

Our ref: LQ80023/G002

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

For the attention of Mr. Mark Bollington

24 March 2017

Dear Mark

## **Supplementary Groundwater Sampling, Phase 2 Development, Enviroparks Wales, Hirwaun**

### ***Introduction***

Pell Frischmann have been appointed by Enviroparks (Wales) Limited to summarise the results of the supplementary groundwater 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 Phase 2 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.

PF report RQ80023G001B recommended supplementary groundwater sampling and analysis should be undertaken in the Phase 2 area. This analysis was recommended to target chromium VI, mercury, phenols, cyanide and hydrocarbons (TPH CWG method) and would need to be undertaken to current practice analytical standards with a laboratory limit of detection (LOD) below the relevant threshold value. The results of this analysis would then be assessed to improve confidence in the assessment of risk to Controlled Waters.

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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5 Manchester Square London W1U 3PD  
Pell Frischmann Consulting Engineers Ltd  
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Registered in England No. 1777946



FS68994  
ISO9001:2008



OHS500940  
OHSAS18001:2007



EMS80008  
ISO14001:2004



## ***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 area. Groundwater monitoring wells were installed in BHWS02 and BHWS03. These wells have been subject to groundwater sampling.

The recovered samples were then sent to I2 Analytical and were subject to chromium VI, mercury, phenols, cyanide and hydrocarbons (TPH CWG method) chemical analysis.

The results of the chemical analysis on the water samples are presented in the enclosed analytical report.

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.

## ***Geochemical Analysis on Water Samples***

Acceptable water quality targets (WQT) are defined for protection of human health (based on drinking water standards (DWS)) and for protection of aquatic ecosystems (environmental quality standards (EQS)).

The table overleaf compares the recorded concentrations for each element or compound against the published threshold value:

Chemical of Potential Concern	WQT (ug/l)	BHWS02 (ug/l)	BHWS03 (ug/l)
Chromium VI	3.4	<5	<5
Mercury	0.05 (EQS) 1.0 (DWS)	0.26	1.07
Phenols	7.7	<3.5	<3.5
Cyanide	1	<1	<1
TPH-CWG - Aliphatic >C5 - C6	10	<10	<10
TPH-CWG - Aliphatic >C6 - C8	10	<10	<10
TPH-CWG - Aliphatic >C8 - C10	10	<10	<10
TPH-CWG - Aliphatic >C10 - C12	10	<10	<10
TPH-CWG - Aliphatic >C12 - C16	10	<10	<10
TPH-CWG - Aliphatic >C16 - C21	10	<10	<10
TPH-CWG - Aliphatic >C21 - C35	10	<10	<10
TPH-CWG - Aromatic >C5 - C7	10	<10	<10
TPH-CWG - Aromatic >C7 - C8	10	<10	<10
TPH-CWG - Aromatic >C8 - C10	10	<10	<10
TPH-CWG - Aromatic >C10 - C12	10	<10	<10
TPH-CWG - Aromatic >C12 - C16	10	<10	<10
TPH-CWG - Aromatic >C16 - C21	10	<10	<10
TPH-CWG - Aromatic >C21 - C35	10	<10	<10

The concentrations of cyanide, phenols, and all the hydrocarbon fractions in both samples were reported to be less than the laboratory limit of detection (LOD) and the threshold values.

The concentrations of chromium VI were recorded to be below the LOD of <5ug/l. The LOD of chromium VI is greater than the threshold value of 3.4ug/l. Having contacted I2 Analytical, we understand that there is currently no laboratory in the UK which offers an MCERTS accredited test with an LOD below the threshold value. Based on the recorded concentrations of <5ug/l, we believe the risk to controlled waters from a source of chromium VI at the site is very low.

The concentrations of mercury in both samples are above the EQS threshold value of 0.05ug/l. When compared to the DWS threshold of 1ug/l the concentration within the BHWS02 sample is well below the threshold, although the concentration within the sample from BHWS03 marginally exceeds it.

When considering the mercury results of these two samples in combination, there is no significant risk apparent in relation to human health. Comparison with EQS does indicate a possible risk to ecological receptors, this is considered further in subsequent paragraphs.

Identification of mercury concentrations above WQT prompts consideration of whether there is an identifiable source of mercury within Phase 2 or the immediately surrounding areas. However, no significant source of soil based mercury was identified at the site during the GI works. The soil analysis across the development area largely reported mercury concentrations of below the LOD of <0.1 mg/kg. Only a single sample recorded a concentration greater than the LOD and this was

only 0.12mg/kg. This sample was recovered from BH106 which is not located within the Phase 2 site area.

Given the proposed hard surfacing and surface water control associated with the proposed development, rain and surface water infiltration across the site will be significantly reduced in the permanent condition. Based on the very minor mercury concentrations together with reduced infiltration, we consider the the risk to Controlled Waters from any (as yet undetectable) source of mercury at the site is very low.

## **Conclusions**

With regards to controlled waters, based on the analysis reported above, no significant contaminants of concern which require 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 17-41141.  
cc.



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## **Analytical Report Number : 17-41141-B**

Replaces Analytical Report Number : 17-41141, issue no. 1

<b>Project / Site name:</b>	Enviroparks, Hirwaun	<b>Samples received on:</b>	27/02/2017
<b>Your job number:</b>		<b>Samples instructed on:</b>	27/02/2017
<b>Your order number:</b>	PO1909	<b>Analysis completed by:</b>	01/03/2017
<b>Report Issue Number:</b>	2	<b>Report issued on:</b>	23/03/2017
<b>Samples Analysed:</b>	2 water samples		

**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

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



Analytical Report Number: 17-41141-B

Project / Site name: Enviroparks, Hirwaun

Your Order No: PO1909

Lab Sample Number				708968	708969		
Sample Reference				WS2B	WS3B		
Sample Number				None Supplied	None Supplied		
Depth (m)				None Supplied	None Supplied		
Date Sampled				24/02/2017	24/02/2017		
Time Taken				None Supplied	None Supplied		
Analytical Parameter (Water Analysis)	Units	Limit of detection	Accreditation Status				

#### General Inorganics

Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0		
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#### Phenols by HPLC

Catechol	µg/l	0.5	NONE	< 0.5	< 0.5		
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5		
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5		
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5		
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5		
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5		
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5		
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5		

#### Total Phenols

Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5		
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#### Heavy Metals / Metalloids

Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0		
Mercury (dissolved)	µg/l	0.05	ISO 17025	0.26	1.07		

#### Monoaromatics

Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0		
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0		
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0		
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0		
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0		

#### Petroleum Hydrocarbons

TPH-CWG - Aliphatic >C5 - C6	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C6 - C8	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C8 - C10	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10		
<b>TPH-CWG - Aliphatic (C5 - C35)</b>	µg/l	10	NONE	< 10	< 10		

TPH-CWG - Aromatic >C5 - C7	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C7 - C8	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C8 - C10	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10		
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10		
<b>TPH-CWG - Aromatic (C5 - C35)</b>	µg/l	10	NONE	< 10	< 10		

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



**Analytical Report Number : 17-41141-B**

**Project / Site name: Enviroparks, Hirwaun**

**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
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Metals in water by ICP-MS (total)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Phenols, speciated, in water, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

**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.**

<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BH201</b>		
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	<b>Operator:</b> NF & IT	<b>Logged By:</b> A Jones	<b>Sheet No.</b> 1 Of 1	<b>m Per Page</b> 10.1	All measurements in metres unless otherwise stated	
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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BH202B</b>		
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	
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)			
					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)			
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	<b>Operator:</b> NF & IT	<b>Logged By:</b> A Jones	<b>Sheet No.</b> 1 Of 1	<b>m Per Page</b> 10.1	All measurements in metres unless otherwise stated	
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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BH203</b>		
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

<b>Equipment Used:</b> Dando 150 <b>Remarks:</b>									
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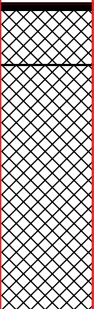
  

 Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	<b>Operator:</b> NF & IT	<b>Logged By:</b> A Jones	<b>Sheet No.</b> 1 Of 1	<b>m Per Page</b> 10.1	All measurements in metres unless otherwise stated	
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Form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

<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BHWS01</b>		
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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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BHWS01A</b>		
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. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BHWS02</b>			
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. 1 Of 1	m Per Page 10.1	All measurements in metres unless otherwise stated	
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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BHWS03</b>		
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:**

	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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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>										<b>Borehole No.</b> <b>BHWS03A</b>		
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		

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



  

m B.G.L.	Samples		Sample Run		Strata			Legend	Depth (Thickness)	Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description				
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										

<b>Equipment Used:</b> <b>Groundwater:</b> <b>Remarks:</b>									
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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		



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



  

m B.G.L.	Samples		Sample Run		Strata			Legend	Depth (Thick-ness)	Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thick-ness)	Description				
0						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										

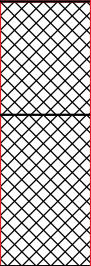
<b>Equipment Used:</b> <b>Groundwater:</b> <b>Remarks:</b>									
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	Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No. 1 Of 1	m Per Page 8	All measurements in metres unless otherwise stated	
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<b>Contract : Enviroparks, Hirwaun</b> <b>Client : Dawnus Construction Ltd</b>							<b>Window Sample No. WS03</b>	
Dates : 30/11/16 - 30/11/16 Location :				Job Number : G994 Engineer : Pell		Ground Level : Coordinates:		



  

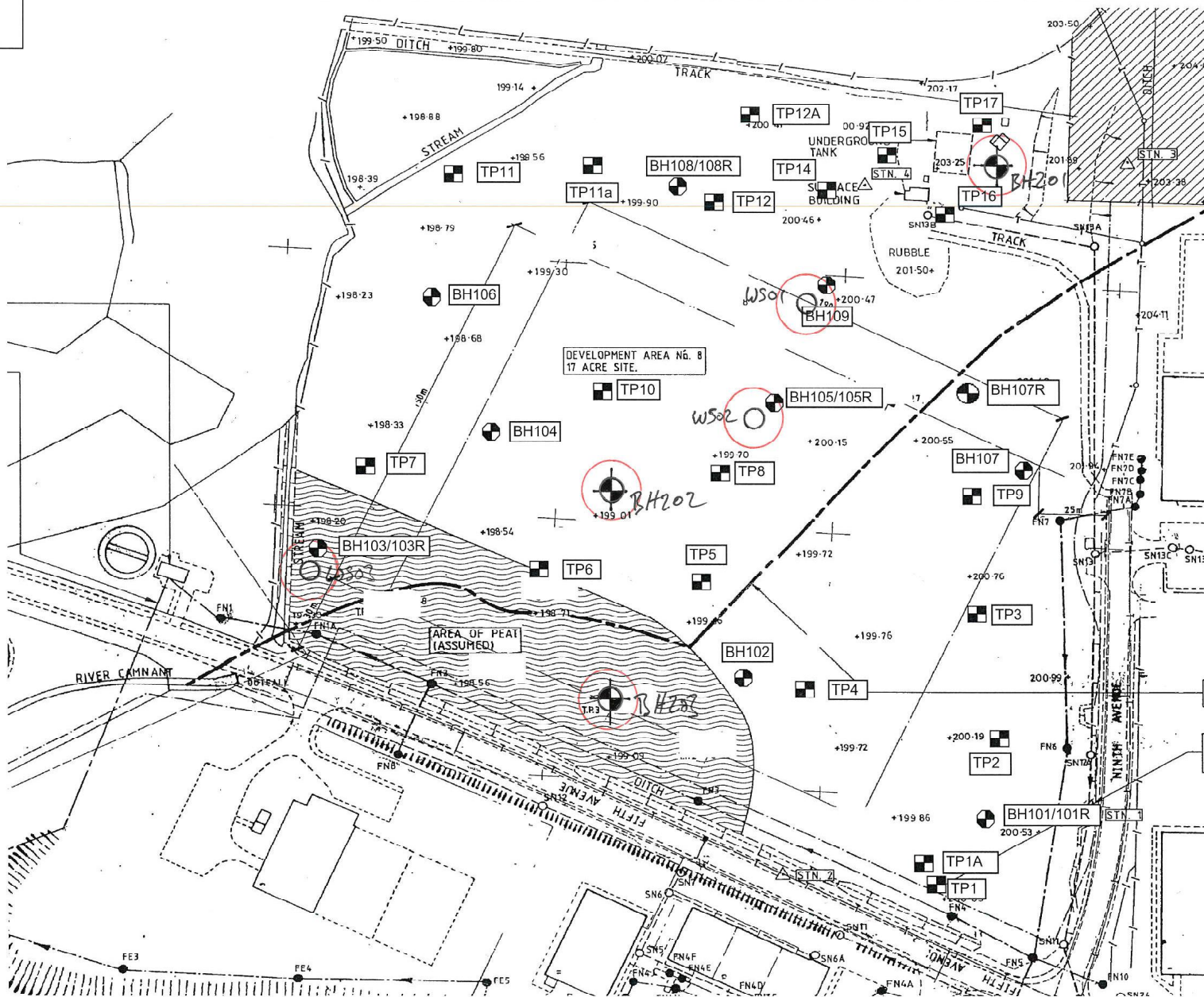
m B.G.L.	Samples		Sample Run		Strata				Water
	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thickness)	Description	Legend	Depth (Thickness)	
0					(0.60)	MADE GROUND: Brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to sub rounded fine to coarse sandstone and concrete. Cobbles 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									

<b>Equipment Used:</b> <b>Groundwater:</b> <b>Remarks:</b>	
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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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F 2 - EXPLORATORY HOLE LOCATION PLAN Not To Scale

Hirwaun Industrial Estate

H8076



Soil Mechanics