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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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FS68994 OHS500940 EMS80008 ISO9001:2008 OHSAS18001:2007 ISO14001:2004

Cont'd./... 2

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 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:

Cont'd./... 3

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**

Cont'd./... 4

Enc.

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



Anthony Cleeve Pell Frischmann **Burrator House** Peninsula House Rydon Lane Exeter EX2 7NT

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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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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		
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		
ndeno(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		
ארבווב(מ,וו)מוונווומניבווב			1	< 0.05	< 0.05		

Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	1.6	MCERTS	< 1.60	< 1.60		





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.





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 'IK' analysis have been carried out in our laboratory in the United Kingdom. For method numbers ending in 'IL' 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 ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH203		S	17-38757	694837	с	Speciated EPA-16 PAHs in soil	L064-PL	С
BH203		S	17-38757	694838	С	Speciated EPA-16 PAHs in soil	L064-PL	С



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Analytical Report Number : 17-39862

Project / Site name:	Enviroparks	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.

111_____ 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.

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soils	 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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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				
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	0.05	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								





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			
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	 		

< 1.60

Total PAH Speciated Total EPA-16 PAHs

mg/kg 1.6 MCERTS





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.





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 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	а			
WS02	ES	S	17-39862	701285	a			
WS03	ES	S	17-39862	701286	а			
WS03	ES	S	17-39862	701287	a			

		: Envir Dawnus	-										ehole 3H20	
Dat	es : 29/	/11/16 - 1	/12/16			Job Nur	nber	: G994		Ground	l Level :			
0	ation :					Enginee	er: F	Pell		Coordin	nates:			
i 2	Sam	ples	Insit	u Test R	esults				Stra	ta				
	Depth	Type No. Blows	Depth	Test Re	esults	Depth (Thick- ness)	TOD		Descrip			Legend	Depth (Thick ness)	/at -i
	0.05 - 0.15	B				- (0.20) - 0.20	\CLA`	Y with ma	own sandy slightly ny rootlets				(0.20) 0.20	-
			Ē			- (0.60)			ndy slightly grave rounded sandsto		el is sub		(0.60)	-
	0.80	D	-			- 0.80			slightly silty slight		<u>.</u>	× · × · · ·	0.80	
	1.20 - 1.65	B SPTLS	- 1.2	SPT (S) (3-3- 4-3 -) 15 - 3-5)	_ (0.80)						××	(0.80)	
		0. 120	-		,	-	Dress	wich one.					1.00	_
	0.00 0.45	-				- 1.60 -			slightly sandy gra				1.60	-
	2.00 - 2.45	В	- 2	SPT (C) (4-5- 3-4 -		-	coars	se sandst	one.					-
			E			- - - (1.90)							(1.90)	-
			E			_ (1.90) _ _							(1.90) 5	-
	3.00 - 3.45	В	- 3	SPT (C) (3-3- 4-4 -) 16 - 3-5)	-								-
			E	(5 5 4 4	-,								5	1
			Ē			- 3.50			slightly gravelly CL		sub angular		3.50	-
	4.00 - 4.45	В	- 4	SPT (S)	24	-	to su	b rounde	d fine to coarse sa	andstone.			•	1
	4.00 - 4.45	SPTLS		(5-5- 5-6 -	-6-7)	-						<u> </u>	5	-
			Ē			-								-
						-						<u> </u>	5	-
	5.00 - 5.45	В	- 5	SPT (C) (6-8- 9-11 -		-						<u> </u>		-
				(*****	,	_ (3.50) _						<u> </u>	(3.50)	
			Ē			-						<u> </u>		
	6.00 - 6.45	в	- 6	SPT (S)	34	-						<u> </u>	5	-
	0.00 - 0.40	L L	-	(6-9- 8-8-		-						<u> </u>		-
			E I			-								
			E			-								ĮĮ
	7.00 - 7.30	В	- 7	SPT (C) 50 (6-14/20mm- 50	/40mm 0/40mm)	- 7.00	MUD	STONE	Rock Recovered a	s: Dark grev G	ravel.		7.00	
			- 7.3	SPT (C) 50 (25/30mm- 50 /	/30mm /30mm)	(0.30) 7.30	-∖Grav	el is angu	lar fine to coarse	mudstone.		_/ <mark></mark>	<u>(0.30)</u> 7.30	7
						1.00	BHte	eminateo	l on bedrock at 7.3	ыпра			7.00	
		ogress / V	-		Cas		Damara	Dere T.	Groundw		October 1		iselling	-
	ate / Time 1/16 16:30	H. Depth 1.20	C. Dept 1.20	h Water		Cas. Dia. 3 200mm	Struck 1.20	Rose To	Bel Seepage at 1.2m	h <mark>aviour</mark> Ibal:	Sealed	From 5.20	To 5.40	Hours 0:30
)/1	1/16 12:15	1.20	1.20	0.90			6.70		Medium water ing	gress at 6.7mb	gl;	7.00	7.30	1:00
/ 1	2/16 11:45	7.30	6.90	6.30										
qu en	ipment Us arks:	ed: Dando '	150											
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<u> </u>			Ty B	erwig				Onerste	Lograd D-	Chost NI-	m Per			
	Quantum		Byne Tel: (erwig a, Llanelli, SA14 01554 744880 01554 716150	9ST			Operator: NF & IT	Logged By. A Jones	Sheet No. 1 Of 1	Page	measurements i metres unless therwise stated		

	ontract ient :			-			l								ehole H202	
Da	tes : 28	/11/1	6 - 2	9/11/1	6		Job Nu	mber	: G994	ŀ	G	round Le	evel :			
Lo	cation :						Engine	er: F	Pell		С	oordinate	s:			
į	Sam	ples		Insit	u Test F	Results				Str	ata					
ы 9.0 Ш	Depth		e No. ows	Depth	Test R	esults	Depth (Thick- ness)			Descri				Legend	Depth (Thick ness)	- 1
,	0.05 - 0.50 0.55 - 1.00	в						low o sub i coars	cobble an rounded f	ND: Brown sligh d low boulder co ine to coarse sau ind concrete. Col	ntent. Gra ndstone, a	vel is angi ngular fine	ular to e to			
	1.20 - 1.65	в		1.2	SPT (I (8-10- 9	C) 31 - 8-7-7)	(2.60)								(2.60)	
	2.00 - 2.45	В		- 2	SPT (((4-3 -4 -											
3	2.60 3.00 - 3.45	DB		- 3	SPT (0 (3-3 -4 -	C) 24 5-9-6)	- 2.60 - (0.70)	Clay	E GROU . Gravel i sandston	ND: Reddish brc s angular to sub e.	own sandy angular fin	slightly gr le to coars	avelly se brick		2.60 (0.70)	
	4.00 - 4.45	в		- 4	SPT (I (8-4- 6 -	C) 29 7-9-7)	- 3.30	and	boulder c	n grey sandy grav ontent. Gravel is obbles are sub ro	sub angul	ar to sub	cobble rounded		3.30	.
					(8-4-6-		- (1.80) 								(1.80)	
	5.00 - 5.45	В		- 5	SPT (((3-5 -4 -		 5.10 	Grav	el is sub	silty sandy GRAV rounded to round obbles are sub ro	ded fine to	coarse	content.			-
	6.00 - 6.45	В		- 6	SPT (C) 50 (4-4- 17 -	18-15-)										
	7.00 - 7.45	В		- 7	SPT (((5-8- 9-10	C) 42 I-12-11)	(4.30)									L
	8.00 - 8.45	В		- 8	SPT (C) 5 (11-12- 12-15 -	0/245mm 16-7/20mm)	- - - - - - -							00^0 8 . 00 8 . 00 8 . 00 8 . 00 8 . 00		.
	9.00 - 9.45	в		- 9	SPT (C) 5 (3-4- 7 -											
5	9.45 - 9.60	В		- - 9.6	SPT (C) 5 (25/40mm- 5	i0/30mm 0/30mm)	9.40 (<u>0.20)</u> 9.60	∖Grav	el is ang	BEDROCK. Reco ular fine to coars d on bedrock at 9	e Siltstone		Gravel.		9.40 \(0.20) 9.60	7
	Hole Pro					Cas			1	Ground	water				sellin	g
8/1 9/1	Atte / Time H. Depth C. Depth Water I 11/16 16:30 6.00 6.00 4.50 1 11/16 08:00 6.00 6.00 4.30 1 11/16 14:00 9.60 9.40 6.80 1						Cas. Dia. 200mm	Struck 4.80	Rose To 4.10	B Medium Water 4.8mbgl;	ehaviour ingress at		Sealed	3.80 6.30 7.60	To 1.40 4.00 6.50 8.00	Hou 0:3 0:3 0:3 1:0
															8.50 9.60	1:0 1:0
	uipment Us narks:	ed: Da	ando 1	50									<u> </u>			
	Quantum				erwig a, Llanelli, SA14 11554 744880	I 9ST			Operator NF & IT	Logged By. A Jones	Sheet N 1 Of	Pag		easurements in etres unless		J

			-	ks, Hirwa structio		I										rehole BH20	
		/11/16 - 1				Job Nur	nber	: G994	4			Grou	nd Lev	vel :			
.00	cation :					Enginee	er: F	Pell				Coord	linates	8:			
	Sam	nples	Insit	u Test Re	sults					St	rata						
	Depth	Type No. Blows	Depth	Test Res	sults	Depth (Thick- ness)				Descr	ription				Legend	Dep (Thio nes	:k-
						(0.80)	Clay	Gravel is	s ang	Brownish g ular to sub fine to coa	rounde	ed fine to	o coars	se		(0.80	- - - -
			- - - 1.2 -	SPT (C) (4-4- 3-3-3		0.80 (1.00)	low c	obble co	ntent	Brown sand . Gravel is andstone.	dy sligh angulai	tly grave r to sub	elly Cla angula	ay with ar fine to		0.8	-
			- 2	SPT (S) (4-11 -4-2-:	9 2-1)	- 1.80 - (1.10)	Soft	brown sill	ty slig	htly sandy	CLAY.				× × × · · · · · · · · · · · · · · · · ·	×	
			- 3	SPT (S) (2-2 -1-2-3	9 ⊢3)	- 2.90	Soft roun	grey sand ded fine t	dy slię to me	ghtly gravel dium sands	lly CLA stone.	Y. Grave	el is su	b		₹_ 	-
			- - - - - 4	SPT (S) 2 (3-4- 5-6-6	22 ⊶5)	- (1.20) 4.10	Grey	sandy sl	lightly	gravelly C	LAY wit	th low co	obble c	content.		(1.20	,
	5.00 - 5.45	в		SPT (C) : (5-4 -6-7-7	27 '- 7)	 _ (1.30) 	Grav sand	el is sub stone. Co	angu obble	lar to sub r s are sub r avelly from	oundec oundec	l fine to I sandst	coarse	9		 (1.30 	
	6.00 - 6.45	в	- 6	SPT (C)		- 5.40	Stiff low b fine t	grey Sligh oulder co o coarse	htly sand	andy grave t. Gravel is stone. Cob rs are sand	Ily CLA sub ar	Y with longualr to	sub ro	ounded		5.4	
	6.70	D		(11-9- 12-8 -		- (1.30) 				CLAY. Gra		ngular te	o sub a	angualr			, - - -
	7.00 - 7.45	В	- 7	SPT (C) : (8-8- 9-7-8	33 ⊩9)	- - - - (1.80)	fine t	o coarse	siltst	one		0		0		 (1.80	
	8.00 - 8.45 8.50 - 8.70	В	- 8	SPT (S) ((5-9- 9-1-9 -	29 -10)	-										<u> </u>	
	0.50 - 0.70	D	- 8.7	SPT (C) 50/3 (25/30mm- 50/3		- 8.50 <u>(0.20)</u> 8.70	∖Grav	el is angu	ular fi	ck Recove ne to coars bedrock at a	se siltst	one.	ey Gra	ivel.		× 8.5 × (0.20 8.7)_/
	Hole Pro	ogress /	Water (Ohs	Cas	sing				Ground	water					nisellir	
	ate / Time	H. Dept	h C. Dept	h Water	Depth	Cas. Dia.	Struck	Rose To		E	Behavio	ur	- la -s la	Sealed	d From	То	Но
5/1	1/16 16:30 1/16 08:00 1/16 12:25	5.00	4.40 4.40 8.50	DRY DRY 6.10	8.70	200mm	5.60	4.70	Mec	lium water	ingress	s at 5.6n	nogi;		5.50 6.20 8.50	5.80 6.40 8.70	1: 0: 1:
	ipment Us narks:	ed: Dando	150														
_				Berwig				Onerste		Logged D	01	oot NI-	m Pe	er			
	Quantum		Tel: Fax:	ea, Llanelli, SA14 98 01554 744880 01554 716150 il: ArwelJones@qua		ch.co.uk		Operator: NF & IT		Logged By. A Jones		eet No. Of 1	Pag 10.7		measurements metres unless otherwise stated		G

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.

				ks, Hirwa											ehole IWSC	
				structio							~				1000	/ I
		2/16 - 1/2	12/16					:: G994	ļ		Groun					
Lo	cation :					Engine	er :	Pell			Coordi	nates:				
	Sam	ples	Insi	tu Test Re	eulte				Stra	ta						
Π9.8 μθ 1 2 3 4 5 6 7	Jan	Type No.			50115	Depth (Thick-			0114	ita					Depth	ter
E E	Depth	Blows	Depth	Test Res	sults	ness)			Descrip	otion				Legend	(Thick ness)	Water
-						= <u>(0.05)</u> = 0.05		RMAC* wn.clayboi	und hardcore fill*				/		<u>∖(0.05)</u> 0.05	/-
-			-			- <u>(0.45)</u> - 0.50		-	crete fragments*						<u>(0.45)</u> 0.50	
-			-			-			0						0.00	-
Ε'			Ē			Ē]
-			È I			_ (2.00)									(2.00)	-
-						-										-
-2			Ē			Ē]
-			Ē			2.50	Obs	struction at	2.5mbgl. BH term	ninated	and mo	oved 1	m		2.50	-
								th BHWS0		alea						
-3																
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⊢,	Hole Pro	DGRESS / V			Cas Depth		Struck	Rose To	Groundw	haviour			Sealed	From	selling) Hours
<u> </u>		The Depth	o. Dep	an water	Dopti	ous. Dia.	Jau	. 1.030 10	De	avioul			Juaieu			
	uipment Us narks:	ed:		1												
			Ty	Berwig nea, Llanelli, SA14 99	sт			Operator:	Logged By.	Shee	t No	m Pe				
	Quantum		Tel Fax	: 01554 744880 :: 01554 716150				operator.	Logged Dy.	1 C		Page	e All me othe	easurements ir etres unless erwise stated		29
Form	'	Version 2 11 00	ema	ail: ArwelJones@qua								10.1				10

				ks, Hirwaun											le No. 601A
Cl	lient : I	Dawnus	Con	struction L	td								DI		
Da	ites : 1/1	2/16 - 2/1	12/16		Job Nu	mber	: G994			Groun	d Lev	el :			
Lo	cation :				Engine	er: I	Pell			Coord	inates				
-i	Sam	ples	Insi	tu Test Result	ts			Stra	ta						
om B.G.L.	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)			Description				Legend	Depth (Thick- ness)	Water	Install/ Backfill
- 0 -			-		-\(0.05)		MAC*				/	*****	(0.05)	-	<u>Á</u> : <u>Á</u> :
-			È I		0.05 (0.45)			nd hardcore fill*					0.05 (0.45)		
-					0.50	Brick	k and conci	rete fragments*					0.50	-	
-1			-		E-								S.	-	
-			E		(1.50)								(1.50)	-	
-			-		F								8	1	
			-		Ę								X	-	
-2			-		2.00	Obs	truction at 2	2.0mbgl. BH term	ninated	unable	e to	*****	2.00	1	
-						proc	eed. Install	ation to 2.0mbgl.							
-															
-3															
-															
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-4															
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10	Hole Pro	ogress / V	Vater	Obs Ca	asing			Groundw	ater				Ch	isell	ing
(Date / Time	H. Depth				Struck	Rose To		haviour			Sealed	From	То	Hours
Ear	uipment Us	ed:													
	marks:														
			Ty	Berwig			Operator:	Logged By.	Shee	t No.	m Pe	r 🗛 🗤 🖂		in	
	Quantum		Tel	nea, Llanelli, SA14 9ST : 01554 744880 :: 01554 716150			operator.	Logged Dy.		Of 1	Page	; All me	easurements etres unless erwise stated	ш1 	AGS
	Seoteennical		Fax ema	:: 01554 /16150 iil: ArwelJones@quantum-ge	otech.co.uk						10.1	- Oule	. moo stateu		us

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.

				ks, Hirwaur struction L										oreho BHW	le No. S02
				Struction L		1	0004			Grou	nd Leve	-] ·			
	cation :	2/12 - 5/	12/16		Job Nu Engine		: G994 Pell				linates:				
Ŀ	Sam	ples	Insi	tu Test Resul	ts			Stra	ata						
m B.G.	Depth	Type No	Depth	Test Results	Depth			Description				Legend	Depth (Thick- ness)	- Jat	Install/ Backfill
- - - - - - - - - - -			- - - - - - - -			bould	ders*	y CLAY fill with c	000100	anu			<u>, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,</u>		
- - - - - - - - -			- - - - - - - - -		(3.10)								9 1 3.10) 9 1 1		
			- - - - - - - - -		- 3.10	Grey	gravelly (CLAY*					9) 		
-4			- - - - - - - -		(1.20) - (1.20) 	Dens	se brown s	sandy gravel with	n stiff b	rown					
			- - - - - - - - -		 _ (1.70)	bould	der Clay.						- - - - - - - - - - - - - - - - - - -		
-6			-		6.00	BH te	erminated	at 6.0mbgl for ir	nstallati	ion			6.00		
-8															
-10	Hole Pro	ogress / V	Vater (Obs C	asing			Groundv	vater				C	hisell	ing
	Date / Time	H. Depth	C. Dept	th Water Dept	h Cas. Dia.	Struck	Rose To	B	ehaviou	ır		Sealed	From	То	Hours
	uipment Us marks:	ed:	<u> </u>												
	Quantum Geotechnical		Byn Tel: Fax	Berwig ea, Llanelli, SA14 9ST 01554 744880 : 01554 716150 il: ArwelJones@quantum-g	eotech.co.uk		Operator:	Logged By.		et No. Of 1	m Per Page 10.1	e Airme mi oth	easurements etres unless erwise state	s in d	AGS

				ks, Hirwaun struction Lt	d									rehole 8HWS	
<u> </u>		2/16 - 5/				mbor	:: G994			Grou	nd Lev	vel :			
	cation :	2/10 - 3/	12/10		Engine					Coord					
Ŀ.	Sam	ples	Insi	tu Test Result	S			Stra	ata						
T980 1 1 1 1 1 1 1 1 1 1	Depth	Type No	Depth	Test Results	Depth (Thick- ness)			Descri	otion				Legend	Dept (Thic ness	/at
			-		 (0.60)	Bro	wn gravelly	CLAY*						(0.60)	
-					- 0.60	Gre	ey gravelly (CLAY*						<u>ō</u> 0.60	-
-1 -			-		(0.80) 									(0.80) 	-
-					- 1.40	Bro	wn sandy g	ravelly CLAY wit	th cobb	bles and	d bould	lers*	<u>.</u>	 	
			-		<u>(0.30)</u> 1.70	Obs	struction at th BHWS03	1.7mbgl. BH terr	minate	d and m	noved	1m		<u> </u>	
- 2						101									
-															
-3															
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-															
- 10	Hole Pro	ogress / V	Vater	Obs Ca	sing			Groundv	vater				CI	nisellin	g
0	Date / Time	H. Depth	C. Dep	th Water Depth	Cas. Dia.	Struck	k Rose To	Be	ehaviou	ır		Sealed	From	То	Hours
	uipment Us	ed:	I		1										
ĸer	narks:														
			Ту	Berwig			Operator:	Logged By.	She	et No.	m Pe	er 🚬		in F	
	Quantum		Tel Faz	nea, Llanelli, SA14 9ST : 01554 744880 :: 01554 716150			operator.	Loggen Dy.		Of 1	Pag	e n	neasurements netres unless nerwise stated		29
) ¹		em	ail: ArwelJones@quantum-geo							10.1	1			uu

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.

C	ontract	: Envir	opark	s, Hirwau	n									e No.
C	lient : I	Dawnus	Cons	struction I	_td							B	IWS	03A
		2/16 - 5/	12/16				: G994			nd Leve	1:			
Lo	cation :				Engin	eer :	Pell		Coord	dinates:				
	Sam	ples	Insit	u Test Resu	Ilts			Stra	ta					
1 1 1 1 1 1 1 1 1 1		Type No.	Depth		Depti	1					1	Depth (Thick-	Water	Install/
8	Depth	Blows	-	Test Result	S ness		wn gravelly	Description			Legend	ness)		Backfill
-			Ē		(0.60)							(0.60)	-	, , , , , , , , , , , , , , , , , , ,
-					- 0.60	Gre	y gravelly	CLAY*			<u> </u>	0.60	-	
-1					- (0.80)					-		(0.80) ·	-	
-					- 1.40	Brov	wn sandy g	gravelly CLAY with	n cobbles*		0	5 1.40	-	
-										-			-	
-			E		Ē								-	
-					_ (2.20)							(2.20)	-	
			-		-					-			-	
-					Ę					-	<u> </u>	5	-	
-					- 3.60	Gro	v cilty con	ly gravelly CLAY*			<u> </u>	3.60		
			-		- 3.00	Gle	y sity sand	Iy gravelly CLAT		-	<u> </u>	. 5.00	-	
-					Ē					3	× · × · ×	5	-	
-			-		Ē					<u>-</u>	× × ×	-	-	
-5			-		(2.40)						<u>x.</u> <u>x</u>	(2.40)	-	
-					Ę						× × ×	- - -	-	
-			-		-					7	× · · · × · · · × · · · × · · · × · · · × · · · × · · · × · · · ×	-	-	
-6					-						_ ` <u>X_</u> ` _X <u>*o * _ ;</u>		-	
					6.00	BH	terminated	at 6.0mbgl for ins	stallation			6.00		
-														
- 7														
-														
-														
-8														
-														
-														
-														
- -														
-10	Hole Pro	ogress / V	Vater ()hs (Casing			Groundw	ater			Ch	iselli	na
	Date / Time	H. Depth				. Struck	Rose To		haviour	:	Sealed	From	То	Hours
	uipment Us	ed:	1			1								1
Rei	marks:													
			Ty B	erwig a Llanelli SA14.0ST			Operator:	Logged By.	Sheet No.	m Per		asurements	in	
	Quantum		Tel: Fax:	a, Llanelli, SA14 9ST 01554 744880 01554 716150			operator.	Loggou Dy.	1 Of 1	Page	Airmea	res unless wise stated		NGS
	V.		emai	l: ArwelJones@quantum-	geotech.co.uk					10.1				

C	ontract	: Е	nviropa	rks, Hirv	vaun							Window	w San No.	nple
Cl	lient :	Daw	nus Co	onstructio	on Lte	d							501	
Da	ites : 30)/11/1	6 - 30/11	1/16		Job Numbe	er: G994		Grou	nd Level :		<u></u>		
Lo	cation :					Engineer :	Pell		Coord	dinates:				
Ŀ.	Samp		Samp	le Run	Darath	1		Strata						er
om B.G.L.	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thick- ness)			Description	1			Legend	Depth (Thick- ness)	Water
-					(0.05) 0.05 (0.45)	- TARMAC - Brownish gre - coarse limes		VEL. Gravel is a	ingualr to su	b angular f	ine to		(0.05) 0.05 (0.45)	-
-					_ 0.50 - -	 cobble conte concrete. Co 	nt. Gravel is a	grey clayey slig ngular to sub ro angular to sub r	unded. sand	stone. bric	low k and		0.50	-
- 1 - -					- - (0.90) -	_ sandstone.							(0.90) -	-
-					1.40	_ WS Refused	at 1.4mbgl					~~~~~	1.40	
- - - - -2					-	-								-
-					-									
-					-	-							-	
-3 -3					-	-							-	-
-					- - -	- - -							-	-
-					-	- - -								-
-4 - -					- - -	-							-	• - -
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- - 5					- - -	- - -							-	-
- - -					- - -	- - -								-
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- 6 -					- - -	- 							-	-
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- - - -7					-	-								-
- / - -					-	-								-
-					- - -	-							-	
-					-	-								-
Gro	uipment U oundwater marks:													
	Quantun Geotechnica			Bynea, Llanelli, SA14 Tel: 01554 744880 Fax: 01554 716150 email: ArwelJones@c	quantum-geot		Operator:	Logged By.	Sheet No. 1 Of 1	m Per Page 8	metre otherwi	urements in s unless ise stated	AG	J S
Form N	Name: WINDC	ks: Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 744880 otechnical Far: 01554 716150 Tel: 01554 7155 Tel: 01554									NTUM 4.G	iLB.		

Form Name: WINDOW SAMPLE. Version 2.10.000, 28/05/13 Output By: ArwelJones	. Library File: C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\QUANTUM 4.G
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Contract : Enviroparks, Hirwaun										Window Sample No.				
Cl	lient :	Daw	nus Co	onstructio	on Lte	b						WS02		
Dates : 30/11/16 - 30/11/16					Job Numbe	er: G994		Gr	Ground Level :					
Location :					Engineer : Pell Coordinates:									
i Samples Sample Run					Strata									
om B.G.L.	Depth	Туре	Diam.	Recovery	Depth (Thick-			Description				Legend	Depth (Thick-	Water
E 0	Deptil	No.	(mm)	(%)	ness)							XXXXXX	ness)	>
-					-	 to medium co coarse sands 	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)	-							(1.20)	-
- 1					-	-							-	-
-					1.20	_ WS Refused	at 1.2mbgl						1.20	-
-					-	-							-	-
-					-	-								-
- -2					-	-							-	-
-					-	-								
-					-	-							-	1
-					-	-								
- -3					-	-							-	-
-					-	-							-	-
-					-	-							-	-
-						-								-
- -4					-	-							-	-
-						-								1
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-					-	-								1
- 6					-	-								-
-					-	-								-
-					-	-							-	
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- -7					-	-							-	
-					-	-							-	-
-					-	-							-	-
					E									-
-					-	-								
Gro	uipment U oundwater marks:													
Ty Berwig Bynea, Llanelli, SA14 9ST Geotechnical Fax: 01554 744880 Fax: 01554 716150 email: Arwellones@quantum-geote			ech.co.uk	Operator:	Logged By.	Sheet No 1 Of 1	Page	metre	urements in s unless ise stated	AG	l S			

Form Name: WINDOW SAMPLE. Version 2.10.000, 28/05/13 Output By: ArwelJones. Library File: C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\LIBRARIES\QUANTUM 4.GLB.

Contract : Enviroparks, Hirwaun										Window Sample No.				
Client : Dawnus Construction Ltd										WS03				
Dates : 30/11/16 - 30/11/16						Job Numbe	er: G994		Gro	und Level	:	1		
Location :					Engineer :									
Samples Sample Run					Strata							-	er	
om B.G.L.	Depth	Type No.	Diam. (mm)	Recovery (%)	Depth (Thick- ness)	Description						Legend	Depth (Thick- ness)	Water
-					- - - (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.					bble te and		(0.60)	-
-					0.60	_ MADE GROU _ is sub angula	JND. Grey gra ar to sub round	velly CLAY with led sandstone.	low cobble	e content. G	ravel		0.60	-
1 - -					(0.80) 	- - -							(0.80)	-
- -					1.40 	_ WS Refused	at 1.4mbgl					<u> </u>	1.40	-
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Gro	uipment U oundwater marks:				-									_
Ty Berwig Bynea, Llanelli, SA14 9ST Tel: 01554 716150 Fax: 01554 716150 email: ArwelJones@quantum-geot Form Name: WINDOW SAMPLE. Version 2.10.000, 28/05/13 Output By: J					quantum-geoto		Operator:	Logged By.	Sheet No 1 Of 1	Page 8	metre otherw	urements in is unless ise stated	AG	S S
⊢orm I	vame: WINDC	W SAMP	LE. Version 2.1	IU.000, 28/05/13 0	Jutput By: A	ArwelJones. Library F	IIE: C:\USERS\PUE	SLIC\DOCUMENTS\B	=NILEY\GINT\	LIBRARIES\QU	ANTUM 4.0	jLB.		

