the agreed scope of works.

In preparing this appraisal the following documents were reviewed and should be read in conjunction with this report:

- *LK Consult Limited Phase 1 Preliminary Risk Assessment referenced LKC 18 1200, dated June 2018.*
- *Groundtech Consulting Geo-Environmental Appraisal referenced GRO-22462-4516, dated 5th July 2023.*
- *Groundtech Consulting Permanent Ground Gas Risk Assessment referenced GRO-22462-4732, dated September 2023.*

The site is located circa 2km east of Manchester City Centre, as shown on the Project Location Plan *GRO-22462-P01,* Plans are in *Appendix 1,* and is approximately centred on National Grid Reference 393530, 398720.

The site currently consists of Brunswick Mill in the north eastern half of the site, and an area of undeveloped land which previously contained India Mills to the south west. The Ashton Canal towpath runs adjacent to the external area alongside the canal in the south east.

An old above ground steel tank is present along the southern elevation of the mill building adjacent to Bradford Road. The tank is located in a brick bund.

To the south west of the mill building is an area of derelict land which is covered with stone and rough vegetation. Across this area are several soil bunds formed from demolition waste. A stockpile of demolition material is present alongside the north west boundary on the footprint of the proposed properties.

Stockpiles of waste, litter and fly tipping are present scattered around the central area of the external site adjacent to the existing Brunswick Mill building. This includes multiple LPG gas cannisters.

Site photographs are presented in *Appendix 2.*

2.0 SCOPE OF INVESTIGATION

The objective of the Ground Investigation was to sample and test the stockpile, located in the south western area of the site to determine whether the material can be reused throughout construction. Additionally, a second round of groundwater sampling was undertaken, as per recommendations in *Groundtech Consulting Geo-Environmental Appraisal* ref: *GRO-22462-4516*

Groundtech Consulting visited the site on 2nd October 2023 where eight representative samples of the stockpile were taken (SP01A-SP01H) and two groundwater samples were collected from BH01 and BH03.

2.1 Sampling

Soil Sample	Number
Environmental Sample	*8*
Disturbed Sample	*8*
Bulk Sample	*8*

The locations of the sampling from the boreholes are shown on Exploratory Hole Location Plan *GRO-22462-P02* and the stockpile sample locations are shown on the Stockpile Sample Location Plan *GRO-22462-P08*.

2.2 Geo-Environmental Laboratory Testing

The following geo-environmental testing was scheduled to assess the risk from contamination from the stockpile and determine the suitability for reuse.

Contaminants of Concern	Matrix	Number
Arsenic, Cadmium, Chromium (total and hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Organic Matter, Sulphate, and pH.	*Soil*	*8*
Speciated Polycyclic Aromatic Hydrocarbons (PAHs)	*Soil*	*8*
Asbestos Screening	*Soil*	*8*
Asbestos Quantification	*Soil*	*2*
Total Petroleum Hydrocarbons (TPH CWG)	*Soil*	*4*
Arsenic, Cadmium, Chromium (total and hexavalent), Copper, Lead, Mercury, Nickel, Selenium, Zinc, Organic Matter, Sulphate, and pH.	*Groundwater*	*2*
Speciated Polycyclic Aromatic Hydrocarbons (PAHs)	*Groundwater*	*2*
Total Petroleum Hydrocarbons (TPH CWG)	*Groundwater*	*2*
Polychlorinated biphenyl	*Groundwater*	*2*
Volatile Organic Compounds & Semi – Volatile Organic Compound	*Groundwater*	*2*
Ammonia/ammoniacal nitrogen	*Groundwater*	*2*
Dissolved Organic Carbon	*Groundwater*	*2*

The Environmental Laboratory Soil Testing Results for soils are presented in *Appendix 3 and* Environmental Laboratory Groundwater Testing Results for groundwater is presented in *Appendix 4.*

2.3 Geotechnical Laboratory Testing

In addition, representative disturbed samples were obtained for geotechnical purposes for all soil types. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' 1990. The following tests were scheduled:

British Standard	Test Method	Number
Part 2	*Plasticity Index Analysis*	*5*
Part 2	*Water Content*	*5*
Part 3	*Particle Density Testing*	*5*
Part 3	*Particle Size Distribution*	*5*
Part 3	*4.5kg Compaction Test*	*5*

The Geotechnical Laboratory Testing Results are presented in *Appendix 5*.

3.0 GEOTECHNICAL TESTING RESULTS

The below table outlines the range of the results for the above population:

Soil Population	BS 1377 Testing	Units	Range	Selected Value	Water Content Acceptable
Stockpile Made Ground	*Water Content*	*%*	*15 – 23*	*19*	*Wet of optimum*
	Plasticity Index	*%*	*12 - 20*	*16*	
	Optimum Moisture Content	*%*	*13 – 16*	*15*	
	Maximum Dry Density	*Mg/m^3*	*1.75 – 1.89*		
	Particle Density	*-*	*2.54 – 2.61*		

Subsequent geotechnical testing undertaken on the stockpile samples classify the material as predominantly a very clayey very sandy Gravel. In accordance with Table 6/2 of the specification for Highways Works Series 600, the associated class of material is 2C and should be placed and compacted to method 2 in accordance with Table 6/4 guidance.

Two stockpile samples (SP01a and SP01b) were wetter than optimum due to poor weather and fines content. The material will need drying before placement and compaction with subsequent validation testing in line with an Earthworks specification.

4.0 ENVIRONMENMTAL TESTING RESULTS

4.1 Geo-Environmental Testing Results - Soils

Samples of the Made Ground has been tested for a range of relevant Contaminants of Concern (CoCs). In accordance with LCRM, a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the concentrations as derived through Geo-Environmental analysis.

The GQRA process comprises the comparison of the actual concentrations measured on site with Generic Assessment Criteria (GACs) for the protection of human health.

The GACs used for the assessment of soil concentrations have been derived using the CLEA model. The GACs used are listed below:

- *Soil Guideline Values (SGVs) which demonstrate minimal risk.*
- *LQM/CIEH S4ULs which use the same toxicological data as the SGVs but different exposure criteria.*
- *C4SLs which demonstrate low risk.*

In deriving the GACs for use on Brownfield sites, we have used a worst case 1% Soil Organic Matter.

The proposed end-use for the site is a residential development comprising a redevelopment of the existing mill building into apartments, as well as the construction of two additional apartment blocks in the adjacent land to the south with associated driveways, pavements, access roads, and limited areas of soft landscaping.

We have therefore undertaken the GQRA on the basis that the proposed development site falls under the Residential (without Plant Uptake) land-use scenario as defined in SR3 (EA, 2009b).

Metals				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
Arsenic	*7.0 – 11.3*	*40*		
Cadmium	*<0.1 – 1.6*	*85*		
Chromium	*23.6 – 35.0*	*910*		
Hexavalent Chromium	*<0.3*	*21*		
Copper	*30 – 90*	*7100*		
Lead	*50 – 114*	*310*		
Mercury	*<0.1 – 0.3*	*1.2*		
Nickel	*13.4 – 20.5*	*180*		
Selenium	*<1*	*430*		
Zinc	*858 - 149*	*40000*		
Polycyclic Aromatic Hydrocarbons (PAHs)				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
Naphthalene	*0.16 – 9.66*	*2.3*	*1*	*SP01E*
Acenaphthylene	*0.08 – 0.56*	*2900*		
Acenaphthene	*0.15 – 14.88*	*3000*		
Fluorene	*0.14 – 10.19*	*2800*		
Phenanthrene	*1.45 – 72.80*	*1300*		
Anthracene	*0.34 – 19.57*	*31000*		
Fluoranthene	*1.89 – 77.76*	*1500*		

Pyrene	*1.87 – 61.28*	*3700*		
Benzo(a)anthracene	*0.99 – 28.95*	*11*	*1*	*SP01E*
Chrysene	*1.10 – 29.60*	*30*		
Benzo(b)fluoranthene	*1.25 – 30.87*	*3.9*	*1*	*SP01E*
Benzo(k)fluoranthene	*0.49 – 12.01*	*110*		
Benzo(a)pyrene	*1.10 – 25.13*	*3.2*	*1*	*SP01E*
Indeno(123cd)pyrene	*0.69 – 15.49*	*45*		
Dibenzo(ah)anthracene	*0.16 – 4.03*	*0.31*	*4*	*SP01A, SP01D, SP01E, SP01F*
Benzo(ghi)perylene	*0.70 – 14.87*	*360*		
TPH CWG – Aliphatics				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
>C5-C6	*<0.1*	*42*		
>C6-C8	*<0.1*	*100*		
>C8-C10	*<0.1*	*27*		
>C10-C12	*<0.2*	*130*		
>C12-C16	*<4*	*1100*		
>C16-C35	*<7 – 84*	*65000*		
Total aliphatics C5-35	*34 - 102*	*-*		
TPH CWG - Aromatics				
Contaminant	Range (mg/kg)	Screening Value (mg/kg)	Exceedances	Locations
>C5-EC7	*<0.1*	*370*		
>EC7-EC8	*<0.1*	*860*		
>EC8-EC10	*<0.1*	*47*		
>EC10-EC12	*<0.2*	*250*		
>EC12-EC16	*<4 – 8*	*1800*		
>EC16-EC21	*24 – 82*	*1900*		
>EC21-EC35	*109 – 282*	*1900*		
Total aromatics C5-35	*133 – 372*	*-*		
Total aliphatics and aromatics(C5-35)	*167 – 447*	*-*		
MTBE	*<5*	*49*		
Benzene	*<5*	*0.38*		
Toluene	*<5*	*880*		
Ethylbenzene	*<5*	*83*		
m/p-Xylene	*<5*	*82*		
o-Xylene	*<5*	*88*		
Others				
Moisture Content: 12.1 – 17.5				
pH: 8.02 – 8.40				
Organic Matter: 3.0 – 5.2				

Asbestos Screen				
Position	Depth (m bgl)	Result	Asbestos Type	Quantification (mass%)
SP01A	*-*	*None Detected*	*n/a*	*n/a*

SP01B	*-*	*Chrysotile and Amosite*	*Fibre bundles*	*<0.001*
SP01C	*-*	*None Detected*	*n/a*	*n/a*
SP01D	*-*	*None Detected*	*n/a*	*n/a*
SP01E	*-*	*None Detected*	*n/a*	*n/a*
SP01F	*-*	*None Detected*	*n/a*	*n/a*
SP01G	*-*	*None Detected*	*n/a*	*n/a*
SP01H	*-*	*Chrysotile and Amosite*	*Fibre bundles*	*<0.001*

4.2 Generic Quantitative Risk Assessment - Soils

The stockpile comprised of generally granular Made Ground.

Metals
There were no elevated levels of heavy metals encountered throughout the laboratory testing.

Polycyclic Aromatic Hydrocarbons (PAHs)
Several PAHs were recorded within the Made Ground above the screening values and these were encountered in SP01A, SP01D, SP01E, and SP01F. The elevated PAHs include Naphthalene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene.

Likely sources for the elevated PAHs have been calculated using the double plot ratio, which have concluded the exceedances to be coal derived. Ash and coal is present

Total Petroleum Hydrocarbons (TPH CWG)
Several samples tested for hydrocarbons were above laboratory detection limit, however they are still below screening values.

Asbestos
Asbestos was identified within two samples of the stockpile. Amosite and Chrysotile fibre bundles were encountered within SP01B and SP01H at a concentration of <0.001mass% and therefore considered less than trace value.

As the stockpile is contaminated by PAHs and asbestos fibre bundles, the material can only be used below 600mm of 'clean' material below finished site levels and must be removed off site where deeper services are to be installed. As seen on the proposed plan, the area where the stockpile is currently residing will be covered by a proposed apartment building and associated carparks, eliminating any potential human health pathway.

4.3 Geo-Environmental Testing Results - Groundwater

The first round of groundwater monitoring detected elevated concentrations of nickel, zinc and speciated PAHs in BH01 and BH03. A second round of groundwater sampling was undertaken on 16th October 2023 from BH01 and BH03 and were tested for a comprehensive suite similar to the soil testing suite. The results were compared with reference to a selection of guidance documents summarised in the table below.

The implementation of the Water Framework Directive (WFD) is to protect and enhance the quality of groundwater and groundwater-dependent ecosystems. The objective of the WFD requires all groundwater bodies (GWBs) are of 'good' status in terms of water quality. This status is based on thresholds for the chemical

constituents of groundwater and their impact on ecosystems. Preventing pollution is by far the most sustainable and cost-effective way of maintaining good groundwater quality. The EA are committed to the 'prevent or limit' approach reflected in EU and domestic legislation.

Priority is under the Water Framework Directive to protect water supplies intended for human consumption and ensure protection of groundwater quality that supplies dependent ecosystems. After first guidance in 1992 the following significant guidance has been introduced:

- *Water Framework Directive (2000/60/EC) and the Water Act 2003.*
- *The State of Groundwater in England and Wales 2006.*
- *Second phase of the environmental permitting regime in 2010 replacing the Groundwater Regulations (1999, 2009).*
- *Groundwater Daughter Directive.*

Pollutants can be divided into those that break down easily (degradable pollutants) and those that do not (non-degradable pollutants). The Water Framework Directive introduced the concept of 'hazardous substances' and 'non-hazardous pollutants', which replaced the previous List I and List II of substances considered to pose the greatest threat to the environment.

- *Hazardous substances* are the most toxic and must be prevented from entering groundwater. Substances in this list may be disposed of to the ground, under a permit, but must not reach groundwater. They include pesticides, sheep dip, solvents, hydrocarbons, mercury, cadmium and cyanide.
- *Non-hazardous pollutants* are less dangerous and can be discharged to groundwater under a permit but must not cause pollution. Examples include sewage, trade effluent and most wastes. Non-hazardous pollutants include any substance capable of causing pollution and the list is much wider than the previous List II of substances. For example, nitrate is now a non-hazardous pollutant whereas before it was not a List II substance.

Polluting substances in groundwater can occur as a gas (gaseous phase) or dissolved in water (aqueous phase), or as a non-aqueous phase liquid (NAPL). Some pollutants include substances that dissolve readily in water. These are said to have high solubility; an example is MTBE. Substances that have low solubility (such as oil) are referred to as non-aqueous phase liquids (NAPLs). NAPLs behave differently in groundwater depending on whether they are lighter or heavier than water. Light non-aqueous phase liquids (LNAPLs) may float on the water table whereas dense non-aqueous phase liquids (DNAPLs) may sink through the aquifer until they reach an impermeable layer. They may then generate plumes of contamination. In both cases, the slowly dissolving pollutant may form a plume of dissolved contamination which moves with the groundwater flow.

A table summarising the groundwater testing results is presented below:

Metals				
Contaminant	Range (ug/l)	EQS (ug/l)	Exceedances	Locations
Dissolved Arsenic	*<2.5*	*50*	*..*	-
Dissolved Cadmium	*<0.5*	*<0.08 - 0.25*	*..*	
Dissolved Chromium	*<1.5*	*4.7*	*..*	-
Hexavalent Chromium	*<0.006*	*3.4*	*..*	-
Dissolved Copper	*<7*	*10*	*..*	-
Dissolved Lead	*<5*	*7.2*	*..*	-
Dissolved Mercury	*<1*	*1*	*..*	-

Dissolved Nickel	*<2 – 10*	*4*	*..*	-
Dissolved Selenium	*<3*	*8 - 125*	*..*	-
Dissolved Zinc	*<3 - 6*	*75*	*..*	-
Polycyclic Aromatic Hydrocarbons (PAHs)				
Contaminant	Range (ug/l)	EQS (ug/l)	Exceedances	Locations
Benzo(a)pyrene	*<0.002*	*0.00017*	*..*	-
Indeno(123cd)pyrene	*<0.005*	*0.00017*	*..*	-
Benzo(ghi)perylene	*<0.005*	*0.00017*	*..*	-
Benzo(b)fluoranthene	*<0.005*	*0.00017*	*..*	-
Benzo(b)fluoranthene	*<0.005*	*0.00017*	*..*	-
TPH CWG – Aliphatics				
Contaminant	Range (ug/l)	EQS (ug/l)	Exceedances	Locations
>C5-C6	*<10*	*15,000*	*..*	-
>C6-C8	*<10*	*15,000*	*..*	-
>C8-C10	*<10*	*300*	*..*	-
>C10-C12	*<5*	*300*	*..*	-
>C12-C16	*<10*	*300*	*..*	-
>C16-C35	*<10*	-	*..*	-
Total aliphatics C5-35	*<10*	-		
TPH CWG - Aromatics				
Contaminant	Range (ug/l)	EQS (ug/l)	Exceedances	Locations
>C5-EC7	*<10*	-	*0*	-
>EC7-EC8	*<10*	-	*0*	-
>EC8-EC10	*<10*	-	*0*	-
>EC10-EC12	*<5*	*90*	*0*	-
>EC12-EC16	*<10*	*90*	*0*	-
>EC16-EC21	*<10*	*90*	*0*	-
>EC21-EC35	*<10*	*90*	*0*	-
Total aromatics C5-35	*<10*	-	*0*	-
Total aliphatics and aromatics(C5-35)	*<10*	-	*0*	-
MTBE	*<0.1*	*15*	*0*	-
Benzene	*<0.5*	*10*	*0*	-
Toluene	*<5*	*74*	*0*	-
Ethylbenzene	*<1*	*300*	*0*	-
m/p-Xylene	*<2*	*30*	*0*	-
o-Xylene	*<1*	*30*	*0*	-
Others				
Total Hardness			*304- 620 mg/l*	

No elevated levels of Toxic/phytoxic metals and PolyChlorinated Biphenyls (PCBs) were detected throughout laboratory testing of the groundwater and all concentrations were below laboratory detection limits.

All Volatile Organic Compounds and Semi-Volatile Organic Compounds tested did not exceed laboratory detection limits.

All speciated Polycyclic Aromatic Hydrocarbons were below laboratory detection limits and/or EQS screening values.

4.4 Generic Quantitative Risk Assessment - Groundwater

Similar to the original ground investigation, groundwater samples were collected to determine if the potential onsite sources identified in the Preliminary Risk Assessment and the Ground Investigation have migrated to the underlying groundwater.

Historically, the site has been used as a mill. In addition, there are a number of offsite sources that could potentially impact the underlying groundwater at the site and include other mills, boiler works, engineering works, glass works, gas works, chemical works, landfills and printing works.

The most recent groundwater results indicated that all potential Contaminants of Concern, which included metals, PAHs, VOC/SVOC and TPHs have been recorded at concentrations below the relevant EQS screening values, confirming no viable risk to surface and groundwater.

These results are therefore at odds compared against the initial groundwater results which recorded elevated concentrations of nickel in BH01 and BH03, and elevated zinc in BHG03. The groundwater results are also at odds with the soil samples collected from the stockpile.

Whilst there was a minor oily sheen present on some of the Made Ground soils collected during the original investigation, no evidence of contamination was present within the underlying groundwater samples obtained from the site.

Much like the original investigation, the groundwater testing results have proven that the underlying groundwaters have not been impacted by the sources of contamination identified during the original investigation on site.

5.0 FINAL APPRAISAL

The recorded stockpile on site comprised Made Ground of dark brown very claeye very sandy Gravel from an unknown origin. Gravel was angular to rounded fine to coarse of brick, ceramic, concrete and plastic. No visual or olfactory evidence of contamination was recorded.

Geo-environmental testing has recorded elevated concentrations of speciated PAHs within the stockpile material. Asbestos fibre bundles were encountered within two samples with a quantification value of <0.001mass% and therefore is below trace value. As the stockpile is contaminated by PAHs and asbestos fibre bundles, the material can only be used below 600mm of 'clean' material below finished site levels and must be removed off site where deeper services are to be installed. As seen on the proposed plan, the area where the stockpile is currently residing will be covered by a proposed apartment building and associated carparks, eliminating any potential human health pathway.

Subsequent geotechnical testing undertaken on the stockpile samples classify the material as predominantly a very clayey very sandy Gravel. In accordance with Table 6/2 of the specification for Highways Works Series 600, the associated class of material is 2C and should be placed and compacted to method 2 in accordance with Table 6/4 guidance. In addition, two stockpile samples were wetter than optimum and will need drying out drying before placement and compaction with subsequent validation testing required.

The most recent groundwater results indicated that all potential Contaminants of Concern, which included metals, PAHs, VOC/SVOC and TPHs have been recorded at concentrations below the relevant EQS screening values, confirming no viable risk to surface and groundwater

6.0 RELEVANT INDUSTRY REFERENCES

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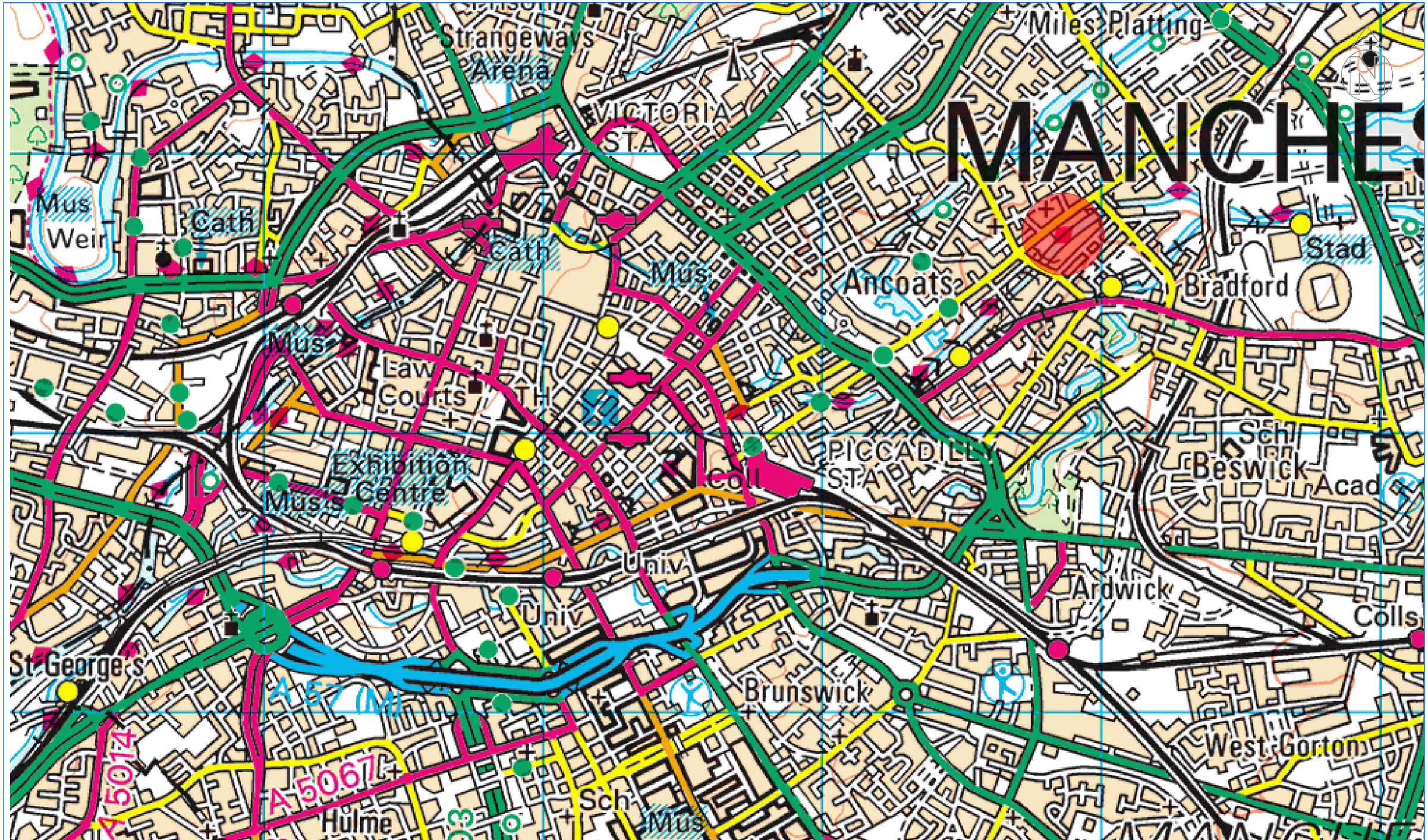
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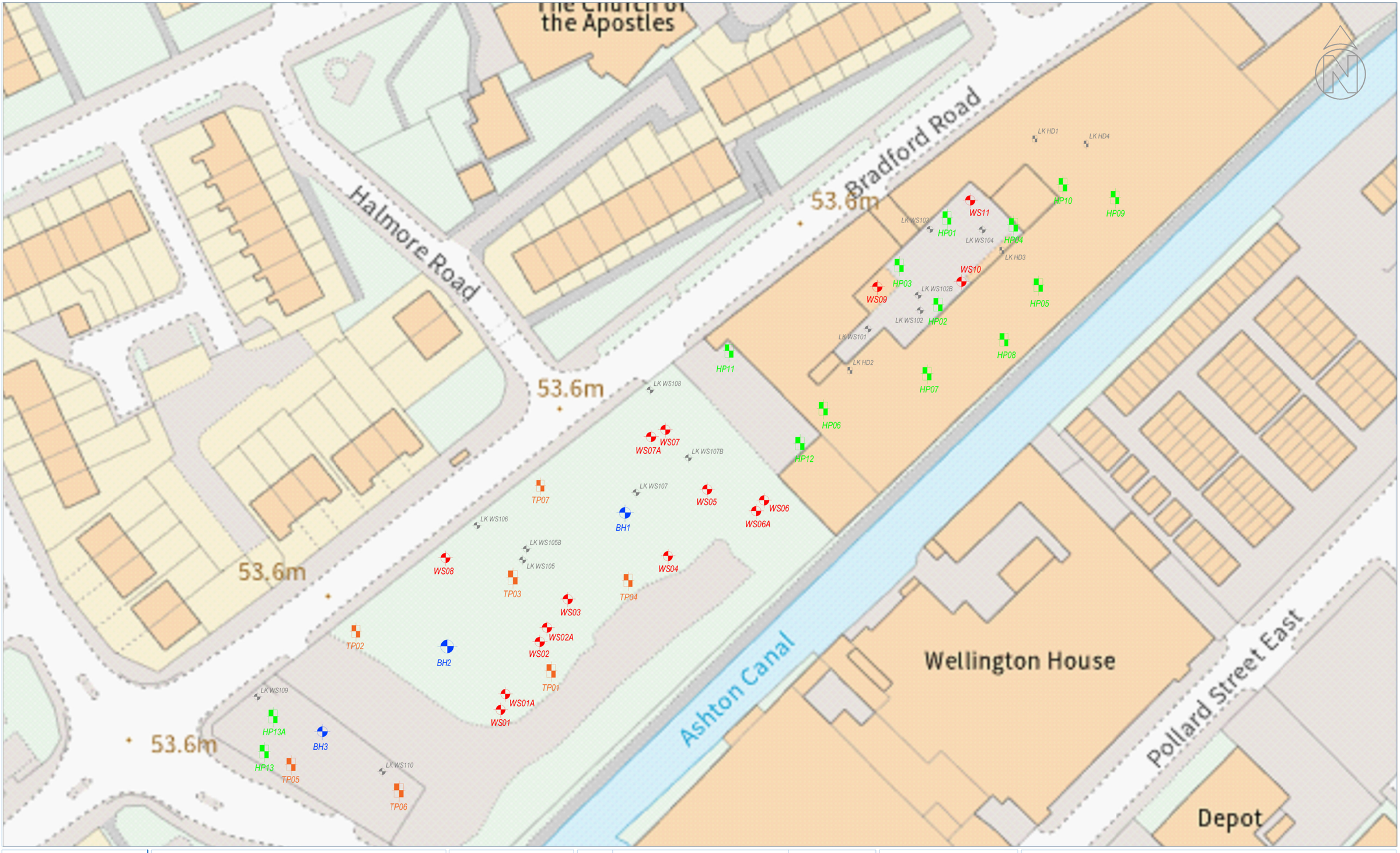
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APPENDIX 1 - Plans



GROUNDTECH CONSULTING	CLIENT ARROWSMITH INVESTMENT LIMITED	DATE JUNE 2023				Status	Notes
	PROJECT TITLE BRUNSWICK MILL	SCALE NTS				Preliminary	SITE LOCATION
	PLAN TITLE PROJECT LOCATION PLAN	PLAN NUMBER GRO-22462-P01				Draft	
						Issued	
						For Comment	
			Rev.	Details	Date	Approved	



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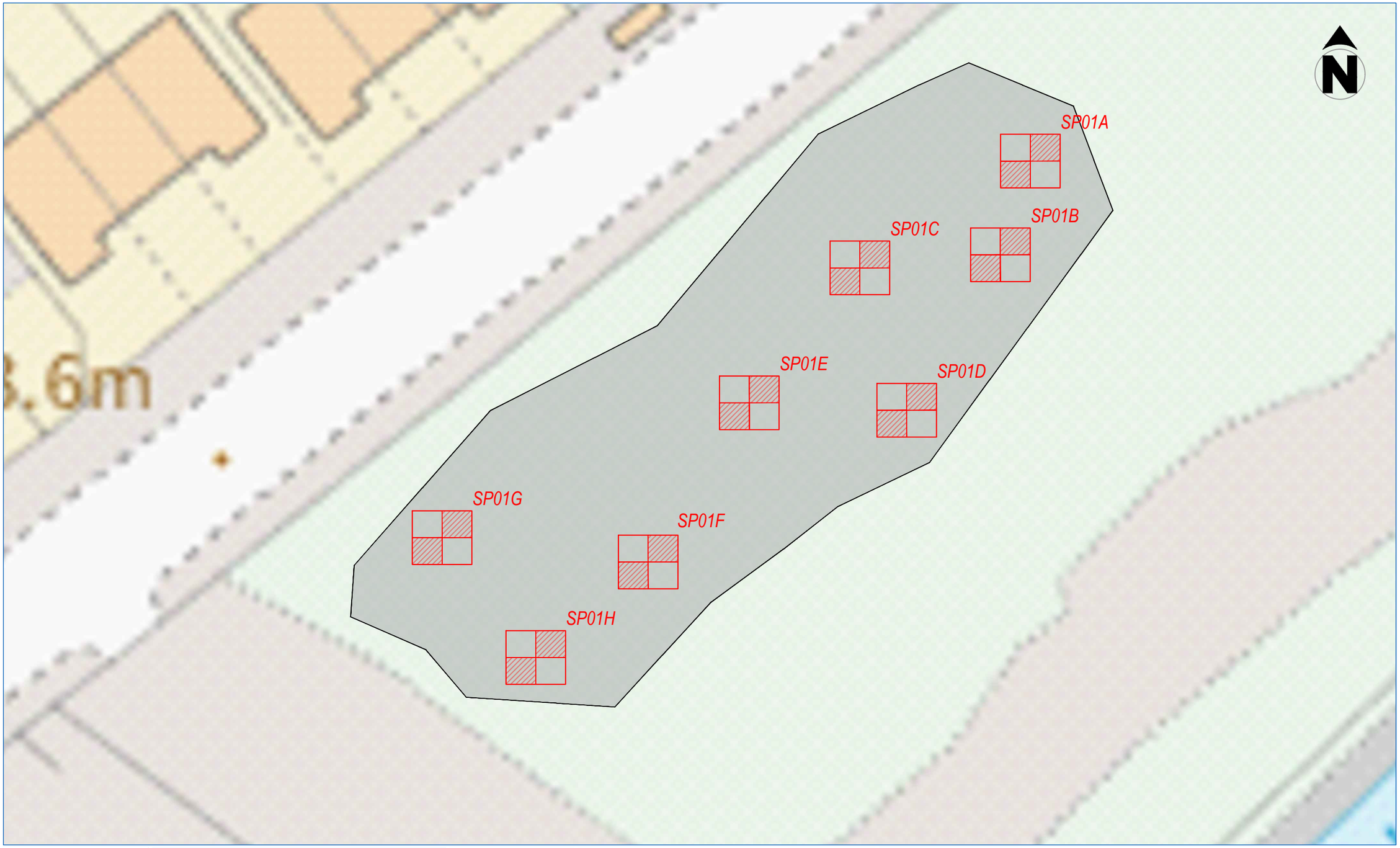
CLIENT	ARROWSMITH INVESTMENT LIMITED
PROJECT TITLE	BRUNSWICK MILL
PLAN TITLE	EXPLORATORY HOLE LOCATION PLAN
DATE	JUNE 2023
SCALE	NTS
PLAN NUMBER	GRO-22462-P02

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

- GROUNDTECH HAND DUG PIT LOCATION
- GROUNDTECH TRIAL PIT LOCATION
- GROUNDTECH CABLE PERCUSSION AND ROTARY BOREHOLE LOCATION
- GROUNDTECH WINDOWLESS SAMPLE BOREHOLE LOCATION
- LK WINDOWLESS SAMPLE BOREHOLE LOCATION
- LK HAND DUG PIT LOCATION



GROUNDTECH CONSULTING

CLIENT	ARROWSMITH INVESTMENTS LTD
PROJECT TITLE	BRUNSWICK MILL
PLAN TITLE	STOCKPILE SAMPLE LOCATIONS PLAN
DATE	NOVEMBER 2023
SCALE	NTS
PLAN NUMBER	GRO-22462-P08

Rev.	Details	Date

Status	
Preliminary	
Draft	
Issued	●
For Comment	
Approved	

Notes

Stockpile Location

Sample Location

APPENDIX 2 - Site Photographs



Photograph 1 - Stockpile in south west of site.



Photograph 2 - Stockpile in south west of site with Brunswick Mill in the rear.

APPENDIX 3 - Geo-Environmental Laboratory Testing Results (Soil)

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Groundtech Consulting Limited
PO Box 499
Manchester
United Kingdom
M28 8EE

Attention :	Jacob Roby
Date :	20th October, 2023
Your reference :	GRO-22462
Our reference :	Test Report 23/17029 Batch 1
Location :	Brunswick Mill
Date samples received :	13th October, 2023
Status :	Final Report
Issue :	1

Eight samples were received for analysis on 13th October, 2023 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 24.616 kg of CO2

Scope 1&2&3 emissions - 58.174 kg of CO2

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17029

Report : Solid

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	SP01A	SP01B	SP01C	SP01D	SP01E	SP01F	SP01G	SP01H					
Depth													
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023					
Arsenic #	8.8	11.0	10.5	10.8	10.7	11.3	7.0	9.0			<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	0.2	0.2	0.2	0.5	0.2	1.6	0.5			<0.1	mg/kg	TM30/PM15
Chromium #	29.4	34.4	31.4	32.4	35.0	29.8	26.2	23.6			<0.5	mg/kg	TM30/PM15
Copper #	43	90	47	38	50	47	30	41			<1	mg/kg	TM30/PM15
Lead #	71	109	99	87	97	114	50	80			<5	mg/kg	TM30/PM15
Mercury #	0.2	0.1	0.2	0.1	0.3	<0.1	0.1	0.2			<0.1	mg/kg	TM30/PM15
Nickel #	14.8	20.5	16.7	15.8	17.9	14.9	13.4	13.8			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM30/PM15
Zinc #	85	149	114	93	128	102	90	113			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.59	0.16	0.20	0.18	9.66 AA	1.24	0.49	0.24			<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.40	0.08	0.09	0.20	0.56 AA	0.15	0.15	0.10			<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.43	0.15	0.25	0.22	14.88 AA	0.56	0.27	0.18			<0.05	mg/kg	TM4/PM8
Fluorene #	0.42	0.14	0.20	0.24	10.19 AA	0.46	0.24	0.18			<0.04	mg/kg	TM4/PM8
Phenanthrene #	2.96	1.45	2.53	2.68	72.80 AA	4.14	2.47	1.50			<0.03	mg/kg	TM4/PM8
Anthracene #	0.79	0.34	0.60	0.74	19.57 AA	1.05	0.59	0.39			<0.04	mg/kg	TM4/PM8
Fluoranthene #	3.51	2.01	3.13	3.51	77.76 AA	4.88	3.23	1.89			<0.03	mg/kg	TM4/PM8
Pyrene #	3.32	1.90	2.83	3.31	61.28 AA	4.55	2.95	1.87			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	1.78	1.12	1.37	1.83	28.95 AA	2.78	1.46	0.99			<0.06	mg/kg	TM4/PM8
Chrysene #	1.87	1.12	1.49	1.97	29.60 AA	2.59	1.57	1.10			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	3.10	1.74	2.21	3.05	42.88 AA	3.62	2.38	2.25			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	2.00	1.10	1.40	1.97	25.13 AA	2.34	1.49	1.58			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	1.32	0.69	0.88	1.24	15.49 AA	1.56	1.01	1.08			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.28	0.16	0.24	0.34	4.03 AA	0.31	0.27	0.24			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	1.33	0.70	0.95	1.30	14.87 AA	1.57	0.99	1.11			<0.04	mg/kg	TM4/PM8
PAH 16 Total	24.1	12.9	18.4	22.8	427.7 AA	31.8	19.6	14.7			<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	2.23	1.25	1.59	2.20	30.87 AA	2.61	1.71	1.62			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.87	0.49	0.62	0.85	12.01 AA	1.01	0.67	0.63			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	110	110	112	110	125 AA	109	112	112			<0	%	TM4/PM8
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	-	<0.2	-	<0.2	-	<0.2	-	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	-	<4	-	<4	-	<4	-	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	-	18	-	9	-	<7	-	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	-	84	-	66	-	48	-	34			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	-	102	-	75	-	48	-	34			<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17029

Report : Solid

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

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			LOD/LOR	Units	Method No.
Sample ID	SP01A	SP01B	SP01C	SP01D	SP01E	SP01F	SP01G	SP01H					
Depth													
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023	02/10/2023					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023	13/10/2023					
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR) #	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	-	<0.1	-	<0.1	-	<0.1	-	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	-	<0.2	-	<0.2	-	<0.2	-	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	-	<4	-	8	-	<4	-	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	-	25	-	82	-	40	-	24			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	-	150	-	282	-	205	-	109			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	-	175	-	372	-	245	-	133			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	-	277	-	447	-	293	-	167			<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
Benzene #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
Toluene #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
Ethylbenzene #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
m/p-Xylene #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
o-Xylene #	-	<5	-	<5	-	<5	-	<5			<5	ug/kg	TM36/PM12
Natural Moisture Content	12.9	17.1	17.5	13.7	16.7	14.5	12.1	12.6			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.6495	1.7047	1.5035	1.0543	1.5164	1.6028	1.4032	1.0664			<0.0015	g/l	TM38/PM20
Organic Matter	3.5	5.0	4.1	5.2	3.6	3.4	3.0	4.0			<0.2	%	TM21/PM24
pH #	8.40	8.17	8.33	8.17	8.02	8.15	8.16	8.12			<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Groundtech Consulting Limited

Reference: GRO-22462

Location: Brunswick Mill

Contact: Jacob Roby

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
23/17029	1	SP01B		4-6	PAH's & Luibricating oil
23/17029	1	SP01D		10-12	PAH's & Luibricating oil
23/17029	1	SP01F		16-18	PAH's & Luibricating oil
23/17029	1	SP01H		22-24	PAH's & Luibricating oil

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby

Note:

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

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

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

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

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/17029	1	SP01A		3	Catherine Coles	18/10/2023	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	18/10/2023	**Asbestos Fibres**	NAD
					Catherine Coles	18/10/2023	**Asbestos ACM**	NAD
					Catherine Coles	18/10/2023	**Asbestos Type**	NAD
23/17029	1	SP01B		6	Catherine Coles	18/10/2023	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	18/10/2023	**Asbestos Fibres**	Fibre Bundles
					Catherine Coles	18/10/2023	**Asbestos Fibres (2)**	Free Fibres
					Catherine Coles	18/10/2023	**Asbestos ACM**	NAD
					Catherine Coles	18/10/2023	**Asbestos ACM (2)**	NAD
					Catherine Coles	18/10/2023	**Asbestos Type**	Chrysotile
					Catherine Coles	18/10/2023	**Asbestos Type (2)**	Amosite
					Catherine Coles	18/10/2023	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Catherine Coles	18/10/2023	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Catherine Coles	18/10/2023	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					Matthew Turner	18/10/2023	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					Matthew Turner	18/10/2023	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
23/17029	1	SP01C		9	Emily Anderton	18/10/2023	**General Description (Bulk Analysis)**	Brown soil with stones
					Emily Anderton	18/10/2023	**Asbestos Fibres**	NAD
					Emily Anderton	18/10/2023	**Asbestos ACM**	NAD
					Emily Anderton	18/10/2023	**Asbestos Type**	NAD
23/17029	1	SP01D		12	Emily Anderton	18/10/2023	**General Description (Bulk Analysis)**	Brown soil with stones
					Emily Anderton	18/10/2023	**Asbestos Fibres**	NAD
					Emily Anderton	18/10/2023	**Asbestos ACM**	NAD
					Emily Anderton	18/10/2023	**Asbestos Type**	NAD
23/17029	1	SP01E		15	Catherine Coles	18/10/2023	**General Description (Bulk Analysis)**	soil,stone,brick
					Catherine Coles	18/10/2023	**Asbestos Fibres**	NAD
					Catherine Coles	18/10/2023	**Asbestos ACM**	NAD
					Catherine Coles	18/10/2023	**Asbestos Type**	NAD
23/17029	1	SP01F		18	Emily Anderton	18/10/2023	**General Description (Bulk Analysis)**	Brown soil
					Emily Anderton	18/10/2023	**Asbestos Fibres**	NAD
					Emily Anderton	18/10/2023	**Asbestos ACM**	NAD
					Emily Anderton	18/10/2023	**Asbestos Type**	NAD

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/17029	1	SP01G		21	Catherine Coles	18/10/2023	**General Description (Bulk Analysis)**	soil,stone,brick
					Catherine Coles	18/10/2023	**Asbestos Fibres**	NAD
					Catherine Coles	18/10/2023	**Asbestos ACM**	NAD
					Catherine Coles	18/10/2023	**Asbestos Type**	NAD
23/17029	1	SP01H		24	Catherine Coles	18/10/2023	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	18/10/2023	**Asbestos Fibres**	Fibre Bundles
					Catherine Coles	18/10/2023	**Asbestos Fibres (2)**	Fibre Bundles
					Catherine Coles	18/10/2023	**Asbestos ACM**	NAD
					Catherine Coles	18/10/2023	**Asbestos ACM (2)**	NAD
					Catherine Coles	18/10/2023	**Asbestos Type**	Chrysotile
					Catherine Coles	18/10/2023	**Asbestos Type (2)**	Amosite
					Catherine Coles	18/10/2023	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Catherine Coles	18/10/2023	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Catherine Coles	18/10/2023	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					Matthew Turner	18/10/2023	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					Matthew Turner	18/10/2023	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 23/17029						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/17029

SOILS and ASH

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

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

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

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

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

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

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

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

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

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

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

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

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

WATERS

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

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

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

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

STACK EMISSIONS

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

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

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x10 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/17029

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

EMT Job No: 23/17029

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM131	Quantification of Asbestos Fibres and ACM based on HSG 248 Second edition:2021, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes

APPENDIX 4 - Geo-Environmental Laboratory Testing Results (Groundwater)

Element Materials Technology
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Groundtech Consulting Limited
PO Box 499
Manchester
United Kingdom
M28 8EE

Attention :	Jacob Roby
Date :	30th October, 2023
Your reference :	GRO-22462
Our reference :	Test Report 23/17168 Batch 1
Location :	Brunswick Mill
Date samples received :	16th October, 2023
Status :	Final Report
Issue :	1

Two samples were received for analysis on 16th October, 2023 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 5.575 kg of CO2

Scope 1&2&3 emissions - 13.175 kg of CO2

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17168

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-17									LOD/LOR	Units	Method No.
Sample ID	BH01	BH03											
Depth													
COC No / misc													
Containers	V H HNUF N Z P G	V H HN N Z P G											
Sample Date	13/10/2023	13/10/2023											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	16/10/2023	16/10/2023											
Dissolved Arsenic	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Dissolved Boron	195	56									<12	ug/l	TM30/PM14
Dissolved Cadmium	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Total Dissolved Chromium	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper	<7	<7									<7	ug/l	TM30/PM14
Dissolved Lead	<5	<5									<5	ug/l	TM30/PM14
Dissolved Mercury	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel	10	<2									<2	ug/l	TM30/PM14
Dissolved Selenium	<3	<3									<3	ug/l	TM30/PM14
Dissolved Zinc	6	<3									<3	ug/l	TM30/PM14
PAH MS													
Naphthalene*	0.03	<0.01									<0.01	ug/l	Subcontracted
Acenaphthylene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Acenaphthene*	0.009	<0.005									<0.005	ug/l	Subcontracted
Fluorene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Phenanthrene*	0.013	0.007									<0.005	ug/l	Subcontracted
Anthracene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Fluoranthene*	0.010	0.009									<0.005	ug/l	Subcontracted
Pyrene*	0.012	0.012									<0.005	ug/l	Subcontracted
Benzo(a)anthracene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Chrysene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Benzo(bk)fluoranthene*	<0.01	<0.01									<0.01	ug/l	Subcontracted
Benzo(a)pyrene*	<0.002	<0.002									<0.002	ug/l	Subcontracted
Indeno(123cd)pyrene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Dibenzo(ah)anthracene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Benzo(ghi)perylene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
PAH 16 Total*	<0.082	<0.082									<0.082	ug/l	Subcontracted
Benzo(b)fluoranthene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Benzo(k)fluoranthene*	<0.005	<0.005									<0.005	ug/l	Subcontracted
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	100	96									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	100									<0	%	TM15/PM10

Element Materials Technology

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17168

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-8	9-17									LOD/LOR	Units	Method No.
Sample ID	BH01	BH03											
Depth													
COC No / misc													
Containers	V H HNUF N Z P G	V H HN N Z P G											
Sample Date	13/10/2023	13/10/2023											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	16/10/2023	16/10/2023											
TPH CWG													
Aliphatics													
>C5-C6	<10	<10									<10	ug/l	TM36/PM12
>C6-C8	<10	<10									<10	ug/l	TM36/PM12
>C8-C10	<10	<10									<10	ug/l	TM36/PM12
>C10-C12	<5	<5									<5	ug/l	TM5/PM16/PM30
>C12-C16	<10	<10									<10	ug/l	TM5/PM16/PM30
>C16-C21	<10	<10									<10	ug/l	TM5/PM16/PM30
>C21-C35	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12	<5	<5									<5	ug/l	TM5/PM16/PM30
>EC12-EC16	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC16-EC21	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC21-EC35	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35)	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
PCB 28	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 52	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 101	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 118	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 138	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 153	<0.1	<0.1									<0.1	ug/l	TM17/PM30
PCB 180	<0.1	<0.1									<0.1	ug/l	TM17/PM30
Total 7 PCBs	<0.7	<0.7									<0.7	ug/l	TM17/PM30
Sulphate as SO4	1888.8	154.4									<0.5	mg/l	TM38/PM0
Ammoniacal Nitrogen as N	0.25	0.09									<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3	0.302	0.113									<0.030	mg/l	TM38/PM0
Hexavalent Chromium	<0.006	<0.006									<0.006	mg/l	TM38/PM0
Total Alkalinity as CaCO3	620	304									<1	mg/l	TM75/PM0
Dissolved Organic Carbon	8	4									<2	mg/l	TM60/PM0
pH	7.40	6.93									<0.01	pH units	TM73/PM0

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17168

SVOC Report : **Liquid**

EMT Sample No.	1-8	9-17									LOD/LOR	Units	Method No.
Sample ID	BH01	BH03											
Depth													
COC No / misc													
Containers	V H HNUF N Z P G	V H HN N Z P G											
Sample Date	13/10/2023	13/10/2023											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	16/10/2023	16/10/2023											
SVOC MS													
Phenols													
2-Chlorophenol	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene	<1	<1									<1	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Other SVOCs													
1,2-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	<1	<1									<1	ug/l	TM16/PM30
Carbazole	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane	<1	<1									<1	ug/l	TM16/PM30
Isophorone	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	108	111									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	114	110									<0	%	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby
EMT Job No: 23/17168

VOC Report : **Liquid**

EMT Sample No.	1-8	9-17									LOD/LOR	Units	Method No.
Sample ID	BH01	BH03											
Depth													
COC No / misc													
Containers	V H HNUF N Z P G	V H HN N Z P G											
Sample Date	13/10/2023	13/10/2023											
Sample Type	Liquid	Liquid											
Batch Number	1	1											
Date of Receipt	16/10/2023	16/10/2023											
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM)	<3	<3									<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane	<2	<2									<2	ug/l	TM15/PM10
Chloroform	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane	<2	<2									<2	ug/l	TM15/PM10
Benzene	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene	<2	<2									<2	ug/l	TM15/PM10
o-Xylene	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	100	96									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	100									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Groundtech Consulting Limited

Reference: GRO-22462

Location: Brunswick Mill

Contact: Jacob Roby

Matrix : Liquid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
23/17168	1	BH01		1-8	No interpretation possible
23/17168	1	BH03		9-17	No interpretation possible

Client Name: Groundtech Consulting Limited
Reference: GRO-22462
Location: Brunswick Mill
Contact: Jacob Roby

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 23/17168						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/17168

SOILS and ASH

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

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

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

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

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

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

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

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

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

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

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

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

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

WATERS

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

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

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

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

STACK EMISSIONS

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

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

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

Measurement Uncertainty

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

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

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

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/17168

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified				
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.				
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.				

EMT Job No: 23/17168

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.				
Subcontracted	See attached subcontractor report for accreditation status and provider.						

Please include all sections of this report if it is reproduced

APPENDIX 5 - Geotechnical Laboratory Testing Results

LABORATORY REPORT

Contract Number: PSL23/8518

Report Date: 31 October 2023

Client's Reference: GRO-22462

Client Name: Groundtech Consulting
First Floor
Lloyd House
Orford Court
Greenfold Way
WN7 3XJ

For the attention of: Mike Berry

Contract Title: Brunswick Mill

Date Received: 6/10/2023
Date Commenced: 6/10/2023
Date Completed: 31/10/2023

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

A Watkins (Director)
R Berriman (Quality Manager)
S Royle (Laboratory Manager)

L Knight (Assistant Laboratory Manager)
S Eyre (Senior Technician)
T Watkins (Senior Technician)

5 – 7 Hexthorpe Road,
Hexthorpe,
Doncaster,
DN4 0AR
Tel: 01302 768098
Email: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
SP01a					MADE GROUND dark brown very gravelly very sandy clay.
SP01b					MADE GROUND dark brown very gravelly very sandy clay.
SP01c					MADE GROUND dark brown very gravelly very sandy clay.
SP01d					MADE GROUND dark brown very sandy very clayey gravel.
SP01e					MADE GROUND dark brown very gravelly very sandy clay.

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract No:
PSL23/8518
Client Ref:
GRO-22462

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
SP01a					23		2.57	38	19	19	58	Intermediate Plasticity CI
SP01b					18		2.54	35	18	17	48	Intermediate Plasticity CI
SP01c					15		2.58	36	18	18	47	Intermediate Plasticity CI
SP01d					17		2.61	32	20	12	41	Low Plasticity CL
SP01e					16		2.56	39	19	20	44	Intermediate Plasticity CI

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

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

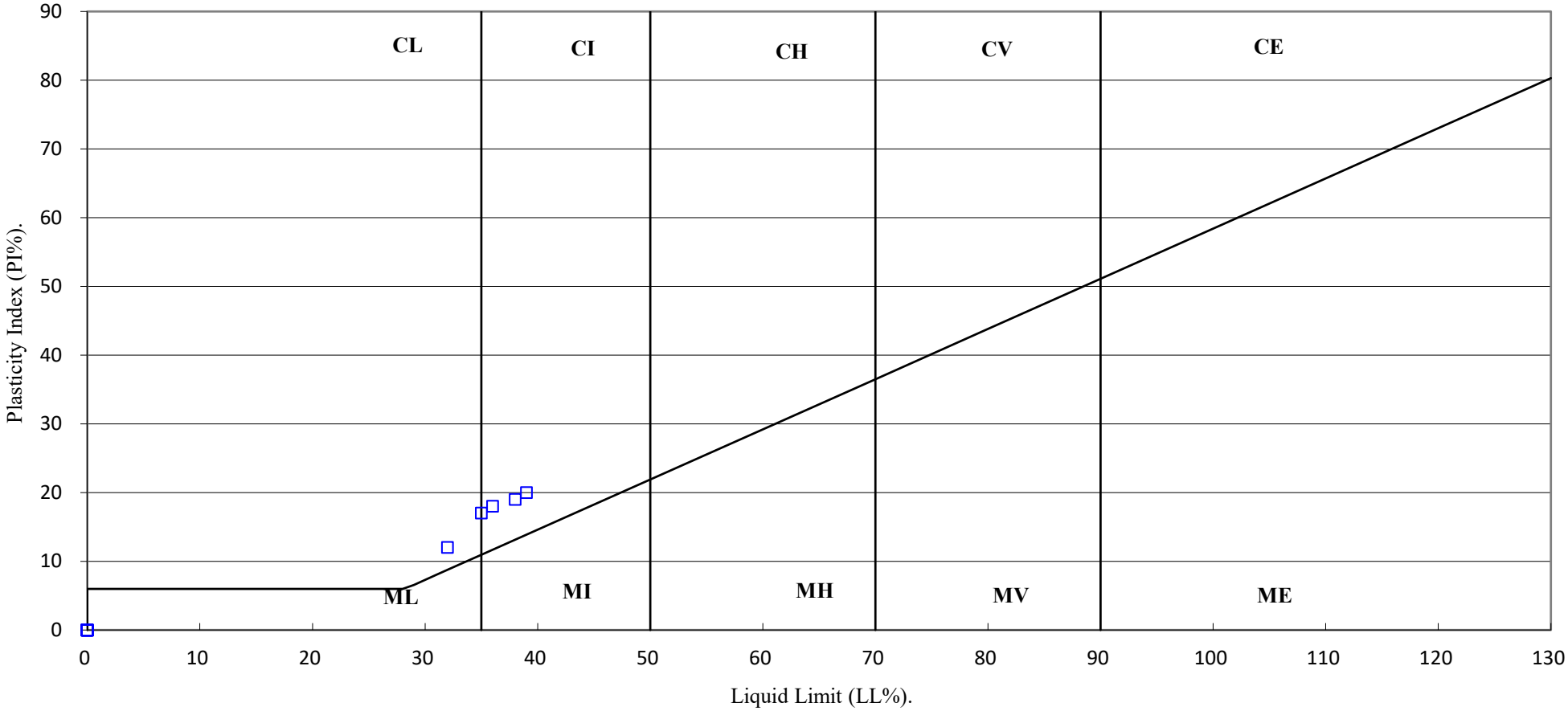
Contract No:

PSL23/8518

Client Ref:

GRO-22462

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043 / PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY	**Brunswick Mill**	**Contract No:**
		PSL23/8518
		Client Ref:
		GRO-22462

PARTICLE SIZE DISTRIBUTION TEST

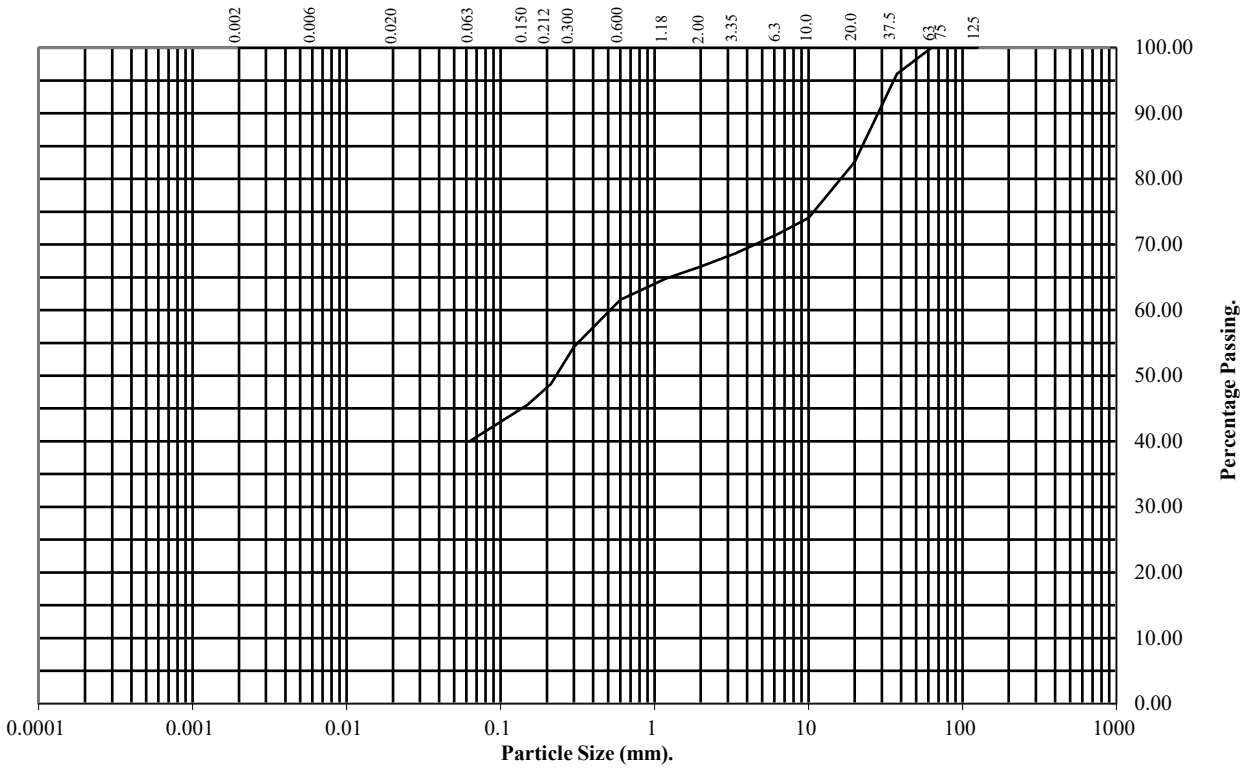
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **SP01a** **Top Depth (m):**

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

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	96
20	83
10	74
6.3	72
3.35	69
2	67
1.18	65
0.6	62
0.3	54
0.212	49
0.15	46
0.063	40

Soil Fraction	Total Percentage
Cobbles	0
Gravel	33
Sand	27
Silt/Clay	40

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract No: PSL23/8518

Client Ref: GRO-22462

PARTICLE SIZE DISTRIBUTION TEST

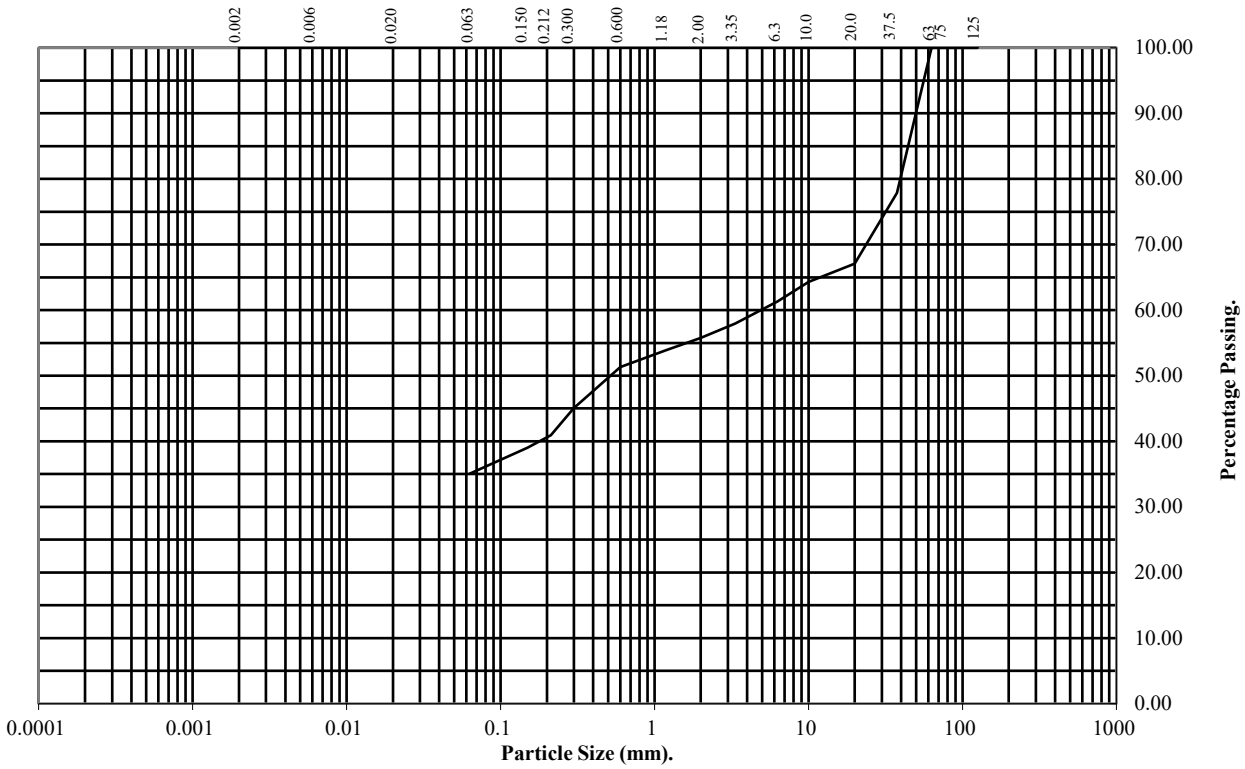
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **SP01b** **Top Depth (m):**

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

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	78
20	67
10	64
6.3	61
3.35	58
2	56
1.18	54
0.6	51
0.3	45
0.212	41
0.15	39
0.063	35

Soil Fraction	Total Percentage
Cobbles	0
Gravel	44
Sand	21
Silt/Clay	35

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

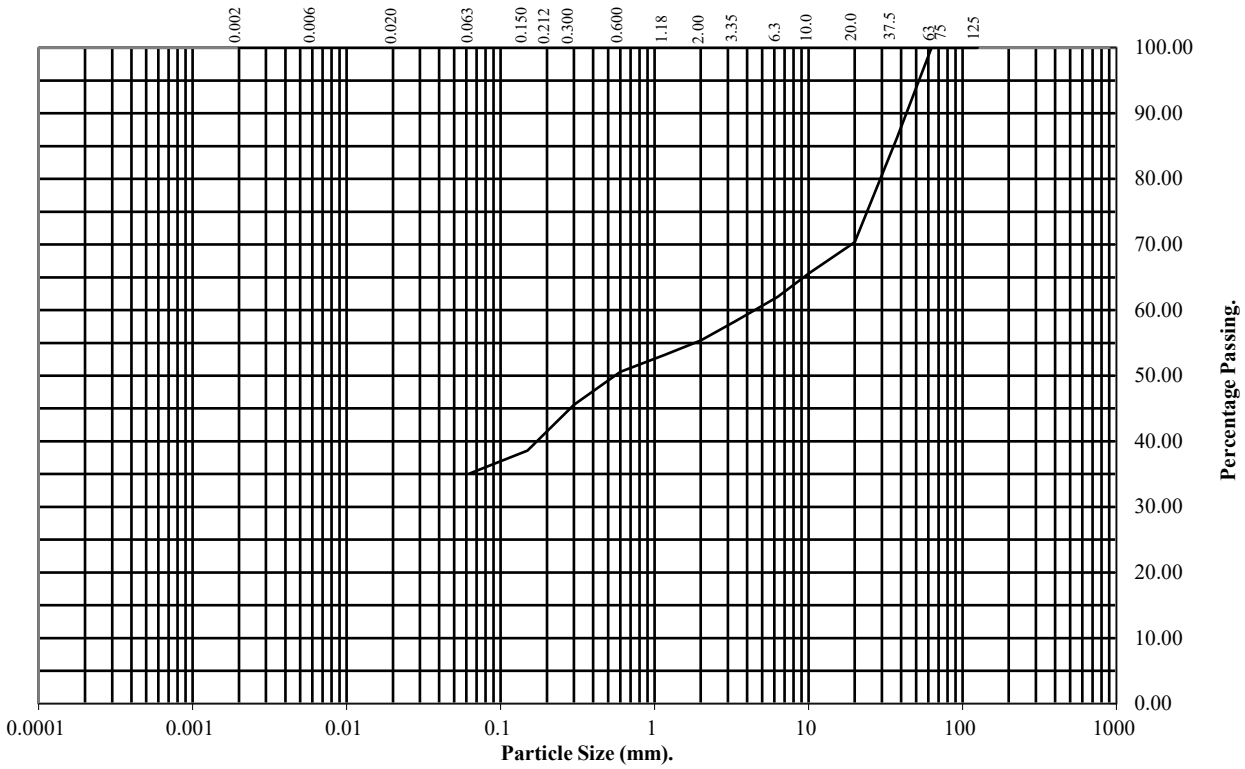
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **SP01c** **Top Depth (m):**

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

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	86
20	70
10	66
6.3	62
3.35	58
2	55
1.18	53
0.6	51
0.3	46
0.212	42
0.15	39
0.063	35

Soil Fraction	Total Percentage
Cobbles	0
Gravel	45
Sand	20
Silt/Clay	35

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

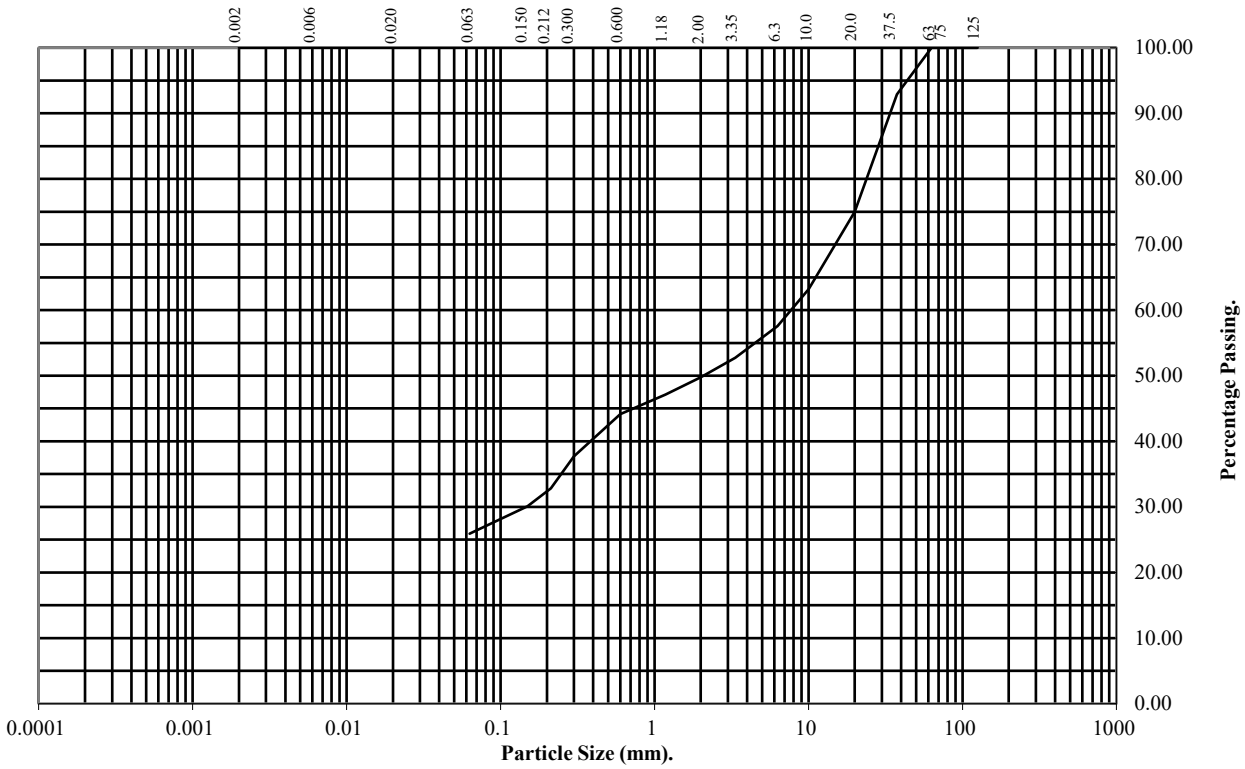
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **SP01d** **Top Depth (m):**

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

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	93
20	75
10	63
6.3	58
3.35	53
2	50
1.18	47
0.6	44
0.3	38
0.212	33
0.15	30
0.063	26

Soil Fraction	Total Percentage
Cobbles	0
Gravel	50
Sand	24
Silt/Clay	26

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract No: PSL23/8518

Client Ref: GRO-22462

PARTICLE SIZE DISTRIBUTION TEST

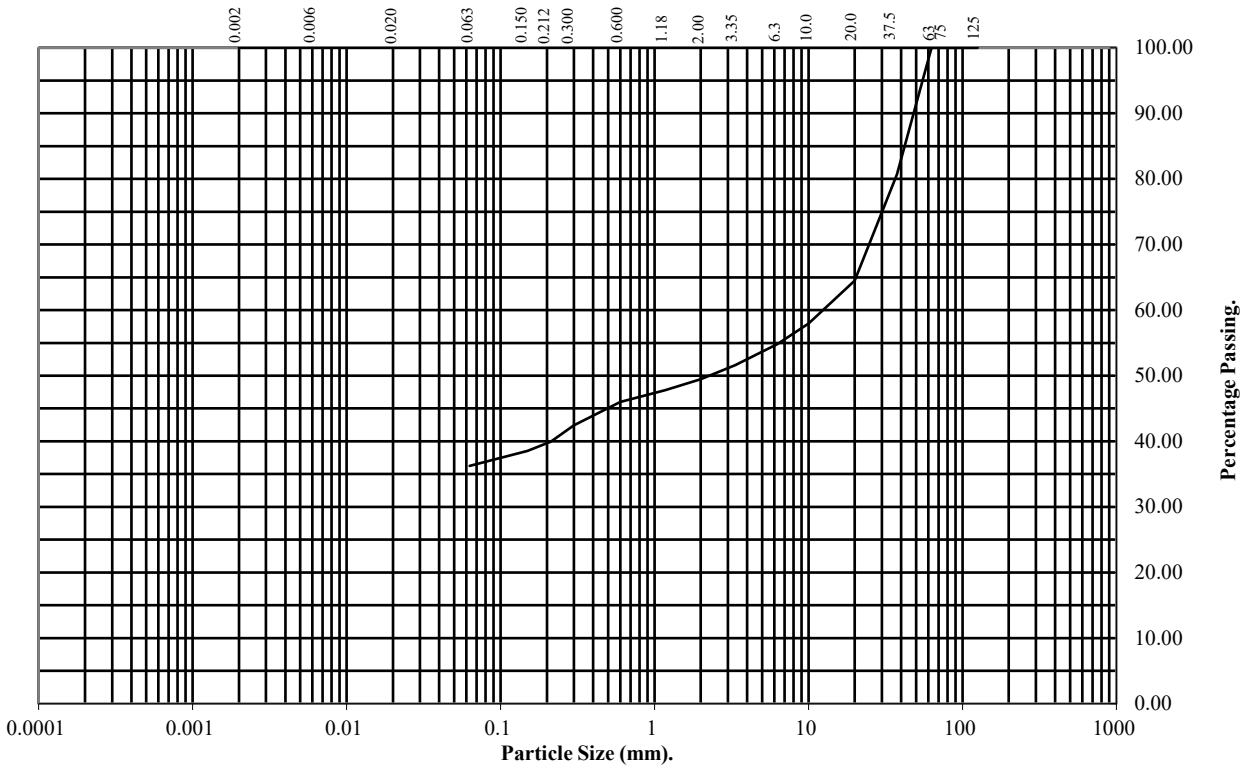
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **SP01e** **Top Depth (m):**

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

Sample Type:



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	81
20	64
10	58
6.3	55
3.35	52
2	49
1.18	48
0.6	46
0.3	42
0.212	40
0.15	39
0.063	36

Soil Fraction	Total Percentage
Cobbles	0
Gravel	51
Sand	13
Silt/Clay	36

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract No: PSL23/8518

Client Ref: GRO-22462

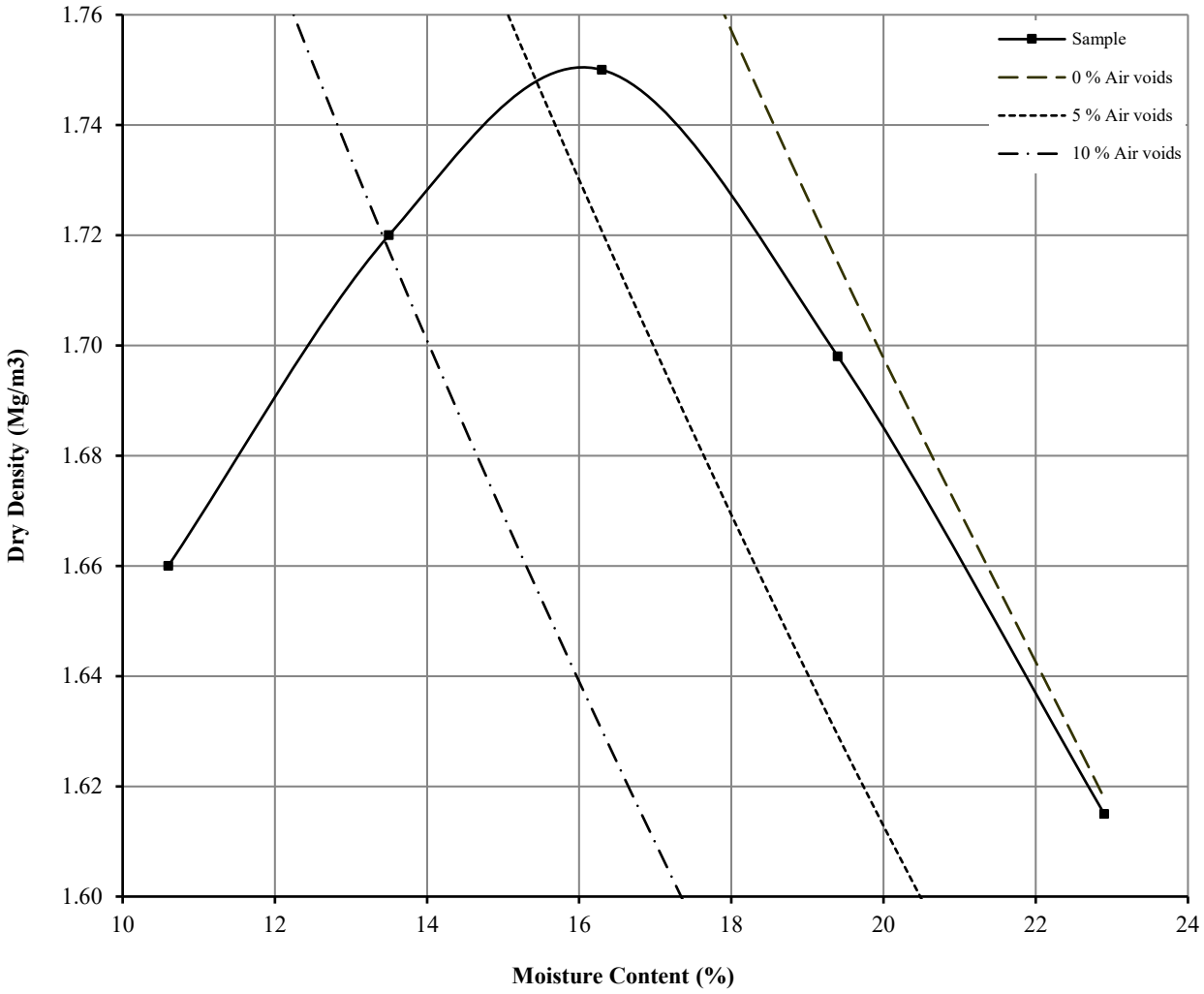
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.6 : 1990

Hole Number: SP01a **Top Depth (m) :**

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

Sample Type:



Initial Moisture Content:		23	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.57	Measured	Material Retained on 37.5 mm Test Sieve (%):		4
Maximum Dry Density (Mg/m3):		1.75	Material Retained on 20.0 mm Test Sieve (%):		13
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

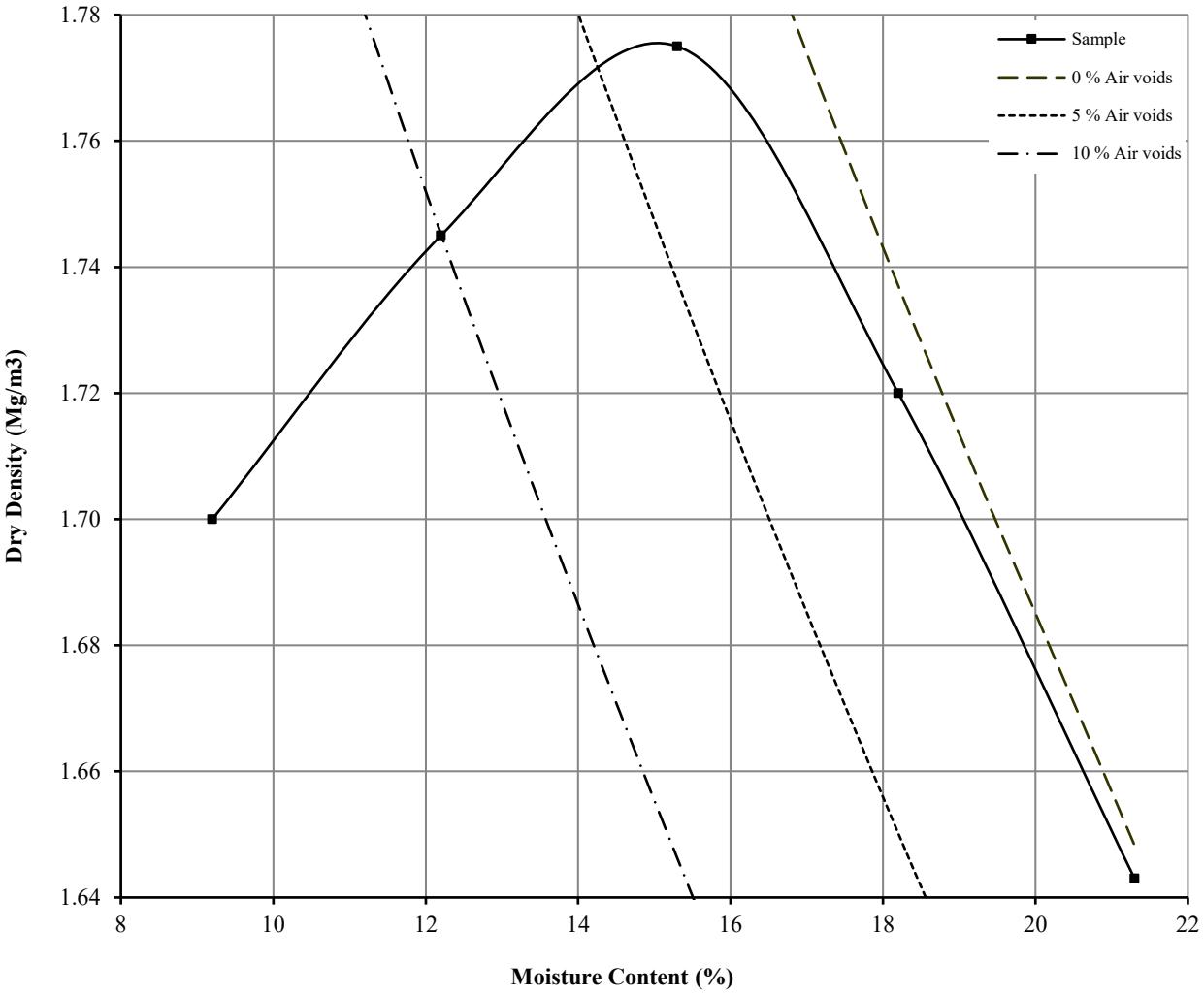
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.6 : 1990

Hole Number: SP01b **Top Depth (m) :**

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

Sample Type:



Initial Moisture Content:		18	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.54	Measured	Material Retained on 37.5 mm Test Sieve (%):		22
Maximum Dry Density (Mg/m3):		1.78	Material Retained on 20.0 mm Test Sieve (%):		11
Optimum Moisture Content (%):		15			
Remarks See summary of soil descriptions					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract
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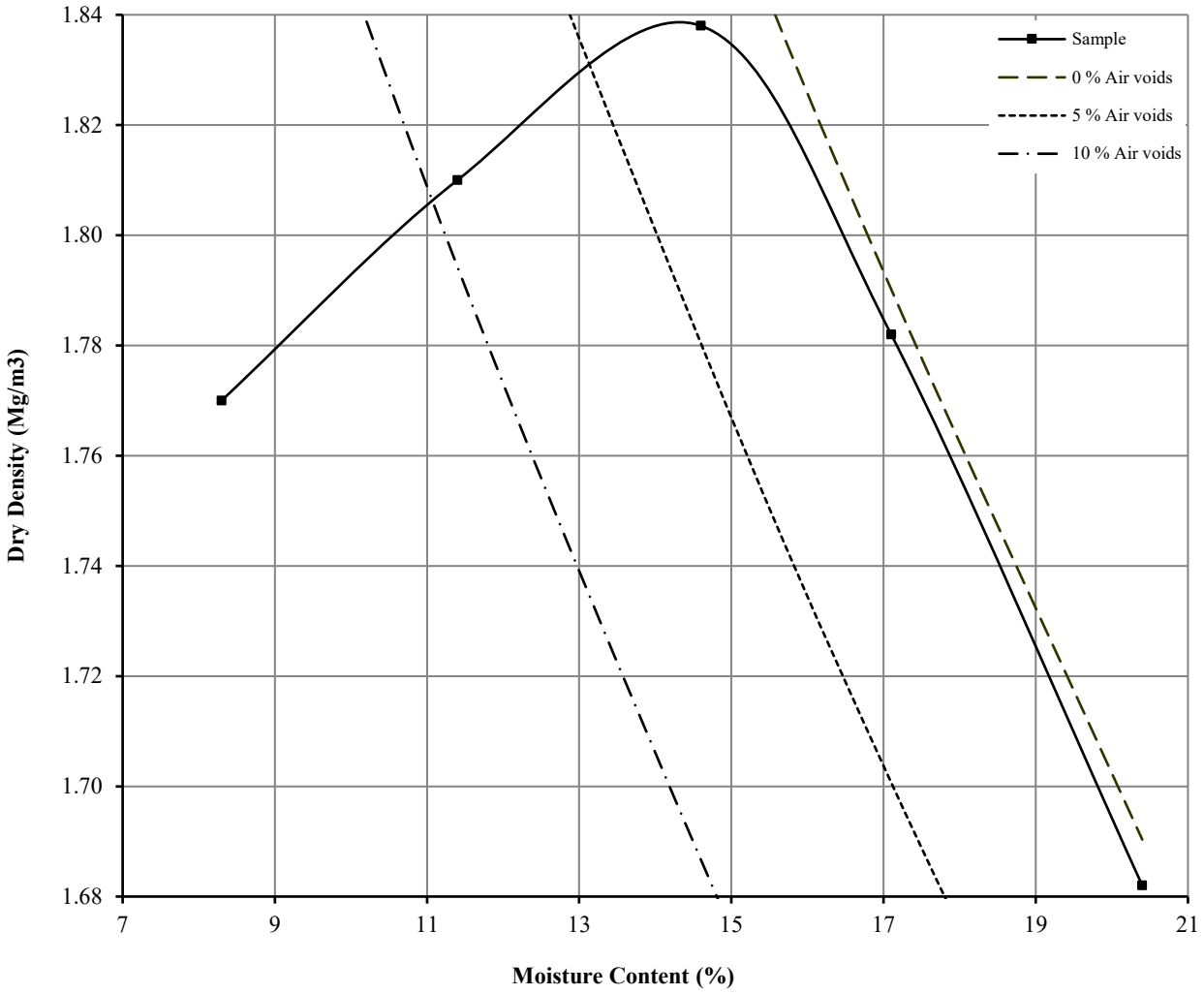
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.6 : 1990

Hole Number: SP01c **Top Depth (m) :**

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

Sample Type:



Initial Moisture Content:		15	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.58	Measured	Material Retained on 37.5 mm Test Sieve (%):		14
Maximum Dry Density (Mg/m3):		1.84	Material Retained on 20.0 mm Test Sieve (%):		16
Optimum Moisture Content (%):		15			
Remarks See summary of soil descriptions					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract
PSL23/8518
Client Ref
GRO-22462

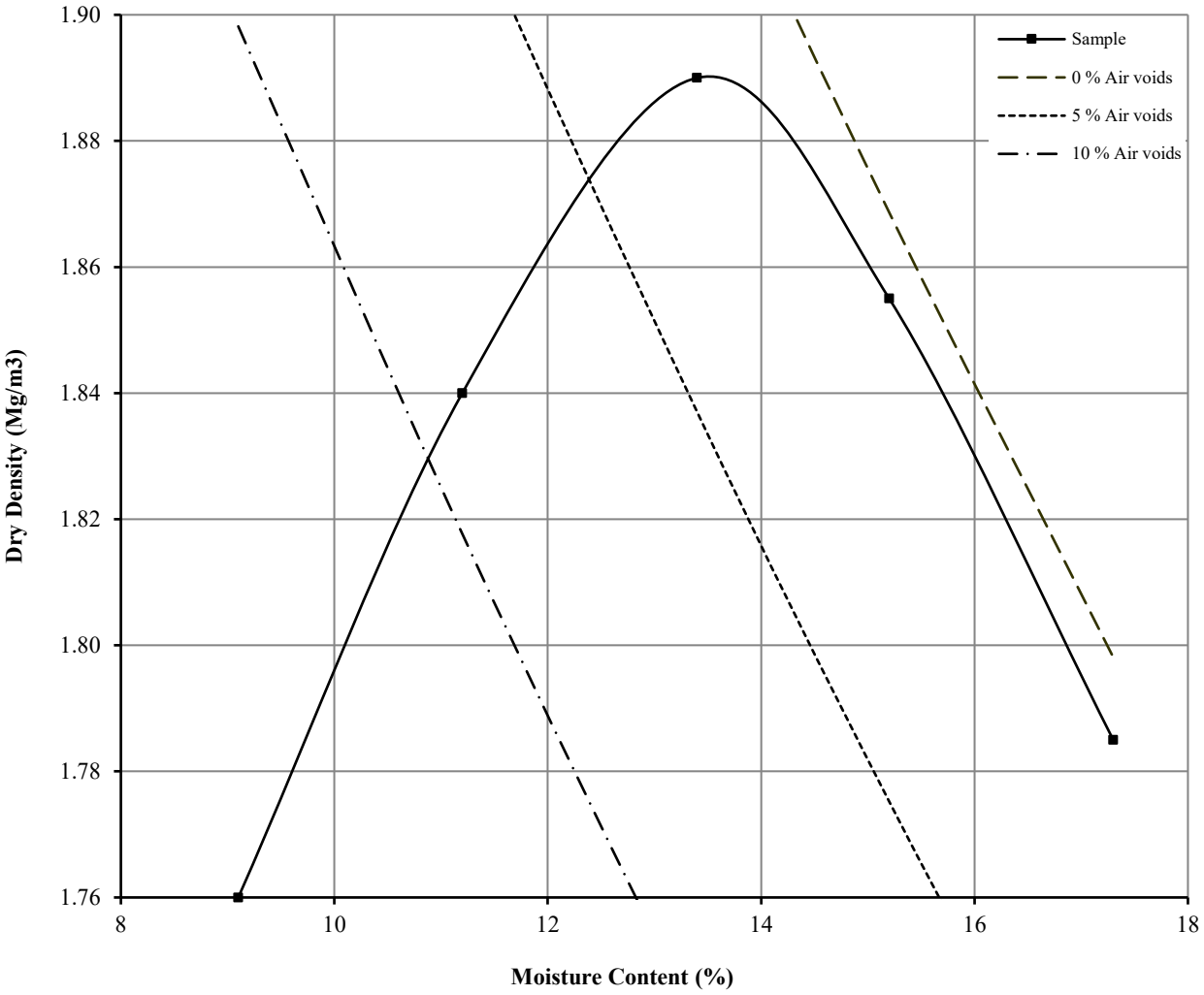
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.6 : 1990

Hole Number: SP01d **Top Depth (m) :**

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

Sample Type:



Initial Moisture Content:		15	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.61	Measured	Material Retained on 37.5 mm Test Sieve (%):		7
Maximum Dry Density (Mg/m3):		1.89	Material Retained on 20.0 mm Test Sieve (%):		18
Optimum Moisture Content (%):		13			
Remarks See summary of soil descriptions					

UKAS TESTING 4043

PSL PROFESSIONAL SOILS LABORATORY A PHENNA GROUP COMPANY

Brunswick Mill

Contract
PSL23/8518
Client Ref
GRO-22462

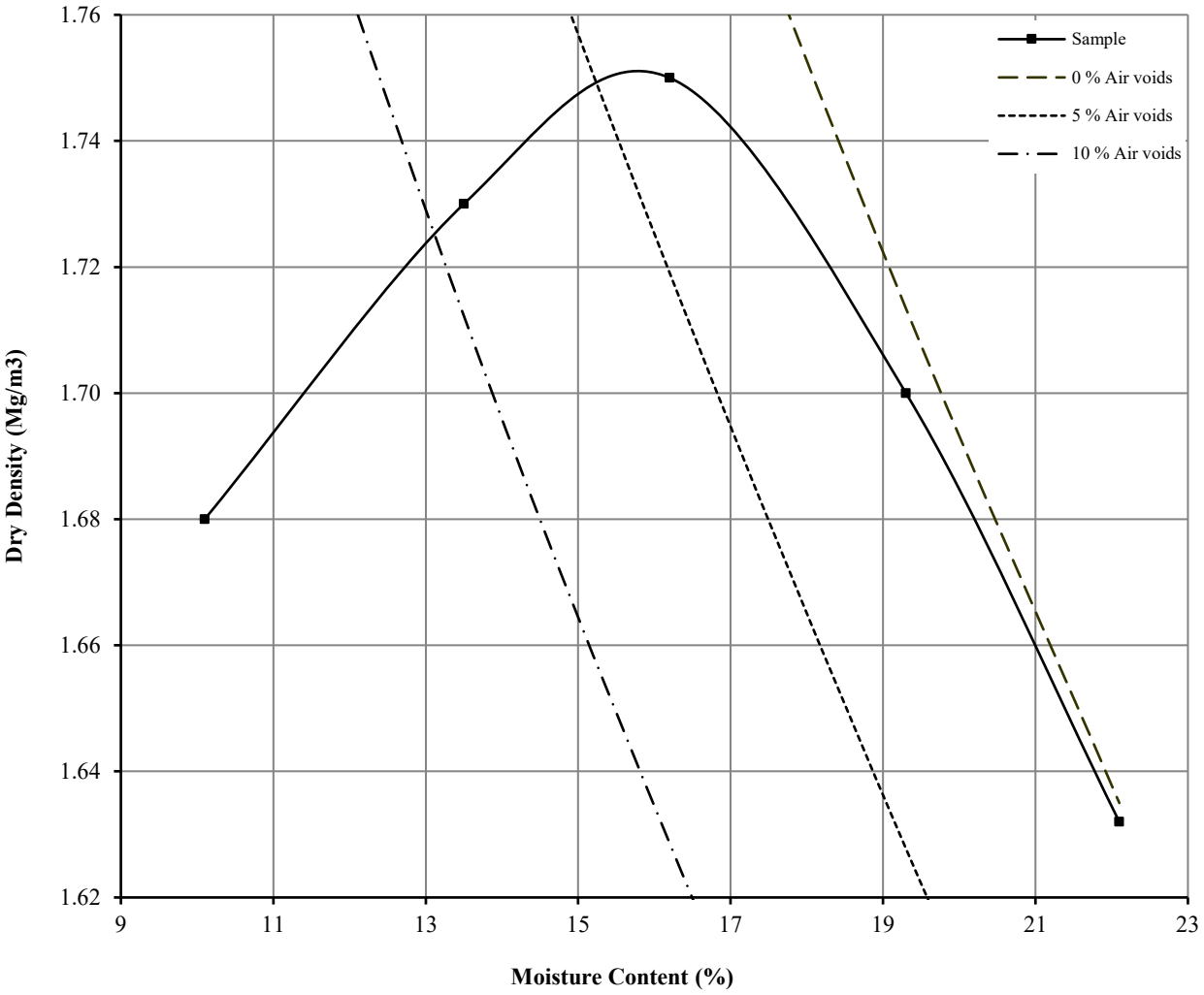
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

Non compliance with BS 1377 : Part 4 : Clause 3.6 : 1990

Hole Number: SP01e **Top Depth (m) :**

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

Sample Type:



Initial Moisture Content:		16	Method of Compaction:	4.5kg	Separate Samples
Particle Density (Mg/m3):	2.56	Measured	Material Retained on 37.5 mm Test Sieve (%):		19
Maximum Dry Density (Mg/m3):		1.75	Material Retained on 20.0 mm Test Sieve (%):		17
Optimum Moisture Content (%):		16			
Remarks See summary of soil descriptions					

APPENDIX 6 - Relevant Contaminated Land Legislation

Legislative Background

Environmental liabilities and risks have been evaluated in terms of a source -pathway - target relationship in accordance with the approach set out in:

- The 1995 Environment Act;
- The Contaminated Land (England) Regulations 2000;
- The DETR circular 02/2000 Environmental Protection Act 1990: Part IIA Contaminated Land.

Contaminated land is defined within the legislative framework as land which is in such condition by reason of substances in, on or under the land that:

1) Significant harm is being caused or there is a significant possibility of such harm being caused;
2) Significant pollution of controlled waters is being or is likely to be caused.

The potential for harm is based on the presence of three factors:

- **Source** - substances that are potential contaminants or pollutants that may cause harm;
- **Pathway** - a potential route by which contaminants can move from the source to the receptor;
- **Receptor** - a receptor that may be harmed, for example the water environment, humans and water.

Where a source, pathway and target are all present a pollutant linkage exists and there is potential for harm to be caused. The presence of a source does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm. The nature and importance of both pathways and receptors are site specific and will vary according to the intended end use of the site, its characteristics and its surroundings.

The key principle which supports the SPR approach is 'suitable for use' criteria. This requires remedial action only where contamination is considered to pose unacceptable actual or potential risks to health or the environment and, taking into account the proposed use of the site.

Relevant Guidance Documents

This report has been prepared in accordance with the list of guidance below however the list is not exhaustive:

- LCRM – Model Procedures;
- Contamination and Environmental Matters - Their implications for Property Professionals (2nd Edition RICS Nov 2003);
- Brownfields – Managing the development of previously developed land – A client's guide, CIRIA 2002;
- DEFRA and Environment Agency publications CLR7 – 10, supported by the TOX guides and SGV guides, dated March 2002;
- DETR Circular 02/2000, Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990;
- Environment Agency technical advice to third parties on Pollution of Controlled Waters for Part IIA of the EPA1990, May 2002;

Relevant Legislative Documents

The following is a non-exhaustive list of legislative framework documents that has been considered in the production of this report:

- The Environment Act (1995);
- The Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (2012);
- The Environment Protection Act (1990);
- The Contaminated Land (England) Act (2000);
- Contaminated Land (England) Regulations (2012);
- The Water Resources Act (1991);
- The Pollution Prevention and Control (England and Wales) Regulations (2000);
- The Landfill Regulations (England and Wales) Regulations (2002);
- The Landfill (England and Wales) (Amendment) Regulations (2004);
- Health and Safety at Work Act;

APPENDIX 7 - CIRIA Risk Assessment Methodology

Contaminated Land Risk Assessment

Contaminated Land Risk Assessment is a technique that identifies and considers the associated risk, determines whether the risks are significant and whether action needs to be taken. The four main stages of risk assessment are:

Hazard Identification ⇨ Hazard Assessment ⇨ Risk Estimation ⇨ Risk Evaluation

LCRM outlines the framework to be followed for risk assessment in the UK. The framework is designed to be consistent with UK legislation and policies including planning. The starting point of the risk assessment is to identify the context of the problem and the objectives of the process.

Formulating and developing a conceptual model for the site is an important requirement of risk assessment, this supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process.

Risk is a combination of the likelihood of an event occurring and the magnitude of its consequences. Therefore, both the likelihood and the consequences of an event must be taken into account when assessing risk.

The risk assessment process needs to take into account the degree of confidence required in decisions. Identification of uncertainties is an essential step in risk assessment.

The likelihood of an event is classified on a four-point system using the following terms and definitions from CIRIA C552:

- High likelihood: There is a pollution linkage and an event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;

- Likely: There is a pollution linkage and all the elements are present and in the right place, which means it is probable that an event will occur. Circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;

- Low likelihood: There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain even over a longer period such event would take place, and is less likely in the short term;

- Unlikely: There is a pollution linkage but circumstances are such that it is improbable the event would occur even in the long term.

The severity is also classified using a system based on CIRIA C552. The terms and definitions are:

- Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. A short-term risk to a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples – High concentrations of contaminant on surface of recreation area, major spillage of contaminants from site into controlled waters, explosion causing building to collapse;

- Medium: Chronic damage to human health ('significant harm' as defined in DETR 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);
  Examples - Concentrations of contaminants exceed the generic assessment criteria, leaching of contaminants from a site to a Principal or Secondary Aquifer, death of species within a designated nature reserve;

- Mild: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures, services or the environment;
  Examples – Pollution of non-classified groundwater or damage to buildings rendering it unsafe to occupy.

- Minor: harm, not necessarily significant harm, which may result in financial loss or expenditure to resolve. Non-permanent health effects to human health (easily prevented by use of personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.
  Examples – Presence of contaminants at such concentrations PPE is required during site work, loss of plants in landscaping scheme or discolouration of concrete.

Once the likelihood and severity have been determined, a risk category can be assigned using the table below.

		Consequences			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/low
	Likely	High	Moderate	Moderate/low	Low
	Low likelihood	Moderate	Moderate/low	Low	Very low
	Unlikely	Moderate/low	Low	Very Low	Very low

Definitions of the risk categories obtained from the above table are as follows together with an assessment of the further work that might be required:

- Very high: There is a high probability that severe harm could arise to a designated receptor from an identified hazard or there is evidence that severe harm is currently happening. This risk, if realised, could result in substantial liability. Urgent investigation and remediation are likely to be required;

- High: Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the longer term;

- Moderate: It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it would be more likely to be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term;

- Low: It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild;

- Very Low: There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.

APPENDIX 8 - Limitations

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

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

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

Groundtech Consulting are not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The services provided are based upon Groundtech Consulting observations of existing physical conditions at the site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and Groundtech Consulting assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable due to its heterogeneous properties and as investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report,

particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

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

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

