

Our ref: LQ80023/G001

Enviroparks (Wales) Limited
1st Floor Tiverton Place
Lion Street
Abergavenny
NP7 5PN

For the attention of Mr. Mark Bollington

24 February 2017

Dear Mark

Supplementary Soil Sampling, Phase 2 Development, Enviroparks Wales, Hirwaun

Introduction

Pell Frischmann have been appointed by Enviroparks (Wales) Limited to summarise the results of the supplementary soil analysis and make comment on their suitability for the proposed land-use at the Enviroparks redevelopment.

Background

The 8 ha parcel of land in North-West Hirwaun is proposed for redevelopment as a new sustainable waste resource recovery and energy production plant.

In February 2017, Pell Frischmann (PF) produced the Geo-Environmental Assessment Report RQ80023G001B for the second Phase of the Enviroparks development. The report summarised the previous site investigation works and assessed the ground, ground gas and groundwater conditions encountered at the site.

The statistical analysis of the soil samples obtained during the previous ground investigations, identified a potential risk to human health from Polycyclic Aromatic Hydrocarbons (PAHs) within the soils. The PAH analysis undertaken in the ground investigations were predominantly total PAH rather than speciated PAH. There is currently no Category 4 Screening Level (C4SL) or Suitable 4 Use Level (S4UL) which a total PAH analysis result can be compared against, so the risk from this group of compounds could not be discounted within the report.

In consequence, within the report it was recommended that a limited ground investigation should be undertaken to obtain soil samples from the Made Ground and to enable speciated PAH testing to be undertaken. The results of the speciated PAH analyses are able to be compared against published C4SL or S4UL thresholds.

Offices at: London, Birmingham, Bishop's Stortford, Croydon, Exeter, Leeds, Milton Keynes, Sunderland, Wakefield, India, Iraq, Manila, Qatar, Romania, UAE

Pell Frischmann is the trading name of Pell Frischmann Consulting Engineers Ltd and Pell Frischmann Consultants Ltd

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PF report RQ80023G001B also recommended supplementary groundwater sampling and analysis should be undertaken. This analysis will target chromium VI, mercury, phenols, cyanide and hydrocarbons (TPH CWG method) and will be undertaken to current standards with a MDL below the relevant threshold value. The results of this analysis will then be assessed to improve confidence in the assessment of risk to Controlled Waters.

Supplementary Investigation

Further to the recommendation for further ground investigation in PF report RQ80023G001B, a supplementary ground investigation was undertaken by Quantum Geotechnical. The ground investigation included the drilling of seven exploratory holes by cable percussion method.

Four of the exploratory holes (BH202, BH203, BHWS02, BHWS03) were located within the Phase 2 development area. Soil samples were recovered from these exploratory holes at depths of 0.5m and 1.0m below ground level (bgl) within the Made Ground. These samples were then sent to I2 Analytical and were subject to speciated PAH chemical analysis.

As of the date of issue of this letter, we are yet to receive the factual ground investigation report on the supplementary investigation. The draft exploratory hole records and an exploratory hole location plan are attached.

The ground conditions encountered in the supplementary exploratory holes in the Phase 2 development area may be summarised as Made Ground, overlying Alluvium, overlying Glacial Till, in turn overlying the weathered Lower Coal Measures. These findings accord with the findings of the previous ground investigation activities.

No evidence of visual or olfactory signs of contamination was noted in any of the supplementary exploratory holes undertaken.

Groundwater monitoring wells were installed in BH202 and BH203. These wells have been subject to groundwater sampling; however the results of the associated chemical analyses are not yet available. These results will be reported separately.

Geochemical Analysis On Soil Samples

The results of the speciated PAH analysis on the soil samples are presented in the enclosed analytical reports.

The recorded PAH concentrations have been compared against the Defra Category 4 Screening Levels (C4SLs) or the LQM/CIEH Suitable 4 Use Level (S4UL) where C4SLs are not available. Given the proposed use as a waste to energy plant, the C4SL and S4UL 'Commercial' guidelines have been applied to the site (using a 1% SOM value where appropriate, to provide a conservative initial assessment).

The table overleaf compares the maximum recorded concentration for each compound against the published C4SL and S4UL threshold value:

Chemical of Potential Concern	Threshold value (mg/kg)	No. of Samples	Max Concentration (mg/kg)	Max. < Criterion
Naphthalene	190	8	<0.05	PASS
Acenaphthylene	83000	8	<0.10	PASS
Acenaphthene	84000	8	<0.10	PASS
Fluorene	63000	8	<0.10	PASS
Phenanthrene	22000	8	<0.10	PASS
Anthracene	520000	8	<0.10	PASS
Fluoranthene	23000	8	<0.10	PASS
Pyrene	54000	8	<0.10	PASS
Benzo(a)anthracene	170	8	<0.10	PASS
Chrysene	350	8	<0.05	PASS
Benzo(b)fluoranthene	44	8	<0.10	PASS
Benzo(k)fluoranthene	1200	8	<0.10	PASS
Benzo(a)pyrene	76	8	<0.10	PASS
Indeno(1,2,3-cd)pyrene	500	8	<0.10	PASS
Dibenz(a,h)anthracene	3.5	8	<0.10	PASS
Benzo(ghi)perylene	3900	8	<0.05	PASS

The concentrations of all of the PAH compounds in all eight of the samples were reported to be less than the laboratory limit of detection. The concentrations of the PAHs in all the samples are also below the relevant C4SL or S4UL threshold.

Conclusions

With regards to human health, based on the speciated PAH analysis reported above, no pervasive PAH contaminants of potential concern which require either further assessment or any remediation have been identified.

Should you wish to discuss any points contained in the above, please do not hesitate to contact us.

Yours sincerely
On behalf of **Pell Frischmann**

Anthony Cleeve
Senior Geo-Environmental Engineer

Enc.
Quantum Geotechnical Draft Exploratory Hole Records
Draft Exploratory Hole Locations Plan
Geochemical Analysis Reports 17-39862 and 17-38757.
cc.

**Anthony Cleeve**

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Analytical Report Number : 17-38757

Project / Site name:	Enviroparks	Samples received on:	31/01/2017
Your job number:	G994	Samples instructed on:	31/01/2017
Your order number:		Analysis completed by:	Not complete
Report Issue Number:	1	Report issued on:	07/02/2017
Samples Analysed:	2 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-38757

Project / Site name: Enviroparks

Lab Sample Number				694837	694838			
Sample Reference				BH203	BH203			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.50	1.00			
Date Sampled				24/11/2016	24/11/2016			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	10	10			
Total mass of sample received	kg	0.001	NONE	2.0	2.0			

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60			
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Analytical Report Number : 17-38757

Project / Site name: Enviroparks

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
694837	BH203	None Supplied	0.50	Brown clay and loam with gravel and vegetation.
694838	BH203	None Supplied	1.00	Brown clay and sand with gravel.



Analytical Report Number : 17-38757

Project / Site name: Enviroparks

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH203		S	17-38757	694837	c	Speciated EPA-16 PAHs in soil	L064-PL	c
BH203		S	17-38757	694838	c	Speciated EPA-16 PAHs in soil	L064-PL	c

**Anthony Cleeve**

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e: reception@i2analytical.com

Analytical Report Number : 17-39862

Project / Site name:	Enviro Parks	Samples received on:	13/02/2017
Your job number:	G994	Samples instructed on:	13/02/2017
Your order number:		Analysis completed by:	15/02/2017
Report Issue Number:	1	Report issued on:	15/02/2017
Samples Analysed:	6 soil samples		

Signed:

Rexona Rahman
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Signed:

Emma Winter
Assistant Reporting Manager
For & on behalf of i2 Analytical Ltd.

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

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

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

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Analytical Report Number: 17-39862

Project / Site name: Enviroparks

Lab Sample Number				701282	701283	701284	701285	701286
Sample Reference				BH202	BH202	WS02	WS02	WS03
Sample Number				ES	ES	ES	ES	ES
Depth (m)				0.50	1.00	0.50	1.00	0.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	30	19	23	20	26
Total mass of sample received	kg	0.001	NONE	1.3	1.4	1.4	1.2	0.94

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60	< 1.60	< 1.60	< 1.60
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Analytical Report Number: 17-39862

Project / Site name: Enviroparks

Lab Sample Number				701287				
Sample Reference				WS03				
Sample Number				ES				
Depth (m)				1.00				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	16				
Total mass of sample received	kg	0.001	NONE	1.3				

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.1	MCERTS	< 0.10				
Acenaphthene	mg/kg	0.1	MCERTS	< 0.10				
Fluorene	mg/kg	0.1	MCERTS	< 0.10				
Phenanthrene	mg/kg	0.1	MCERTS	< 0.10				
Anthracene	mg/kg	0.1	MCERTS	< 0.10				
Fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Pyrene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(a)anthracene	mg/kg	0.1	MCERTS	< 0.10				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(k)fluoranthene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(a)pyrene	mg/kg	0.1	MCERTS	< 0.10				
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	MCERTS	< 0.10				
Dibenz(a,h)anthracene	mg/kg	0.1	MCERTS	< 0.10				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60				
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Analytical Report Number : 17-39862

Project / Site name: Enviroparks

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
701282	BH202	ES	0.50	Brown clay and loam with vegetation.
701283	BH202	ES	1.00	Light brown clay and sand with gravel and vegetation.
701284	WS02	ES	0.50	Brown clay and loam with vegetation.
701285	WS02	ES	1.00	Light brown clay and sand with gravel and vegetation.
701286	WS03	ES	0.50	Brown clay and loam with vegetation.
701287	WS03	ES	1.00	Light brown clay and sand with gravel and vegetation.

Analytical Report Number : 17-39862

Project / Site name: Enviroparks

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report



Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH202	ES	S	17-39862	701282	a			
BH202	ES	S	17-39862	701283	a			
WS02	ES	S	17-39862	701284	a			
WS02	ES	S	17-39862	701285	a			
WS03	ES	S	17-39862	701286	a			
WS03	ES	S	17-39862	701287	a			

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BH201		
Dates : 29/11/16 - 1/12/16 Location :					Job Number : G994 Engineer : Pell			Ground Level : Coordinates:				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0	0.05 - 0.15	B			(0.20)	TOPSOIL: Brown sandy slightly gravelly slightly organic CLAY with many rootlets		(0.20)	
	0.20 - 0.65	B			0.20			0.20	
					(0.60)	Pale brown sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded sandstone.		(0.60)	
1	0.80	D			0.80	Brownish grey slightly silty slightly sandy CLAY.		0.80	
	1.20 - 1.65	B SPTLS	1.2	SPT (S) 15 (3-3-4-3-3-5)	(0.80)			(0.80)	
2	2.00 - 2.45	B	2	SPT (C) 14 (4-5-3-4-4-3)	1.60	Brownish grey slightly sandy gravelly CLAY with low cobble content. Gravel is sub angular to sub rounded fine to coarse sandstone.		1.60	
					(1.90)			(1.90)	
3	3.00 - 3.45	B	3	SPT (C) 16 (3-3-4-4-3-5)					
					3.50	Brown sandy slightly gravelly CLAY. Gravel is sub angular to sub rounded fine to coarse sandstone.		3.50	
4	4.00 - 4.45	B SPTLS	4	SPT (S) 24 (5-5-5-6-6-7)					
5	5.00 - 5.45	B	5	SPT (C) 35 (6-8-9-11-10-5)	(3.50)			(3.50)	
6	6.00 - 6.45	B	6	SPT (S) 34 (6-9-8-8-8-10)					
7	7.00 - 7.30	B	7	SPT (C) 50/40mm (6-14/20mm-50/40mm---)	7.00	MUDSTONE Rock Recovered as: Dark grey Gravel. Gravel is angular fine to coarse mudstone.		7.00	
			7.3	SPT (C) 50/30mm (25/30mm-50/30mm---)	(0.30) 7.30	BH terminated on bedrock at 7.3mbgl		(0.30) 7.30	
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
29/11/16 16:30	1.20	1.20		6.90	200mm	1.20		Seepage at 1.2mbgl;		5.20	5.40	0:30
30/11/16 12:15	1.20	1.20	0.90			6.70		Medium water ingress at 6.7mbgl;		7.00	7.30	1:00
01/12/16 11:45	7.30	6.90	6.30									

Equipment Used: Dando 150
Remarks:

	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator: NF & IT	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BH202B		
Dates : 28/11/16 - 29/11/16 Location :					Job Number : G994 Engineer : Pell					Ground Level : Coordinates:		

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
0	0.05 - 0.50	B				MADE GROUND: Brown slightly sandy gravelly Clay with low cobble and low boulder content. Gravel is angular to sub rounded fine to coarse sandstone, angular fine to coarse brick and concrete. Cobbles and boulders are sandstone.			
	0.55 - 1.00	B							
1	1.20 - 1.65	B	1.2	SPT (C) 31 (8-10-9-8-7-7)	(2.60)				
2	2.00 - 2.45	B	2	SPT (C) 18 (4-3-4-5-4-5)					
	2.60	D			2.60	MADE GROUND: Reddish brown sandy slightly gravelly Clay. Gravel is angular to sub angular fine to coarse brick and sandstone.		2.60	
3	3.00 - 3.45	B	3	SPT (C) 24 (3-3-4-5-9-6)	(0.70)				(0.70)
					3.30	Firm brownish grey sandy gravelly CLAY with low cobble and boulder content. Gravel is sub angular to sub rounded sandstone. Cobbles are sub rounded sandstone.		3.30	
4	4.00 - 4.45	B	4	SPT (C) 29 (8-4-6-7-9-7)	(1.80)				(1.80)
5	5.00 - 5.45	B	5	SPT (C) 20 (3-5-4-4-6-6)		Brown slightly silty sandy GRAVEL with low cobble content. Gravel is sub rounded to rounded fine to coarse sandstone. Cobbles are sub rounded sandstone.		5.10	
6	6.00 - 6.45	B	6	SPT (C) 50/225mm (4-4-17-18-15-)					
7	7.00 - 7.45	B	7	SPT (C) 42 (5-8-9-10-12-11)	(4.30)			(4.30)	
8	8.00 - 8.45	B	8	SPT (C) 50/245mm (11-12-12-15-16-7/20mm)					
9	9.00 - 9.45	B	9	SPT (C) 50/225mm (3-4-7-8-35-)					
	9.45 - 9.60	B	9.6	SPT (C) 50/30mm (25/40mm-50/30mm-)	9.40 (0.20) 9.60	SILTSTONE BEDROCK. Recovered as Dark grey Gravel. Gravel is angular fine to coarse Siltstone. BH terminated on bedrock at 9.6mbgl		9.40 (0.20) 9.60	
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
28/11/16 16:30	6.00	6.00	4.50	9.40	200mm	4.80	4.10	Medium Water ingress at 4.8mbgl;		1.20	1.40	0:30
29/11/16 08:00	6.00	6.00	4.30							3.80	4.00	0:30
29/11/16 14:00	9.60	9.40	6.80							6.30	6.50	0:30
										7.60	8.00	1:00
										8.20	8.50	1:00
										9.40	9.60	1:00

Equipment Used: Dando 150
Remarks:

Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator: NF & IT	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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Form Name: SA/SPT. Version 2.11.000, 22/05/15 Output By: ArwelJones. Library File: C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\QUANTUM 4.GLB.

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BH203		
Dates : 24/11/16 - 25/11/16 Location :					Job Number : G994 Engineer : Pell			Ground Level : Coordinates:				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
0					(0.80)	MADE GROUND: Brownish grey slightly sandy gravelly Clay. Gravel is angular to sub rounded fine to coarse sandstone, angular fine to coarse brick and concrete.		(0.80)	
1			1.2	SPT (C) 14 (4-4-3-3-3-5)	0.80 (1.00)	MADE GROUND: Brown sandy slightly gravelly Clay with low cobble content. Gravel is angular to sub angular fine to coarse brick and sandstone.		0.80 (1.00)	
2			2	SPT (S) 9 (4-11-4-2-2-1)	1.80 (1.10)	Soft brown silty slightly sandy CLAY.		1.80 (1.10)	
3			3	SPT (S) 9 (2-2-1-2-3-3)	2.90 (1.20)	Soft grey sandy slightly gravelly CLAY. Gravel is sub rounded fine to medium sandstone.		2.90 (1.20)	
4			4	SPT (S) 22 (3-4-5-6-6-5)	4.10 (1.30)	Grey sandy slightly gravelly CLAY with low cobble content. Gravel is sub angular to sub rounded fine to coarse sandstone. Cobbles are sub rounded sandstone.		4.10 (1.30)	
5	5.00 - 5.45	B	5	SPT (C) 27 (5-4-6-7-7-7)		Becoming more gravelly from 5.0mbgl			
6	6.00 - 6.45	B	6	SPT (C) 37 (11-9-12-8-9-8)		Stiff grey Slightly sandy gravelly CLAY with low cobble and low boulder content. Gravel is sub angular to sub rounded fine to coarse sandstone. Cobbles are sub rounded sandstone. Boulders are sandstone.			
7	6.70 7.00 - 7.45	D B	7	SPT (C) 33 (8-8-9-7-8-9)	6.70 (1.80)	Dark grey gravelly CLAY. Gravel is angular to sub angular fine to coarse siltstone		6.70 (1.80)	
8	8.00 - 8.45	B	8	SPT (S) 29 (5-9-9-1-9-10)					
9	8.50 - 8.70	B	8.7	SPT (C) 50/30mm (25/30mm-50/30mm---)	8.50 (0.20) 8.70	SILTSTONE bedrock Recovered as: Dark grey Gravel. Gravel is angular fine to coarse siltstone. BH terminated on bedrock at 8.7mbgl		8.50 (0.20) 8.70	

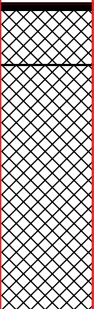
Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
24/11/16 16:30	5.00	4.40	DRY	8.70	200mm	5.60	4.70	Medium water ingress at 5.6mbgl;		5.50	5.80	1:00
25/11/16 08:00	5.00	4.40	DRY							6.20	6.40	0:30
25/11/16 12:25	8.70	8.50	6.10							8.50	8.70	1:00

Equipment Used: Dando 150 Remarks:									
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 Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator: NF & IT	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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Form Name: SA/SPT. Version 2.11.000, 22/05/15 Output By: ArwelJones. Library File: C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\QUANTUM 4.GLB.

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BHWS01		
Dates : 1/12/16 - 1/12/16 Location :				Job Number : G994 Engineer : Pell				Ground Level : Coordinates:				




m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0					(0.05)	TARMAC*		(0.05)	
					0.05	Brown claybound hardcore fill*		0.05	
					(0.45)	Brick and concrete fragments*		(0.45)	
					0.50			0.50	
1									
					(2.00)			(2.00)	
2									
					2.50	Obstruction at 2.5mbgl. BH terminated and moved 1m north BHWS01A		2.50	
3									
4									
5									
6									
7									
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment Used:
Remarks:



	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BHWS01A			
Dates : 1/12/16 - 2/12/16 Location :					Job Number : G994 Engineer : Pell					Ground Level : Coordinates:			

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Depth (Thick- ness)		
0					(0.05)	TARMAC*		(0.05)		
					0.05	Brown claybound hardcore fill*		0.05		
					(0.45)	Brick and concrete fragments*		(0.45)		
					0.50			0.50		
1					(1.50)			(1.50)		
2					2.00	Obstruction at 2.0mbgl. BH terminated unable to proceed. Installation to 2.0mbgl.		2.00		
3										
4										
5										
6										
7										
8										
9										
10										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment Used:
Remarks:

	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
				1 Of 1	10.1		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BHWS02		
Dates : 2/12/12 - 5/12/16 Location :					Job Number : G994 Engineer : Pell					Ground Level : Coordinates:		

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Depth (Thick- ness)		
0						Brown Gravelly CLAY fill with cobbles and boulders*				
1					(3.10)			(3.10)		
2										
3					3.10	Grey gravelly CLAY*		3.10		
4					(1.20)			(1.20)		
5					4.30	Dense brown sandy gravel with stiff brown boulder Clay.		4.30		
6					(1.70)			(1.70)		
6					6.00	BH terminated at 6.0mbgl for installation		6.00		
7										
8										
9										
10										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment Used:
Remarks:

	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
				1 Of 1	10.1		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BHWS03		
Dates : 5/12/16 - 5/12/16 Location :				Job Number : G994 Engineer : Pell				Ground Level : Coordinates:				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)	
0					(0.60)	Brown gravelly CLAY*		(0.60)	
1					0.60 (0.80)	Grey gravelly CLAY*		0.60 (0.80)	
					1.40 (0.30)	Brown sandy gravelly CLAY with cobbles and boulders*		1.40 (0.30)	
2					1.70	Obstruction at 1.7mbgl. BH terminated and moved 1m north BHWS03A		1.70	
3									
4									
5									
6									
7									
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment Used:
Remarks:



Quantum Geotechnical	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	AGS
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Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd										Borehole No. BHWS03A			
Dates : 5/12/16 - 5/12/16 Location :					Job Number : G994 Engineer : Pell					Ground Level : Coordinates:			

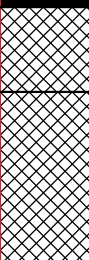
m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Depth (Thick-ness)		
0					(0.60)	Brown gravelly CLAY*		(0.60)		
1					0.60 (0.80)	Grey gravelly CLAY*		0.60 (0.80)		
2					1.40 (2.20)	Brown sandy gravelly CLAY with cobbles*		1.40 (2.20)		
3					3.60 (2.40)	Grey silty sandy gravelly CLAY*		3.60 (2.40)		
4					6.00	BH terminated at 6.0mbgl for installation		6.00		
5										
6										
7										
8										
9										
10										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours



Equipment Used:
Remarks:

	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
				1 Of 1	10.1		

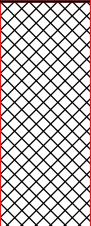
Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd								Window Sample No. WS01	
Dates : 30/11/16 - 30/11/16 Location :				Job Number : G994 Engineer : Pell		Ground Level : Coordinates:			

m B.G.L.	Samples		Sample Run		Strata				Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0					(0.05)	TARMAC		(0.05)	
					0.05	Brownish grey clayey GRAVEL. Gravel is angular to sub angular fine to coarse limestone.		0.05	
					(0.45)			(0.45)	
					0.50	MADE GROUND: Reddish grey clayey slightly sandy Gravel with low cobble content. Gravel is angular to sub rounded, sandstone, brick and concrete. Cobbles are sub angular to sub rounded, concrete and sandstone.		0.50	
1					(0.90)			(0.90)	
					1.40	WS Refused at 1.4mbgl		1.40	
2									
3									
4									
5									
6									
7									



Equipment Used: Groundwater: Remarks:									
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	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
				1 Of 1	8		

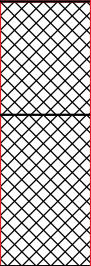
Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd								Window Sample No. WS02	
Dates : 30/11/16 - 30/11/16 Location :				Job Number : G994 Engineer : Pell			Ground Level : Coordinates:		

m B.G.L.	Samples		Sample Run		Strata				Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0					(1.20)	MADE GROUND: Brownish grey slightly sandy gravelly CLAY with low to medium cobble content. Gravel is sub angular to sub rounded fine to coarse sandstone and concrete. Cobbles are sub rounded Sandstone.		(1.20)	
1					1.20	WS Refused at 1.2mbgl		1.20	
2									
3									
4									
5									
6									
7									



Equipment Used: Groundwater: Remarks:									
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				1 Of 1	8		

Contract : Enviroparks, Hirwaun Client : Dawnus Construction Ltd								Window Sample No. WS03	
Dates : 30/11/16 - 30/11/16 Location :				Job Number : G994 Engineer : Pell			Ground Level : Coordinates:		

m B.G.L.	Samples		Sample Run		Strata				Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0					(0.60)	MADE GROUND: Brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to sub rounded fine to coarse sandstone and concrete. Cobbles are sub rounded sandstone.		(0.60)	
					0.60 (0.80)	MADE GROUND. Grey gravelly CLAY with low cobble content. Gravel is sub angular to sub rounded sandstone.		0.60 (0.80)	
					1.40	WS Refused at 1.4mbgl		1.40	
1									
2									
3									
4									
5									
6									
7									

Equipment Used: Groundwater: Remarks:									
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	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No. 1 Of 1	m Per Page 8	All measurements in metres unless otherwise stated	
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