Our Ref: CP/15924/Geotechnical Letter Report

Your Ref:

Contact: Chris Pilkington

Terra Firma (Wales) Ltd.
Consulting Geotechnical & Geo-Environmental Engineers
Site Investigation Contractors

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25th February 2020

Sue Mitchener (by email)
Maverick Industries
Unit G2,
Arena Business Centre,
Holyrood Close,
Poole,
BH17 7FP

For the attn. of Sue Mitchener

Dear Sue,

GEOTECHNICAL SITE INVESTIGATION: DRACAENA CENTRE, FALMOUTH

We confirm that we have completed the required works and report the following:

1.0 Introduction, Limitations and Exceptions of Investigation

Maverick Industries has requested that a Geotechnical site investigation be performed in order to determine the prevailing ground conditions beneath the ground adjacent to the current grass pitch and the permeability of the site soils.

The investigation was conducted, and this report has been prepared for the sole internal reliance of Maverick Industries and their design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-technical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles are generalised by necessity and have been based on the information found at the locations of the exploratory holes.

It is beyond the remit of Terra Firma (Wales) Limited to comment on any other aspects pertaining to the proposed development other than to provide engineering recommendations.

The site location can be seen in and the site layout can be seen in **Figure 01.**

2.0 Site Works

A geotechnical site investigation comprising two soakaway trial pits was undertaken on 21st February 2020.

The fieldwork was supervised by Terra Firma (Wales) Limited, who logged the exploratory holes to the requirements of BS5930:2015. Test locations were chosen in advance by Maverick Industries, as seen in **Drawing 01**.

The trial pits were formed using a JCB 3CX excavator with a 600mm wide bucket.

The location of the trial pits are shown on **Figure 01** and the trial pit logs are presented in **Annex A**.

Soakaway tests were carried out in the two trial pits, in general accordance with BRE 365. The excavation sides were squared using the excavator bucket and the dimensions recorded within the test section. The trial pit was partially filled with clean water using a dedicated bowser and the fall in level recorded against time. The results are discussed in **Section 6.0.**

On completion, the trial pits were backfilled with arisings.

Figure 01 – Site Layout

3.0 Ground Conditions

The ground conditions encountered in the trial pits are summarised as shown in **Table 3.1**.

Table 3.1 Summary of Ground Conditions (SA1)				
Depth (m)			**Thickness (m)**	**Stratum**
G. L	-	0.3	0.3	Soft dark brown silty gravelly CLAY. Gravel is fine and medium angular of slate, brick, glass and plastic.
0.3	-	1.0	0.7	Firm yellowish brown silty sandy very gravelly **CLAY**. Gravel is fine to coarse angular to subangular of brick, slate, tiles, concrete and plastic.

Table 3.1 Summary of Ground Conditions (SA2)				
Depth (m)			**Thickness (m)**	**Stratum**
G. L	-	0.2	0.2	Soft dark brown silty gravelly CLAY. Gravel is subangular to rounded fine and medium of mudstone/phyllite.
0.2	-	1.2	1.0	Firm grey brown silty sandy very gravelly CLAY. Gravel is fine and medium angular of slate. Brick, concrete, coal, timber and suspected asbestos present.

Ground conditions around the site suggests that infilled land has been imported to site during the capping of the adjacent landfill site. This material has been compacted within clay, creating a layer of impermeable made ground.

3.1 Water Strikes

No water strikes were encountered in any of the trial pits.

3.2 Stability and Obstructions

Trial pits were seen to be stable and cut cleanly.

4.0 Soil Laboratory Chemical Testing

4.1 Quality Assurance

During the intrusive investigation, several small disturbed and bulk soil samples were collected.

Care was taken to ensure that sampling quality assurance occurred during site works. This included the following measures:

- Soil samples were collected by hand with nitrile gloves.
- Clean gloves were used for each sample.
- Soil samples were stored at a temperature below 4 degrees.
- No head space was left in sample containers.
- Appropriate sample containers were used.
- Samples were submitted for laboratory testing within holding times.

4.2 Sampling Regime

The sampling regime was conducted in general accordance with BS10175 (2011).

Samples were collected on a non-targeted basis due to the history of the site.

4.3 Soil Laboratory Analysis

During the site works a number of soil samples were taken and despatched to the laboratories of Chemtest for laboratory chemical testing;

Metals and Metalloids	**In-Organics**	**Others**
Arsenic	Cyanide	pH (acidity)
Cadmium	Sulphate	Asbestos
Chromium III		
Chromium VI		
Copper	**Organic Chemicals**	
Lead	Phenols	
Mercury	Polycyclic Aromatic Hydrocarbons (PAH)	
Nickel		
Selenium		
Zinc		

The sample locations and depths as well as scheduled laboratory tests are listed in the following table.

Table 4.1 Soil Sample Details			
Sample	**Depth (m)**	**Sample Description**	**Testing Schedule**
TP1	0.2	Soft dark brown silty gravelly CLAY	SF1 (*Metals, PAH, TPH CWG, Asbestos)*
TP1	0.6	Firm yellowish brown silty sandy very gravelly CLAY	SF1 (*Metals, PAH, TPH CWG, Asbestos)*
TP2	0.1	Soft dark brown silty gravelly **CLAY**.	SF1 (*Metals, PAH, TPH CWG, Asbestos)*
TP2	0.6	Firm grey brown silty sandy very gravelly CLAY	SF1 (*Metals, PAH, TPH CWG, Asbestos)*

4.4 Soil Assessment Methodology

Comparison of the analytical results have been made with the 2015 Suitable 4 Use Levels (S4UL) provided by Land Quality Management (LQM) Limited and the Chartered Institute of Environmental Health (CIEH) or provisional Category 4 Screening Levels (pC4SL). Where S4UL or C4SL values are not available, reference has been made to Soil Guideline Values (SGV) sourced from the now withdrawn Environment Agency Contaminated Land Exposure Assessment (CLEA).

Sulphate results have been compared to British Research Establishment (BRE) guidelines as sulphate levels need only be considered for buried concrete risk assessment only, not human health related.

4.5 Soil Test Results

A summary of the chemical test results which include the regulatory soil guideline values used in a public open space (park) are given in **Tables 5.1 to 5.3**. The complete results can be found in **Annex B**.

Two samples were tested for a standard suite of metals, inorganics and phenols. The summarised results are shown below in **Table 5.1**.

Table 5.1 Summary of Soil Chemical Test Results - Standard Suite

Substance	**GAC/SGV** (mg/kg)	**Source**	**Measured Concentrations of Tested Substances** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
Arsenic	170	LQM/CIEH	78	160	0 of 4
Cadmium	560	LQM/CIEH	0.20	1.1	0 of 4
Chromium III	33000	LQM/CIEH	29	37	0 of 4
Chromium VI	220	LQM/CIEH	<0.5	<0.5	0 of 4
Copper	44000	LQM/CIEH	72	140	0 of 4
Lead	1300	pC4SL	170	470	0 of 4
Mercury (inorganic)	240	LQM/CIEH	0.49	1.1	0 of 4
Nickel	3400	LQM/CIEH	33	58	0 of 4
Selenium	1800	LQM/CIEH	0.28	0.95	0 of 4
Zinc	170000	LQM/CIEH	170	440	0 of 4
Cyanide	480*	CLEA	<0.5	<0.5	0 of 4
Phenols	440	LQM/CIEH	<0.3	<0.3	0 of 4
Sulphate	2400	BRE	340	1100	0 of 4
Organic Matter (%)	-	-	1.5	5.0	-
pH	-	-	6.2	8.0	-
Total PAH	-	-	7.2	38	**See Table 5.2**

Notes:

- GAC - Generic assessment criteria
- - No available guidelines

Four samples were tested for speciated polycyclic aromatic hydrocarbons. The summarised results are shown below in **Table 5.2**.

Table 5.2 Summary of Soil Chemical Test Results - Speciated Polycyclic Aromatic Hydrocarbons

Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedances
			Minimum	**Maximum**	
Naphthalene	1200	LQM/CIEH	<0.10	0.46	0 of 4
Acenaphthylene	29000	LQM/CIEH	<0.10	0.24	0 of 4
Acenaphthene	29000	LQM/CIEH	<0.10	0.16	0 of 4
Fluorene	20000	LQM/CIEH	<0.10	0.17	0 of 4
Phenanthrene	6200	LQM/CIEH	0.69	3.6	0 of 4
Anthracene	150000	LQM/CIEH	0.14	1.0	0 of 4
Fluoranthene	6300	LQM/CIEH	0.86	7.3	0 of 4
Pyrene	620	LQM/CIEH	1.1	6.9	0 of 4
Benzo(a)anthracene	49	LQM/CIEH	0.49	3.0	0 of 4
Chrysene	93	LQM/CIEH	0.59	3.5	0 of 4
Benzo(b)fluoranthene	13	LQM/CIEH	0.65	3.0	0 of 4
Benzo(k)fluoranthene	370	LQM/CIEH	0.46	1.5	0 of 4
Benzo(a)pyrene	11	LQM/CIEH	0.59	3.0	0 of 4
Indeno(123cd)pyrene	150	LQM/CIEH	0.35	2.2	0 of 4
Dibenzo(ah)anthracene	1.1	LQM/CIEH	0.14	0.59	0 of 4
Benzo(ghi)perylene	1400	LQM/CIEH	0.36	2.1	0 of 4
Total PAH	-	-	7.2	38	-

Notes:

- GAC - Generic assessment criteria
- Thresholds based on 1.0% soil organic matter
- - No available guidelines

Table 5.3 Summary of Soil Chemical Test Results: Petroleum Hydrocarbons					
Substance	**SGV/GAC** (mg/kg)	**Source**	**Measured Concentrations** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
PH C5 – C6 Ali	95000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C6 – C8 Ali	150000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C8 – C10 Ali	14000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C10 – C12 Ali	21000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C12 – C16 Ali	25000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C16 – C21 Ali	450000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C21 – C35 Ali	450000	LQM/CEIH	<1.0	92	0 of 4
PH C35 – C44 Ali	450000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C5 – C7 Arom	70000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C7 – C8 Arom	87000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C8 – C10 Arom	7200	LQM/CEIH	<1.0	<1.0	0 of 4
PH C10 – C12 Arom	9200	LQM/CEIH	<1.0	<1.0	0 of 4
PH C12 – C16 Arom	10000	LQM/CEIH	<1.0	<1.0	0 of 4
PH C16 – C21 Arom	7600	LQM/CEIH	<1.0	20	0 of 4
PH C21 – C35 Arom	7800	LQM/CEIH	<1.0	450	0 of 4
PH C35 – C44 Arom	7800	LQMCEIH	<1.0	<1.0	0 of 4

Notes:

- LQM/CIEH - Generic Assessment Criteria for a public open space (park) development
- A total of 4 soil samples were tested for Petroleum Hydrocarbons
- Ali - Aliphatic Hydrocarbon
- Arom - Aromatic Hydrocarbon
- LQM/CEIH Based on 1.0% SOM
- # - LQM for Ali C16 - 21 and C21 - C35 based on LQM for EC >16 - 35

Table 5.4 Summary of Soil Chemical Test Results Asbestos		
Location	**Depth (m)**	**Result**
TP1	0.2	No Asbestos detected
TP1	0.6	
TP2	0.1	
TP2	0.6	
TP2 ACM	0.5	Chrysotile

5.0 Quantitative Risk Assessment

5.1 Contaminants of Concern

5.2 Contaminants of Concern in Soil

All substances tested for were found to be present at concentrations below their respective human health threshold levels for a public open space (park) setting. All chemical test results can be found in **Annex B**.

5.3 Gasses of Concern

Made ground soils are of significant thickness, contain nominal organic matter and may present a risk of ground gas generation. However, as the end use is not residential, ground gas will not pose a risk to future site users.

No radon protective measures are required for new developments on the investigation site, as no residential end-use is proposed.

Petroleum hydrocarbon or PAH substances with the potential to generate volatile organic compounds were not detected above laboratory guideline levels for a public open space scenario.

5.4 Potential Receptors and Pathways

5.4.1 Human Receptors

There is not considered to be a risk to future site end users from any chemical contaminants. However, asbestos containing materials have been identified within these made ground soils. Constructers working within these soils will likely be at risk from exposure to site soils via dermal contract, inhalation and ingestion. Suitable PPE must be provided to all personnel working within this ground.

5.5 Aquatic Environment

There is not considered to be a risk to the aquatic environment from encountered site soils.

5.6 Mitigation and Remedial Measures

5.6.1 Human Health

All imported soils should be validated as clean and suitable for use in accordance with 'Requirements for the Chemical Testing of Imported Soils for Various End Uses and Validation Cover Systems'.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 soils destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties.

Construction workers should adhere to good site management, COSHH, good standards of hygiene and appropriate health & safety on site, with personal protection equipment (PPE) and dust suppression where appropriate.

5.6.1 Human Health (Continued)

Neighbouring site occupants and passers-by can be protected by site screening and dust suppression measures if deemed necessary. Contractors should provide method statements and risk assessment to deal with this particular risk.

If during development works any other unexpected ground conditions or evidence of contamination is found, inspection by a geo-environmental engineer should be made, and any required testing or investigation carried out prior to continuation of works.

5.7 Aquatic Environment

There is not considered to be a risk to aquatic environments from encountered site soils.

During the construction period, there is a risk to the environment/adjacent sites from de-watering, digging foundations, moving contaminated soil, drainage misconnections, discharges to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washings and oil or chemical spills.

The risk is considered to be negligible as any adverse effects will be easily preventable by due diligence to good construction practise and housekeeping in preventing surface runoff and the spillage of materials.

The basic measures that should be taken are as follows:

- Prepare a drainage plan and mark the manholes to prevent pollutants accidently reaching the surface water sewers;
- Carry out any activities that could cause pollution in a designated, bunded area, away from rivers or boreholes. Where possible it should drain to the foul sewer;
- Use settlement ponds to remove silty water;
- Store all oils and chemicals in a fully bunded area to prevent leaks or spills;
- Get advice on whether you need an environmental permit and apply in good time

6.0 Storm Water Drainage

During the site investigation two soakaway tests were undertaken to the general requirements of BRE 365. The tests were undertaken to give an indication as to whether soakaway drainage systems will be feasible. The soakaways were targeted within the gravelly CLAY. The following observations and results were recorded:

Table 4.1 Summary of soakaway testing results				
Shallow Tests for Permeable Paving				
Location	Depth	Test 1	Test 2	Test 3
SA1	1.0m	N/A	N/A	N/A
SA2	1.2m	N/A	N/A	N/A
Notes: N/A = Not Achieved within confines of working day				

SA1 and SA2 were monitored for 340 minutes, during this time negligible infiltration was recorded and the tests were therefore terminated. The test results are shown in **Annex B**.

The negligible infiltration rate is likely a result of high clay content present and the level of compaction that has taken place on the infilled material.

We trust that the above is to your satisfaction, however, if you have any queries or require any further information please do not hesitate to contact us.

Yours sincerely
for: Terra Firma (Wales) Ltd

Chris Pilkington

Enc.
Annex A – Trail Pit Logs
Annex B – Soil Chemical Test Results
Drawing 01 – Site Location

Annex A
Trial Pit Logs

terrafirma

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Terra Firma (Wales) Limited
5 Deryn Court, Wharfedale Road
Pentwyn, Cardiff
CF23 7HA

Trial Pit No: SA1
Sheet 1 of 1

Project Name: Falmouth Soakaways	Project No: 15924	Co-ords: 179688.00 - 33534.00 Level: 15.00	Date: 21/02/2020
Location: Falmouth		Dimensions: 1.20 × 0.50, Depth 1.00	Scale: 1:25
Client: Maverick Industries			Logged: CP

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20 - 0.30	ES		0.30	14.70		Soft dark brown silty gravelly CLAY. Gravel is fine and medium angular of slate, brick, glass and plastic.
	0.60 - 0.70	ES		1.00	14.00		Firm yellowish brown silty sandy very gravelly CLAY. Gravel is fine to coarse angular to subangular of brick, slate, tiles, concrete and plastic.
							End of Pit at 1.000m

Stability:

Remarks:

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Terra Firma (Wales) Limited
5 Deryn Court, Wharfedale Road
Pentwyn, Cardiff
CF23 7HA

Trial Pit No: SA2
Sheet 1 of 1

Project Name: Falmouth Soakaways	Project No: 15924	Co-ords: 179708.00 - 33507.00 Level: 15.00	Date: 21/02/2020
Location: Falmouth		Dimensions: 1.20 x 0.50 Depth 1.20	Scale: 1:25
Client: Maverick Industries			Logged: CP

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10 - 0.20	ES		0.20	14.80		Soft dark brown silty gravelly CLAY. Gravel is fine and medium angular of slate, brick, glass and plastic.
	0.60 - 0.70	ES		1.20	13.80		Firm grey brown silty sandy very gravelly CLAY. Gravel is fine and medium angular of slate. Brick, concrete, coal, timber and suspected asbestos present.
							End of Pit at 1.200m

Stability:

Remarks:

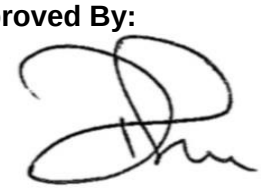
Annex B
Soil Chemical Test Results

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Amended Report

Report No.:	20-06265-4		
Initial Date of Issue:	04-Mar-2020	**Date of Re-Issue:**	09-Mar-2020
Client	Terra Firma (Wales) Ltd		
Client Address:	5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		
Contact(s):	chris@terrafirmawales.co.uk		
Project	Falmouth		
Quotation No.:	Q18-15369	**Date Received:**	27-Feb-2020
Order No.:		**Date Instructed:**	27-Feb-2020
No. of Samples:	5		
Turnaround (Wkdays):	5	**Results Due:**	04-Mar-2020
Date Approved:	09-Mar-2020		

Approved By:



Details: Darrell Hall, Director

Bulk Identification Certificate

Client: Terra Firma (Wales) Ltd
Site Address:
Date Sampled: 24-Feb-2020
Date Received: 27-Feb-2020

Your Ref.:
Project: Falmouth
Job Number: 20-06265
No Samples:
Date Reported: 04-Mar-2020

Sample No.	Sample ID	Sample Ref.	Description	Top (m)	Bottom (m)	SOP	Accred.	Laboratory	Material	Result
976981	TP2 ACM	TP2 ACM		0.5	0.6	2185	U	COVENTRY	Cement	Chrysotile

The in-house procedure SOP2185 is in accordance with the requirements of Appendix 2 of the Analyst Guide (HSG 248).
The results relate only to items tested as supplied by the client.
Comments and interpretations are beyond the scope of UKAS accreditation.
Samples associated with asbestos in building surveys are retained for six months (HSG 264 refers)

Chemtest
The right chemistry to deliver results

Results - Soil

Project: Falmouth

Client: Terra Firma (Wales) Ltd					**Chemtest Job No.:**	20-06265	20-06265	20-06265
Quotation No.: Q18-15369					**Chemtest Sample ID.:**	976977	976978	976979	976980
Order No.:					Client Sample Ref.:	TP1	TP1	TP2	TP2
					Client Sample ID.:	TP1	TP1	TP2	TP2
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.2	0.6	0.1	0.6
					Bottom Depth (m):	0.3	0.7	0.2	0.7
					Date Sampled:	24-Feb-2020	24-Feb-2020	24-Feb-2020	24-Feb-2020
					Time Sampled:	12:00	12:00	12:00	12:00
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A		-	-	-	-
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A		-	-	-	-
Moisture	N	2030	%	0.020		32	16	35	10
Soil Colour	N	2040		N/A		Brown,	Brown,	Brown,	Brown,
Other Material	N	2040		N/A		Roots,	Stones, Roots,	Roots,	Stones,
Soil Texture	N	2040		N/A		Clay,	Clay,	Clay,	Clay,
pH	M	2010		4.0		6.2	7.7	6.2	8.0
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		0.77	0.55	0.62	0.44
Cyanide (Complex)	M	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	M	2430	%	0.010		0.12	0.036	0.10	0.034
Arsenic	M	2450	mg/kg	1.0		84	160	78	110
Beryllium	U	2450	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Cadmium	M	2450	mg/kg	0.10		0.26	1.1	0.20	0.26
Chromium	M	2450	mg/kg	1.0		31	42	37	29
Mercury Low Level	M	2450	mg/kg	0.05		1.1	0.59	0.73	0.49
Manganese	M	2450	mg/kg	5.0		1200	1300	970	750
Molybdenum	M	2450	mg/kg	2.0		2.1	< 2.0	3.4	< 2.0
Antimony	N	2450	mg/kg	2.0		3.0	5.2	2.9	8.2
Copper	U	2450	mg/kg	0.50		91	140	85	72
Nickel	M	2450	mg/kg	0.50		33	58	39	38
Lead	M	2450	mg/kg	0.50		230	470	170	310
Selenium	M	2450	mg/kg	0.20		0.80	0.95	0.69	0.28
Zinc	U	2450	mg/kg	0.50		200	440	170	220
Chromium (Trivalent)	N	2490	mg/kg	1.0		31	42	37	29
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0

Chemtest
The right chemistry to deliver results

Results - Soil

Project: Falmouth

Client: Terra Firma (Wales) Ltd					**Chemtest Job No.:**	20-06265	20-06265	20-06265	20-06265
Quotation No.: Q18-15369					**Chemtest Sample ID.:**	976977	976978	976979	976980
Order No.:					Client Sample Ref.:	TP1	TP1	TP2	TP2
					Client Sample ID.:	TP1	TP1	TP2	TP2
					Sample Type:	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.2	0.6	0.1	0.6
					Bottom Depth (m):	0.3	0.7	0.2	0.7
					Date Sampled:	24-Feb-2020	24-Feb-2020	24-Feb-2020	24-Feb-2020
					Time Sampled:	12:00	12:00	12:00	12:00
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0		92	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		92	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	20
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0		150	< 1.0	< 1.0	450
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		150	< 5.0	< 5.0	470
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		240	< 10	< 10	470
Naphthalene	M	2700	mg/kg	0.10		0.39	0.28	0.46	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10		0.20	0.24	0.21	< 0.10
Acenaphthene	M	2700	mg/kg	0.10		0.16	0.14	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10		0.15	0.17	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10		1.0	1.5	0.69	3.6
Anthracene	M	2700	mg/kg	0.10		0.23	0.25	0.14	1.0
Fluoranthene	M	2700	mg/kg	0.10		1.3	3.0	0.86	7.3
Pyrene	M	2700	mg/kg	0.10		1.3	3.0	1.1	6.9
Benzo[a]anthracene	M	2700	mg/kg	0.10		0.49	1.3	0.55	3.0
Chrysene	M	2700	mg/kg	0.10		0.73	1.7	0.59	3.5
Benzo[b]fluoranthene	M	2700	mg/kg	0.10		0.77	1.9	0.65	3.0
Benzo[k]fluoranthene	M	2700	mg/kg	0.10		0.46	0.98	0.51	1.5
Benzo[a]pyrene	M	2700	mg/kg	0.10		0.76	1.6	0.59	3.0
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10		0.37	1.3	0.35	2.2
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10		0.15	0.47	0.14	0.59
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10		0.38	1.1	0.36	2.1
Total Of 16 PAH's	M	2700	mg/kg	2.0		8.8	19	7.2	38
Total Phenols	M	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30
Organic Matter BS1377	N	2930	%	0.10		4.9	2.1	5.0	1.5

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2185	Asbestos	Asbestos	Polarised light microscopy
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
2930	Organic Matter	Organic Matter	Acid Dichromate digestion/Titration

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

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

Drawings

X 2 PERCOLATION TESTS

FALMOUTH SKATEPARK	MAVERICK INDUSTRIES
CONCEPT FOUR	DATE 28.01.20 SCALE 1:500 @ A3