

Our Ref: RH/12032/ReenLetter

Your Ref:

Contact: Ruth Howells

Terra Firma (Wales) Ltd.

Consulting Geotechnical & Geo-Environmental Engineers
Site Investigation Contractors

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2nd August 2018

Engie
Second Floor
31 Bocam Park
Pencoed
Bridgend
CF35 5LJ

For the attn. of Mr Tom James

Dear Tom

REEN MONITORING: HERBERT ROAD

Testing Summary

In our Remediation Strategy Report No.12032/RS, dated August 2015, it was proposed that assessment of reen water be completed to confirm that the fill imported during the earthworks had not led to contamination of the reen.

It was specified that one round of water sampling be completed prior to fill works, and two upon completion of the Riversee Limited fill works, or in the event of delay, the second and third monitoring rounds should be completed no later than five and six months following commencement of the earthworks.

These three groundwater sampling and testing rounds were completed as required.

The reen was sampled on the 23.07.2015 at the start the earthworks. The fill works were put on hold in late 2015 and in accordance with the above specification the second and third reen sampling rounds were carried out on the 12.01.2016 and 14.02.2016, respectively.

Terra Firma (Wales) Limited (TFW) presented the reen (and groundwater) monitoring data to NRW in August 2016, and suggested that based on the favourable results no further monitoring of the reen was necessary (TFW Letter 25, dated 30.08.2016).

By email NRW officer responded on 01.09.2016 confirming he had 'no concerns with ending the groundwater monitoring' but caveated this by suggesting 'that this may need to be revisited should any fundamental changes occur'.

Between November 2016 and May 2017 fill materials sourced from Hawes Lane and Green Lane was imported.

TFW assessed the suitability of these soils prior to import in accordance with the Remediation Strategy, as detailed in TFW 'Proposed Fill For Importation Risk Assessment Report', dated November 2016.

With regards to reën waters, following a Remedial Targets Methodology Hydrogeological Risk Assessment for Land Contamination it was concluded that there was a potential risk of leaching of substances within the fill that could impact the reën. Therefore, in order to confirm that there were no adverse effects on the water quality of the reën it was recommended that regular sampling and testing of the reën waters be carried out during and two months following placement of this fill.

Reën sampling was subsequently carried out on the 09.02.17, 27.02.2017, 28.05.2018 and 04.08.2017.

In June 2017 Engie had took over management of the site and the final fill was imported. This comprised piling mat material. This material was sampled and tested by TFW as required in accordance with the Remediation Strategy. Leachate test results found some substances to be in exceedence of generic assessment criteria and at the request of NRW a Remedial Targets Methodology Hydrogeological Risk Assessment for Land Contamination was performed to determine site specific target leachate concentrations. Some substances remained in exceedence to unacceptable levels. Therefore, it was proposed that sampling and testing of the reën waters continue (see TFW Letter 38 dated 19.05.2017 and Letter 43 dated 24.08.2017 to NRW).

Import of the piling mat corresponded with works to enlarge and line the reën between the cross-over to land north of the reën and the western site boundary. The reën was inaccessible for some time due to these works, and it was mostly piped during this period. The photo in **Figure 1** below was taken in September 2017, showing the piped reën waters.



Figure 1: Preparation works for lining of the reën.

Reen samples were taken shortly following completion of the lining of the reen, on the 03.11.2017 (See **Figure 2**), and on the 04.01.2017. The short segment of the reen between the cross-over and eastern site boundary remains unchanged. The reen is culverted beneath the cross-over.



Figure 2: Newly lined reen (03.11.2017)

The reen lining is formed by concrete and is impermeable. Therefore any waters within the made ground cannot directly seep into the reen. Run-off of surface waters into the reen is also unlikely.

Reen Test Results

All reen water laboratory chemical test certificates may be found in **Annex A**.

All the test results are compiled in a table in **Annex B**. Results have been compared to Water Framework Directive thresholds where available, and in their absence drinking water directive thresholds or WHO drinking water standards are quoted (taken from CLAIRE: Petroleum Hydrocarbons in Groundwater (2017)). Some substances have also been highlighted where present above the laboratory detection limit (LoD) where no guideline is available.

The results are variable across the different monitoring periods and only limited correlation between the results and imported fill can be made.

The Green Land and Hawes Lane fill leachate results recorded exceedences of cadmium, copper, lead, zinc, cyanide, anthracene, fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, Benzo(a)pyrene and benzo(ghi)perylene in one or more samples.

The piling mat material had recorded leachate exceedences of copper, chromium III, chromium VI, anthracene, fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, Benzo(a)pyrene, benzo(ghi)perylene and some petroleum hydrocarbon fractions. Sampling of the reen could only be carried out after/during the placement of the piling mat once it had been lined.

Copper has consistently been in exceedence of its threshold level throughout the earthworks and following lining of the reen. The presence of copper cannot therefore be attributed to the fill. The levels of zinc have been variable but generally consistent and zinc concentrations too do not seem to correlate to the chemistry of the imported fill.

Levels of arsenic, cadmium, lead, mercury are inconsistent and their detection in reen water at concentrations above their respective threshold is similarly inconsistent. The presence of these chemicals above WFD threshold levels does correspond with the import of the Hawes Lane and Green Lane Fill. However, their absence following lining of the reen confirms that the concrete lining is acting to prevent inflow of surface water of any shallow waters in to the reen.

It should also be noted that whilst arsenic, cadmium, lead, mercury were at elevated concentrations, these concentrations were generally very low and would have soon been significantly diluted upon reaching the River Usk.

PAH levels recorded have been changeable. Elevated levels were first found to be above threshold levels and laboratory detection following placement of the Hawes Lane and Green Lane Fill (Sampling round 09.01.2017). However, results subsequently fell for the following 3 rounds, only becoming as elevated again following lining of the reen. No direct relationship between fill chemistry and the speciated PAH concentrations in reen water are therefore identified.

Conclusions

Test results suggest that minimal impact was made on the reen waters from fill sourced from Hawes Lane and Green Lane and the risk to the River Usk from this was negligible given that chemical concentrations would be significantly diluted in the river.

Where the reen has been lined infiltration of shallow waters and surface water in to the reen has been prevented. Only a very small section of reen, at it's far eastern end, remains in continuity with the fill on site. Any continuing risk to the reen is therefore very low, as demonstrated by the test results acquired following completion of the reen lining.

I 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 me.

Yours sincerely

for: Terra Firma (Wales) Ltd



Mrs Ruth Howells

Annex A
Reen Water Test Results



Certificate of Analysis

Certificate Number 15-41183

03-Aug-15

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 15-41183

Client Reference 12032

Contract Title HERBERT ROAD-ROUND 1

Description 7 Water samples.

Date Received 27-Jul-15

Date Started 27-Jul-15

Date Completed 03-Aug-15

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Richard Bennett'.

Richard Bennett
Managing Director



Summary of Chemical Analysis

Water Samples

Our Ref 15-41183

Client Ref 12032

Contract Title HERBERT ROAD-ROUND 1

Lab No	844518	844519	844520	844521	844522	844523	844524
Sample ID	BH1	BH2	BH3	BH4	BH5	BH6	REEN
Depth							
Other ID							
Sample Type	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units	844518	844519	844520	844521	844522	844523	844524
Metals										
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	8.1	10	5.2	0.48	1.4	1.4	1.6
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.05	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.32	< 0.25	1.3	0.66	< 0.25	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.7	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.38	< 0.09	0.12	< 0.09	< 0.09	< 0.09	0.18
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.3	0.6	1.8	< 0.5	1.0	1.4	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.43	< 0.25	4.3	0.83	3.2	220	2.0
Zinc, Dissolved	DETSC 2306	1.25	ug/l	3.41	3.49	2.45	1.90	10.9	15.1	< 1.25
Inorganics										
Conductivity	DETSC 2009	1	uS/cm	6960	3460	5490	744	1410	5950	590
pH	DETSC 2008			7.1	7.5	7.3	7.8	7.5	7.1	7.6
Total Biochemical Oxygen Demand	DETSC 2031	1	mg/l	13	5.8	1.6	1.2	3.9	9.1	4.6
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l	360	830	710	57	620	880	270
Cyanide Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	< 40	< 40	< 40
Hardness	DETSC 2303	0.1	mg/l	954	541	834	254	353	850	188
Sulphate as SO4	DETSC 2055	0.1	mg/l	30	58	70	28	26	120	34
Sulphide	DETSC 2208	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	7.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	12	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	21	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	21	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	40	28	55	16	68	64	67

Summary of Chemical Analysis

Water Samples

Our Ref 15-41183

Client Ref 12032

Contract Title HERBERT ROAD-ROUND 1

Lab No	844518	844519	844520	844521	844522	844523	844524
Sample ID	BH1	BH2	BH3	BH4	BH5	BH6	REEN
Depth							
Other ID							
Sample Type	WATER	WATER	WATER	WATER	WATER	WATER	WATER
Sampling Date	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15	23/07/15
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
PAHs										
Naphthalene	DETS 074*	0.01	ug/l	0.03	0.04	0.02	< 0.01	< 0.01	0.06	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	0.04	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	0.03	0.03	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	0.09	0.03	0.03	< 0.01	< 0.01	0.03	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.21	< 0.01
Pyrene	DETS 074*	0.01	ug/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.13	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	0.22	< 0.20	< 0.20	< 0.20	< 0.20	0.42	< 0.20
PCBs										
PCB 28 + PCB 31	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 52	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 101	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 118 + PCB 123	DETSC 3402	0.6	ug/l	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
PCB 138	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 153	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 180	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 7 Total	DETSC 3402	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols										
Phenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Information in Support of the Analytical Results

Our Ref 15-41183
Client Ref 12032
Contract HERBERT ROAD-ROUND 1

Containers Received & Deviating Samples

Lab No	Sample ID	Date		Holding time exceeded for tests	Inappropriate container for tests
		Sampled	Containers Received		
844518	BH1 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844519	BH2 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844520	BH3 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844521	BH4 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844522	BH5 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844523	BH6 WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	
844524	REEN WATER	23/07/15	GB 1L, GV x2, PB 1L	BOD (2 days)	

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



Certificate of Analysis

Certificate Number 16-55306

19-Jan-16

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 16-55306

Client Reference 12032

Order No 12032

Contract Title Herbert Road - Round 2

Description 5 Water samples.

Date Received 13-Jan-16

Date Started 13-Jan-16

Date Completed 19-Jan-16

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read "Rob Brown".

Rob Brown
Business Manager



Summary of Chemical Analysis

Water Samples

Our Ref 16-55306

Client Ref 12032

Contract Title Herbert Road - Round 2

Lab No	926091	926092	926093	926094	926095
Sample ID	Hole 2	Hole 3	Hole 5	Hole 6	Reen
Depth					
Other ID					
Sample Type	WATER	WATER	WATER	WATER	WATER
Sampling Date	11/01/16	11/01/16	11/01/16	11/01/16	11/01/16
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Metals								
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	9.9	31	1.7	4.5	1.6
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.05	0.20	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	3.7	0.35	< 0.25	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.2	1.1	2.6	1.6	1.2
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.13	0.16	0.12	0.13	0.14
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.02	0.01	0.02	0.02	0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.9	1.7	1.0	3.9	1.0
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.0	0.71	0.49	0.65	1.2
Zinc, Dissolved	DETSC 2306	1.3	ug/l	58	28	9.1	23	27
Inorganics								
Conductivity	DETSC 2009	1	uS/cm	4510	2640	339	1360	647
pH	DETSC 2008			6.7	7.1	7.5	7.1	7.5
Total Biochemical Oxygen Demand	DETSC 2031	1	mg/l	16	3100	16	1.8	2.0
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l	85	6100	39	78	< 10
Cyanide Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	< 40
Hardness	DETSC 2303	0.1	mg/l	596	309	135	470	280
Sulphate as SO4	DETSC 2055	0.1	mg/l	37	26	39	110	39
Sulphide	DETSC 2208	10	ug/l	< 10	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	24	240	< 10	86	< 10

Summary of Chemical Analysis

Water Samples

Our Ref 16-55306

Client Ref 12032

Contract Title Herbert Road - Round 2

Lab No	926091	926092	926093	926094	926095
Sample ID	Hole 2	Hole 3	Hole 5	Hole 6	Reen
Depth					
Other ID					
Sample Type	WATER	WATER	WATER	WATER	WATER
Sampling Date	11/01/16	11/01/16	11/01/16	11/01/16	11/01/16
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
PAHs								
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCBs								
PCB 28 + PCB 31	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 52	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 101	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 118 + PCB 123	DETSC 3402	0.6	ug/l	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
PCB 138	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 153	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 180	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 7 Total	DETSC 3402	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols								
Phenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Information in Support of the Analytical Results

Our Ref 16-55306
 Client Ref 12032
 Contract Herbert Road - Round 2

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
926091	Hole 2 WATER	11/01/16	GB 1L x2, GV, PB 1L		
926092	Hole 3 WATER	11/01/16	GB 1L x2, GV, PB 1L		
926093	Hole 5 WATER	11/01/16	GB 1L x2, GV, PB 1L		
926094	Hole 6 WATER	11/01/16	GB 1L x2, GV, PB 1L		
926095	Reen WATER	11/01/16	GB 1L x2, GV, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



Certificate of Analysis

Certificate Number 16-58182

22-Feb-16

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 16-58182

Client Reference 12032

Order No (not supplied)

Contract Title Herbert Road - Round Three

Description 5 Water samples.

Date Received 15-Feb-16

Date Started 15-Feb-16

Date Completed 22-Feb-16

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

A handwritten signature in black ink, appearing to read 'Rob Brown'.

Rob Brown
Business Manager



Summary of Chemical Analysis

Water Samples

Our Ref 16-58182

Client Ref 12032

Contract Title Herbert Road - Round Three

Lab No	942175	942176	942177	942178	942179
Sample ID	Hole 2	Hole 3	Hole 5	Hole 6	Reen
Depth					
Other ID					
Sample Type	WATER	WATER	WATER	WATER	WATER
Sampling Date	10/02/16	10/02/16	10/02/16	10/02/16	10/02/16
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Metals								
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	12	11	2.1	3.4	1.8
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	0.08	0.04	< 0.03	0.05
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	1.5	< 0.25	< 0.25	0.88
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.0	0.8	2.4	< 0.4	2.1
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	0.32	0.16	< 0.09	0.29
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	3.6	5.4	2.0	2.3	2.0
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.50	2.5	1.4	1.8	2.0
Zinc, Dissolved	DETSC 2306	1.3	ug/l	19	10	6.7	13	23
Inorganics								
Conductivity	DETSC 2009	1	uS/cm	2320	2440	473	2000	496
pH	DETSC 2008			7.0	6.9	7.2	7.4	7.4
Total Biochemical Oxygen Demand	DETSC 2031	1	mg/l	3.8	7.8	7.5	2.7	3.1
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l	24	26	21	29	< 10
Cyanide Total	DETSC 2130	40	ug/l	< 40	< 40	< 40	< 40	< 40
Hardness	DETSC 2303	0.1	mg/l	328	278	103	271	179
Sulphate as SO4	DETSC 2055	0.1	mg/l	9.8	13	32	120	33
Sulphide	DETSC 2208	10	ug/l	15	17	15	17	19
Petroleum Hydrocarbons								
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	0.5	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10	< 10	< 10	< 10	< 10

Summary of Chemical Analysis

Water Samples

Our Ref 16-58182

Client Ref 12032

Contract Title Herbert Road - Round Three

Lab No	942175	942176	942177	942178	942179
Sample ID	Hole 2	Hole 3	Hole 5	Hole 6	Reen
Depth					
Other ID					
Sample Type	WATER	WATER	WATER	WATER	WATER
Sampling Date	10/02/16	10/02/16	10/02/16	10/02/16	10/02/16
Sampling Time	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
PAHs								
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
PCBs								
PCB 28 + PCB 31	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 52	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 101	DETSC 3402	0.3	ug/l	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
PCB 118 + PCB 123	DETSC 3402	0.6	ug/l	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
PCB 138	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 153	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 180	DETSC 3402	0.2	ug/l	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
PCB 7 Total	DETSC 3402	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Phenols								
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100	< 100	< 100
Phenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Information in Support of the Analytical Results

Our Ref 16-58182

Client Ref 12032

Contract Herbert Road - Round Three

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
942175	Hole 2 WATER	10/02/16	GB 1L x2, GV, PB 1L	BOD (2 days)	
942176	Hole 3 WATER	10/02/16	GB 1L x2, GV, PB 1L	BOD (2 days)	
942177	Hole 5 WATER	10/02/16	GB 1L x2, GV, PB 1L	BOD (2 days)	
942178	Hole 6 WATER	10/02/16	GB 1L x2, GV, PB 1L	BOD (2 days)	
942179	Reen WATER	10/02/16	GB 1L, GV, PB 1L	BOD (2 days)	

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 17-88417

17-Jan-17

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 17-88417

Client Reference 12032

Order No 12032

Contract Title H.Rd (Herbert Road)

Description One Water sample.

Date Received 11-Jan-17

Date Started 11-Jan-17

Date Completed 17-Jan-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Rob Brown
Business Manager



Summary of Chemical Analysis

Water Samples

Our Ref 17-88417

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1108406
Sample ID	H. ROAD REEN
Depth	
Other ID	
Sample Type	WATER
Sampling Date	09/01/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.8
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.84
Chromium III, Dissolved	DETSC 2302*	1	ug/l	< 1.0
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	2.7
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.4
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.1
Zinc, Dissolved	DETSC 2306	1.3	ug/l	9.0
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	738
pH	DETSC 2008			7.6
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	8.7
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	15
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	230
Sulphate as SO4	DETSC 2055	0.1	mg/l	40
Sulphide	DETSC 2208	10	ug/l	12
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	89

Summary of Chemical Analysis

Water Samples

Our Ref 17-88417

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1108406
Sample ID	H. ROAD REEN
Depth	
Other ID	
Sample Type	WATER
Sampling Date	09/01/17
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.02
Fluorene	DETSC 3304	0.01	ug/l	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.05
Anthracene	DETSC 3304	0.01	ug/l	0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.08
Pyrene	DETSC 3304	0.01	ug/l	0.07
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.03
Chrysene	DETSC 3304	0.01	ug/l	0.05
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.07
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	0.04
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	0.05
PAH Total	DETSC 3304	0.04	ug/l	0.58
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10

Information in Support of the Analytical Results

Our Ref 17-88417

Client Ref 12032

Contract H.Rd (Herbert Road)

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1108406	H. ROAD - REEN WATER	09/01/17	GB 1L x2, PB 1L		
<p>Key: G-Glass P-Plastic B-Bottle</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 17-92972

07-Mar-17

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 17-92972

Client Reference 12032

Order No 12032

Contract Title H.Rd (Herbert Road)

Description One Water sample.

Date Received 28-Feb-17

Date Started 28-Feb-17

Date Completed 07-Mar-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Rob Brown
Business Manager



Summary of Chemical Analysis

Water Samples

Our Ref 17-92972

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1135067
Sample ID	H. Road - Reen
Depth	
Other ID	
Sample Type	WATER
Sampling Date	27/02/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.83
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	5.4
Chromium III, Dissolved	DETSC 2302*	1	ug/l	5.4
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	3.3
Lead, Dissolved	DETSC 2306	0.09	ug/l	2.0
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.02
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.2
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.89
Zinc, Dissolved	DETSC 2306	1.3	ug/l	11
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	721
pH	DETSC 2008			7.4
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	9.4
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	36
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	306
Sulphate as SO4	DETSC 2055	0.1	mg/l	40
Sulphide	DETSC 2208	10	ug/l	< 10
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10

Summary of Chemical Analysis

Water Samples

Our Ref 17-92972

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1135067
Sample ID	H. Road - Reen
Depth	
Other ID	
Sample Type	WATER
Sampling Date	27/02/17
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02
Pyrene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	0.05
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10

Information in Support of the Analytical Results

Our Ref 17-92972

Client Ref 12032

Contract H.Rd (Herbert Road)

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1135067	H. Road - Reen WATER	27/02/17	GB 1L x2, GV x2, PB 1L		
<p>Key: G-Glass P-Plastic B-Bottle V-Vial</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 17-01119

05-Jun-17

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 17-01119

Client Reference 12032

Order No (not supplied)

Contract Title H.Rd (Herbert Road)

Description One Water sample.

Date Received 28-May-17

Date Started 28-May-17

Date Completed 05-Jun-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 10725 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 17-01119

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1180407
Sample ID	H. Road - Reen
Depth	
Other ID	
Sample Type	WATER
Sampling Date	23/05/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.2
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	2.7
Chromium III, Dissolved	DETSC 2302*	1	ug/l	2.7
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.6
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.26
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.11
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.6
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.3
Zinc, Dissolved	DETSC 2306	1.3	ug/l	9.0
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	6620
pH	DETSC 2008			7.6
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	< 1.0
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	13
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	960
Sulphate as SO4	DETSC 2055	0.1	mg/l	360
Sulphide	DETSC 2208	10	ug/l	< 10
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	2.2
Aliphatic C21-C35	DETSC 3072*	1	ug/l	7.3
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10

Summary of Chemical Analysis

Water Samples

Our Ref 17-01119

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1180407
Sample ID	H. Road - Reen
Depth	
Other ID	
Sample Type	WATER
Sampling Date	23/05/17
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.03
Pyrene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	0.06
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10

Information in Support of the Analytical Results

Our Ref 17-01119
 Client Ref 12032
 Contract H.Rd (Herbert Road)

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1180407	H. Road - Reen WATER	23/05/17	GB 1L x2, GV x2, PB 1L x2	Chromium, Hexavalent (4 days)	
<p>Key: G-Glass P-Plastic B-Bottle V-Vial</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 17-07209

14-Aug-17

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 17-07209

Client Reference 12032

Order No 12032

Contract Title H.Rd (Herbert Road)

Description One Water sample.

Date Received 05-Aug-17

Date Started 05-Aug-17

Date Completed 14-Aug-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 10725 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 17-07209

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1214167
Sample ID	H. Road - Reen
Depth	
Other ID	S7
Sample Type	WATER
Sampling Date	04/08/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	57
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	7.3
Chromium, Dissolved	DETSC 2306	0.25	ug/l	7.1
Chromium III, Dissolved	DETSC 2302*	1	ug/l	7.1
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	11
Lead, Dissolved	DETSC 2306	0.09	ug/l	1.7
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.10
Nickel, Dissolved	DETSC 2306	0.5	ug/l	15
Selenium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Zinc, Dissolved	DETSC 2306	1.3	ug/l	26
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	649
pH	DETSC 2008			7.6
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	3.9
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	82
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	270
Sulphate as SO4	DETSC 2055	0.1	mg/l	48
Sulphide	DETSC 2208	10	ug/l	< 10
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	110

Summary of Chemical Analysis

Water Samples

Our Ref 17-07209

Client Ref 12032

Contract Title H.Rd (Herbert Road)

Lab No	1214167
Sample ID	H. Road - Reen
Depth	
Other ID	S7
Sample Type	WATER
Sampling Date	04/08/17
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.02
Pyrene	DETSC 3304	0.01	ug/l	0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304*	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304*	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	< 0.04
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10

Information in Support of the Analytical Results

Our Ref 17-07209

Client Ref 12032

Contract H.Rd (Herbert Road)

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1214167	H. Road - Reen WATER	04/08/17	GB 1L, GV, PB 1L x2		
<p>Key: G-Glass P-Plastic B-Bottle V-Vial</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 17-14744

10-Nov-17

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 17-14744

Client Reference 12032RH

Order No 12032RH

Contract Title Herbert Road

Description One Water sample.

Date Received 04-Nov-17

Date Started 04-Nov-17

Date Completed 10-Nov-17

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 17-14744

Client Ref 12032RH

Contract Title Herbert Road

Lab No	1252960
	Reen
Sample ID	Sample
Depth	
Other ID	
Sample Type	WATER
Sampling Date	03/11/17
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.7
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.55
Chromium III, Dissolved	DETSC 2302*	1	ug/l	< 1.0
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.7
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.9
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.4
Zinc, Dissolved	DETSC 2306	1.3	ug/l	12
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	189
pH	DETSC 2008			7.0
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	< 1.0
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	17
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	164
Sulphate as SO4	DETSC 2055	0.1	mg/l	63
Sulphide	DETSC 2208	10	ug/l	< 10
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10

Summary of Chemical Analysis

Water Samples

Our Ref 17-14744

Client Ref 12032RH

Contract Title Herbert Road

Lab No	1252960
	Reen
Sample ID	Sample
Depth	
Other ID	
Sample Type	WATER
Sampling Date	03/11/17
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	0.02
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	0.02
Fluorene	DETSC 3304	0.01	ug/l	0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02
Anthracene	DETSC 3304	0.01	ug/l	0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.09
Pyrene	DETSC 3304	0.01	ug/l	0.07
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.04
Chrysene	DETSC 3304	0.01	ug/l	0.06
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.10
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.04
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.06
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.07
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.06
PAH Total	DETSC 3304	0.04	ug/l	0.68
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.10
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
p-cresol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.10
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.10

Information in Support of the Analytical Results

Our Ref 17-14744
 Client Ref 12032RH
 Contract Herbert Road

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1252960	Reen Sample WATER	03/11/17	GB 1L, GV, PB 1L		
<p>Key: G-Glass P-Plastic B-Bottle V-Vial</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



DETS

Certificate of Analysis

Certificate Number 18-00241

11-Jan-18

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 18-00241

Client Reference 12032RH

Order No 12032RH

Contract Title H.Rd (Herbert Road)

Description One Water sample.

Date Received 05-Jan-18

Date Started 05-Jan-18

Date Completed 11-Jan-18

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Water Samples

Our Ref 18-00241

Client Ref 12032RH

Contract Title H.Rd (Herbert Road)

Lab No	1280568
	Reen
Sample ID	Sample
Depth	
Other ID	
Sample Type	WATER
Sampling Date	04/01/18
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.4
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	2.1
Chromium III, Dissolved	DETSC 2302*	1	ug/l	< 1.0
Chromium, Hexavalent	DETSC 2203	0.007	mg/l	< 0.007
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.7
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.10
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.0
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.86
Zinc, Dissolved	DETSC 2306	1.3	ug/l	4.8
Inorganics				
Conductivity	DETSC 2009	1	uS/cm	565
pH	DETSC 2008			8.4
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	< 1.0
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	< 10
Cyanide, Total	DETSC 2130	40	ug/l	< 40
Hardness	DETSC 2303	0.1	mg/l	178
Sulphate as SO4	DETSC 2055	0.1	mg/l	43
Sulphide	DETSC 2208	10	ug/l	< 10
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 25.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 25.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 25.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 25.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	100
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 25.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 25.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 25.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 25.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	100
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	200
EPH (C10-C40)	DETSC 3311	10	ug/l	420

Summary of Chemical Analysis

Water Samples

Our Ref 18-00241

Client Ref 12032RH

Contract Title H.Rd (Herbert Road)

Lab No	1280568
	Reen
Sample ID	Sample
Depth	
Other ID	
Sample Type	WATER
Sampling Date	04/01/18
Sampling Time	n/s

Test	Method	LOD	Units	
PAHs				
Naphthalene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.02
Anthracene	DETSC 3304	0.01	ug/l	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.03
Pyrene	DETSC 3304	0.01	ug/l	0.02
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01
PAH Total	DETSC 3304	0.04	ug/l	0.07
Phenols				
Phenol	DETSC 3452*	0.1	ug/l	< 0.25
4-Chloro-3-methylphenol	DETSC 3452*	0.1	ug/l	< 0.25
2,4-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.25
2,4-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.25
p-cresol	DETSC 3452*	0.1	ug/l	< 0.25
2,6-Dimethylphenol	DETSC 3452*	0.1	ug/l	< 0.25
2,6-Dichlorophenol	DETSC 3452*	0.1	ug/l	< 0.25
2,4,6-Trichlorophenol	DETSC 3452*	0.1	ug/l	< 0.25

Information in Support of the Analytical Results

Our Ref 18-00241
 Client Ref 12032RH
 Contract H.Rd (Herbert Road)

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1280568	Reen Sample WATER	04/01/18	GV, PB 1L x2		
<p>Key: G-Glass P-Plastic B-Bottle V-Vial</p> <p>DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.</p>					

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Annex B
Summary of Reen Water Test Results

REEN WATER TEST RESULTS

Substance	Threshold (ug/l)	Source	Results (ug/l)									
			Reen Sampling Date									
			Prior to Fill	5 Months After Earthworks Commencement	5 Months After Earthworks Commencement	During and following placement of Hawes Lane and Green Lane Fill				Following Placement of Piling Mat		
			23.07.2015	12.01.2016	14.02.2016	09.01.2017	27.02.2017	23.05.2017	04.08.2017	03.11.2017	04.01.2017	
Arsenic	50	WFD	1.6	1.6	1.8	1.8	0.83	1.2	57	2.7	1.4	
Cadmium	0.15*	WFD	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	7.3	<0.03	<0.03	
Total Chromium	3.4^	WFD	<0.25	<0.25	0.88	-	-	-	-	-	-	
Cr III	4.7		-	-	-	<1.0	5.4	2.8	7.1	<1.0	<1.0	
Cr VI	3.4		-	-	-	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	
Copper	1.0	WFD	<0.4	1.2	2.1	2.3	3.3	1.6	11	2.7	2.7	
Lead	1.2	WFD	0.18	0.14	0.29	2.7	2.0	0.26	1.7	<0.09	0.1	
Mercury	0.07^^	WFD	<0.01	0.01	<0.01	<0.01	0.02	0.11	0.1	0.01	<0.01	
Nickel	4.0	WFD	<0.5	1.0	2.0	1.4	1.2	0.6	15	1.9	1.0	
Selenium	10	DWD	2.0	1.2	2.0	1.1	0.89	1.3	<0.25	1.4	0.86	
Zinc	13.1**	WFD	<1.25	27	23	9.0	11	9.0	26	12	4.8	
Cyanide (Total)	1.0	WFD	<40	<40	>40	<40	<40	<40	<40	<40	<40	
Sulphate	250mg/l	DWD	34	39	33	40	40	360	48	63	43	
Sulphide	10	LoD	<10	<10	19	12	<10	<10	<10	<10	<10	
Total Phenol	7.7	WFD	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Naphthalene	2.0	WFD	All BLDL of 0.01	All BLDL of 0.01	All BLDL of 0.01	0.01	BLDL	BLDL	BLDL	0.02	BLDL	
Acenaphthylene	0.01	LoD				0.01				0.01		<0.01
Acenaphthene	0.01	LoD				0.02				0.02		0.02
Fluorene	0.01	LoD				0.01				0.01		0.01
Phenanthrene	0.01	LoD				0.05	0.01	0.02	0.02			
Anthracene	0.1	WFD				0.01	BLDL	0.01	<0.01			
Fluoranthene	0.0063	WFD				0.08	0.02	0.03	0.02	0.09	0.03	
Pyrene	0.01	LoD				0.07	0.02	0.02	0.01	0.07	0.02	
Benzo(a)anthracene	0.01	LoD				0.03	BLDL	BLDL	BLDL	0.04	BLDL	
Chrysene	0.01	LoD				0.05				0.06		
Benzo(b)fluoranthene	0.017^^	WFD				0.07				0.1		
Benzo(k)fluoranthene	0.017^^	WFD				0.02				0.04		
Benzo(a)pyrene	0.00017	WFD				0.04				0.06		
Indeno(123-cd)pyrene	0.01	LoD				0.04				0.07		
Dibenzo(ah)anthracene	0.01	LoD	<0.01	<0.01								
Benzo(ghi)perylene	0.0082^^	WFD	0.05	0.06								
TPH (Ali C5 – C6)	15000	WHO	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	Total TPH Ali/Aro <10	<0.1	
TPH (Ali C6 – C8)	15000	WHO									<0.1	
TPH (Ali C8 – C10)	300	WHO									<0.1	
TPH (Ali C10 – C12)	300	WHO									<25	
TPH (Ali C12 – C16)	300	WHO									<25	
TPH (Ali C16 – C21)	-	-									<25	
TPH (Ali C21 – C35)	-	-									<25	
TPH (Aro C5 – C7)	10+	WHO									<0.1	
TPH (Aro C7 – C8)	700++	WHO									<0.1	
TPH (Aro C8 – C10)	300	WHO									<0.1	
TPH (Aro C10 – C12)	90	WHO									<25	
TPH (Aro C12 – C16)	90	WHO									<25	
TPH (Aro C16 – C21)	90	WHO									<25	
TPH (Aro C21 – C35)	90	WHO									<25	

- Notes**
- ^ Threshold for CrVI
 - All thresholds Annual Averaged, except ^^MAC maximum allowable concentration
 - *Hardness dependent – threshold base on minimum recorded hardness 164 CaCO₃mg/l
 - ** Zinc based on bioavailable portion and background concentration (catchment of River Usk, see WFD Part 2,Table 2)
 - + Threshold for C5 – C6
 - ++ Threshold for C6 – C8
 - LoD – Limit of Detection
 - BLDL – Below Laboratory Detection Limit

REEN WATER TEST RESULTS