

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I

Project No.: 7932

Instruments Used: GA 2000 INFRA-RED GAS ANALYSER

Monitoring Engineer: KH

Date Sampled: 30/04/2005

Location No.	Installation Level mOD	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	H ₂ S ppm	Atmos Pressure m bar	Flow l/hr	Air Temp °C	BH Water Temp °C	LNAPL Depth m	Water Depth m	Water Level mOD	DNAPL Depth m	Base Depth m	Water Eh Value	Water pH Value	Remarks
BH201	13.07	0.0	0.3	20.2			1024	1.0				3.01	10.08					50mm gas monitoring standpipe 18mm piezometer
BH202	14.68											2.21	12.47					18mm piezometer
BH203	15.92											2.54	13.38					50mm gas monitoring standpipe
BH204	9.51	0.0	6.2	15.6			1024	1.1				DRY	DRY					50mm gas monitoring standpipe
BH205	9.91	0.0	0.0	20.5			1024	1.3				2.76	7.15					50mm gas monitoring standpipe
BH206	7.28	0.0	0.0	20.5			1024	1.1				3.90	3.38					50mm gas monitoring standpipe
BH207	9.25	0.0	0.0	20.5			1025	1.2				DRY	DRY					50mm gas monitoring standpipe
BH208	7.46											2.51	4.95					18mm piezometer
BH209	7.03	0.0	0.5	20.1			1024	1.0				2.20	4.83					50mm gas monitoring standpipe
BH210	7.85	0.0	0.0	20.5			1025	1.1				3.05	4.80					50mm gas monitoring standpipe
BH211	6.91	0.0	8.2	8.1			1025	1.2				2.45	4.48					50mm gas monitoring standpipe
BH212A	7.68											2.82	4.86					18mm piezometer
BH213	7.72	6.7	7.2	0.9			1025	1.3				1.78	5.93					50mm gas monitoring standpipe

Background Gas Levels

	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	Atmos mbar
Before Monitoring	0.0	0.0	21.0		1024
After Monitoring	0.0	0.0	21.0		1025

Calibration
External Calibration Details (available upon request)
Internal Calibration Details (available upon request)

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name:

PEMBERTON DEVELOPMENT SECOND G.I

Project No.: 7832

Instruments Used:

GA 2000 INFRA-RED GAS ANALYSER

Monitoring Engineer:

KH

Date Sampled: 28/10/2005

Location No.	Installation Level mOD	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	H ₂ S ppm	Atmos Pressure m bar	Flow l/hr	Air Temp °C	BH Water Temp °C	LNAPL Depth m	Water Depth m	Water Level mOD	DNAPL Depth m	Base Depth m	Water Eh Value	Water pH Value	Remarks
BH201	13.07	0.0	0.8	18.9			1006	1.3				2.88	10.18					50mm gas monitoring standpipe 19mm piezometer
BH202	14.88											1.89	12.79					19mm piezometer
BH203	15.92											2.20	13.72					50mm gas monitoring standpipe
BH204	9.51	0.0	4.9	15.1			1007	1.2				DRY	DRY					50mm gas monitoring standpipe
BH205	9.91	0.0	0.1	21.2			1007	1.5				2.51	7.40					50mm gas monitoring standpipe
BH206	7.28	0.0	0.0	21.9			1006	1.3				3.75	3.53					50mm gas monitoring standpipe
BH207	9.25	0.0	0.0	21.9			1007	1.2				DRY	DRY					50mm gas monitoring standpipe
BH208	7.48											2.40	5.08					19mm piezometer
BH209	7.03	0.0	0.8	20.9			1006	1.1				2.05	4.98					50mm gas monitoring standpipe
BH210	7.85	0.0	0.0	21.9			1006	1.1				2.88	4.87					50mm gas monitoring standpipe
BH211	6.91	0.0	10.3	12.3			1006	1.4				2.39	4.52					50mm gas monitoring standpipe
BH212A	7.88											2.70	4.98					19mm piezometer
BH213	7.72	5.9	8.0	1.1			1007	1.4				1.85	6.07					50mm gas monitoring standpipe

Background Gas Levels

	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	Atmos mbar
Before Monitoring	0.0	0.0	21.9		1006
After Monitoring	0.0	0.0	21.9		1006

Calibration
External Calibration Details (available upon request)
Internal Calibration Details (available upon request)

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I. Project No.: 7932
 Instruments Used: GA 2000 INFRA-RED GAS ANALYSER
 Monitoring Engineer: KH
 Data Sampled: 14/06/2005

Location No.	Installation Level mOD	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	H ₂ S ppm	Atmos Pressure mbar	Flow l/hr	Air Temp °C	BH Water Temp °C	LNAPL Depth m	Water Depth m	Water Level mOD	DNAPL Depth m	Base Depth m	Water Eh Value	Water pH Value	Remarks
BH201	13.07	0.0	0.7	18.6			1007	1.2				2.81	10.48					50mm gas monitoring standpipe
BH202	14.65											1.77	12.91					19mm piezometer
BH203	15.92											2.46	13.44					19mm piezometer
BH204	9.51	0.0	4.1	15.1			1007	1.3				2.96	6.65					50mm gas monitoring standpipe
BH205	9.91	0.0	0.3	19.4			1007	1.4				2.70	7.21					50mm gas monitoring standpipe
BH206	7.28	0.0	0.0	19.7			1007	1.1				3.88	3.40					50mm gas monitoring standpipe
BH207	9.25	0.0	0.0	19.7			1007	1.2				DRY	DRY					19mm piezometer
BH208	7.46											2.30	5.18					50mm gas monitoring standpipe
BH209	7.03	0.0	0.2	19.6			1007	1.4				1.85	5.18					50mm gas monitoring standpipe
BH210	7.85	0.0	0.0	19.6			1008	1.4				2.91	4.94					50mm gas monitoring standpipe
BH211	6.91	0.0	12.2	1.7			1008	1.5				2.40	4.51					50mm gas monitoring standpipe
BH212A	7.68											2.63	5.05					19mm piezometer
BH213	7.72	4.7	5.6	0.8			1008	1.3				1.77	5.95					50mm gas monitoring standpipe

Background Gas Levels

	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	Atmos mbar
Before Monitoring	0.0	0.0	19.7		1007
After Monitoring	0.0	0.0	19.7		1008

Calibration
 External Calibration Details (available upon request)
 Internal Calibration Details (available upon request)

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: GA 2000 INFRARED GAS ANALYSER
 Monitoring Engineer: KH
 Data Sampled: 18/05/2005

Location No.	Installation Level mOD	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	H ₂ S ppm	Atmos Pressure m bar	Flow l/hr	Air Temp °C	BH Water Temp °C	LNAPL Depth m	Water Depth m	Water Level mOD	DNAPL Depth m	Base Depth m	Water Eh Value	Water pH Value	Remarks
BH201	13.07	0.0	1.0	19.8			1019	1.6				2.54	10.53					50mm gas monitoring standpipe 19mm piezometer
BH202	14.68											1.87	12.81					19mm piezometer
BH203	15.92											2.22	13.70					19mm piezometer
BH204	9.51	0.0	3.6	17.2			1019	1.2				DRY	DRY					50mm gas monitoring standpipe
BH205	9.91	0.0	0.2	20.7			1020	1.4				1.89	8.02					50mm gas monitoring standpipe
BH206	7.28	0.0	0.0	21.1			1019	1.4				3.87	3.41					50mm gas monitoring standpipe
BH207	9.25	0.0	0.0	21.1			1019	1.2				2.92	6.33					50mm gas monitoring standpipe
BH208	7.46											2.20	5.28					19mm piezometer
BH209	7.03	0.0	0.0	21.0			1019	1.3				2.48	4.55					50mm gas monitoring standpipe
BH210	7.85	0.0	0.0	21.1			1019	1.7				2.92	4.93					50mm gas monitoring standpipe
BH211	8.91	0.0	8.3	9.0			1020	1.7				2.44	4.47					50mm gas monitoring standpipe
BH212A	7.68											2.86	5.02					19mm piezometer
BH213	7.72	6.4	5.2	1.6			1020	1.7				1.80	5.92					50mm gas monitoring standpipe

Background Gas Levels

	CH ₄ %	CO ₂ %	O ₂ %	VOC ppm	Atmos mbar
Before Monitoring	0.0	0.0	20.1		1019
After Monitoring	0.0	0.0	20.1		1020

Calibration
 External Calibration Details (available upon request)
 Internal Calibration Details (available upon request)

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Checked By: 

5/66/65
Date

Approved By 

15/04/05
Date

Contract No. GEO/770/05

7932

Pemberton Development Phase 2

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

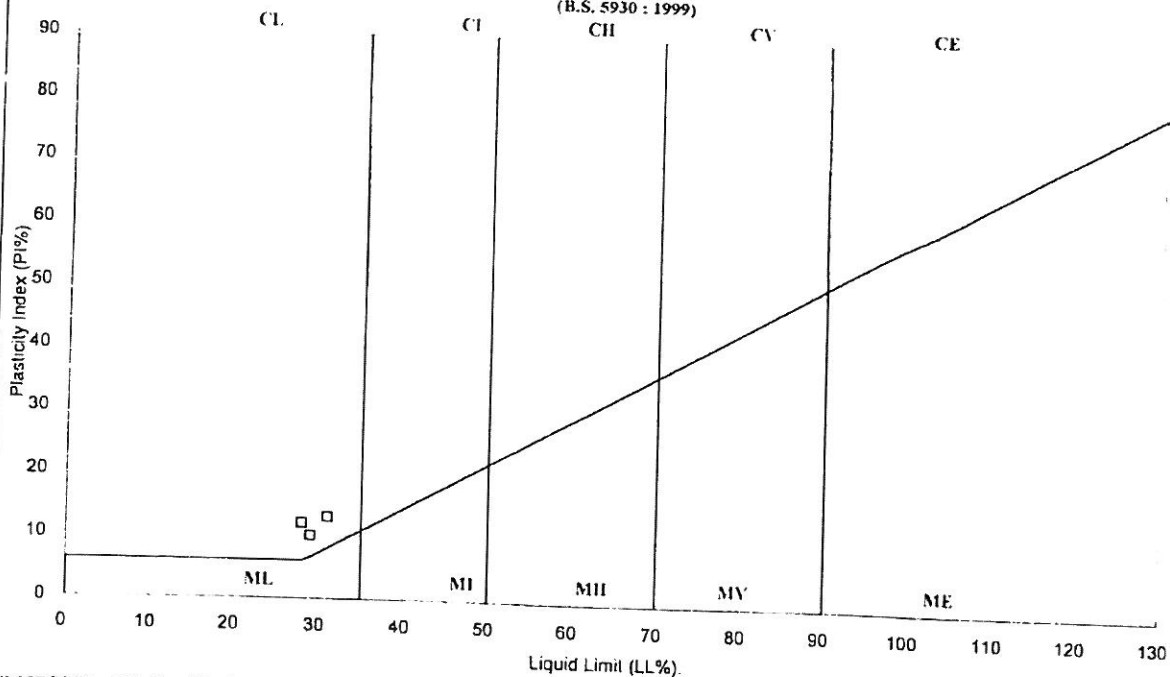
Hole Number	Sample Number	Depth m	Moisture Content % Clause 3.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5	Plasticity Index % Clause 6	% Passing .425mm	Remarks
BH211		5.00-5.45	210		NP			
BH211		8.20-8.70	16	28	16	12	95	Low plasticity CL.
BH213		3.00-3.30	15	31	18	13	95	Low plasticity CL.
BH213		4.40-4.60	13	29	19	10	100	Low plasticity CL.

SYMBOLS: NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S. 5930 : 1999)



SYMBOLS: NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

Checked By

15/06/05
Date

Approved By

15/06/05
Date



Pemberton Development Phase 2

Contract No. GEO/770/05

Client ref no. 7932

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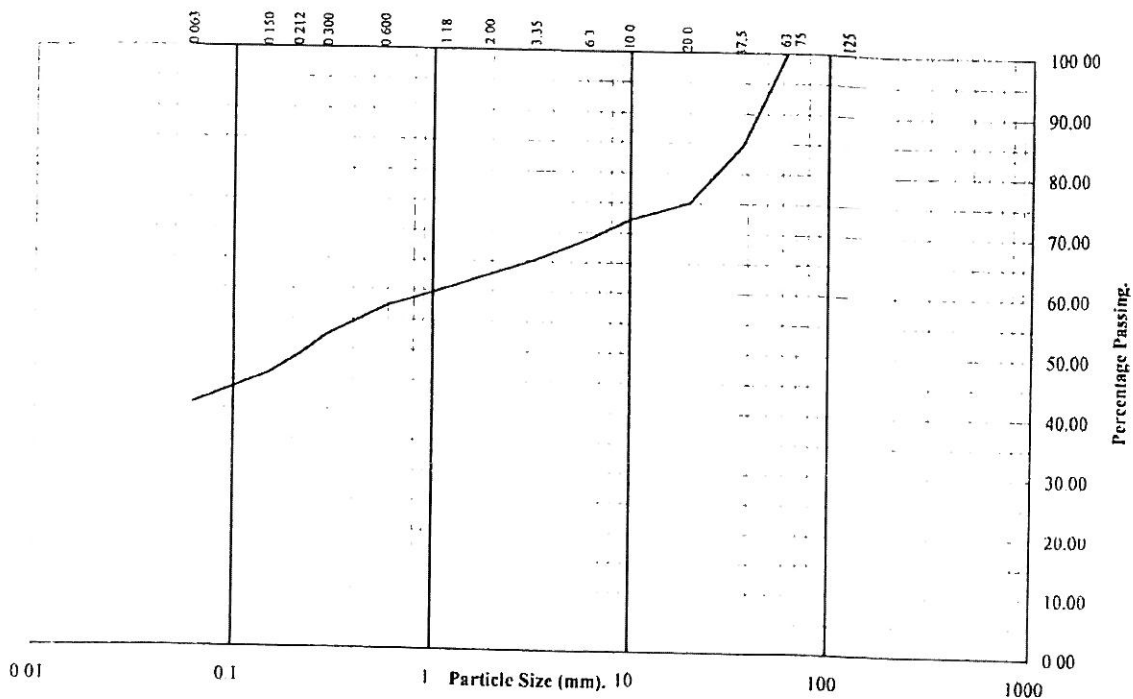
PARTICLE SIZE DISTRIBUTION TEST

BS1377:Part 2:1990

Wet Sieve: Clause 9.2

Hole Number: **BH213**

Depth (m): **2.50-3.00**



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	85
20	75
10	72
6.3	69
3.35	65
2	63
1.18	61
0.6	57
0.3	53
0.212	49
0.15	46
0.063	41

Soil Fraction	Total Percentage
Cobbles	0
Gravel	37
Sand	22
Silt/Clay	41

Remarks:

[Signature]
Checked by

5/6/05
Date

[Signature]
Approved by

5/6/05
Date



Pemberton Development Phase 2

Contract No.:

GEO/770/05

Client Ref No:

7932

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QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH Date Sampled: 31/03/2005

Location No	Sampling Level mAOB	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	6.84	813.5% / 82.7ppm	9.7 °C	68.4mv	620 µs/cm	
SP2	11.32	7.27	232.8% / 22.9ppm	12.7 °C	67.4mv	713 µs/cm	
SP3	7.12	6.45	3.3% / 0.29ppm	11.8 °C	67.6mv	546 µs/cm	
SP4	5.04	7.15	114.6% / 13.4ppm	11.6 °C	67.6mv	636 µs/cm	
SP5	3.07	6.92	846.5% / 85.5ppm	10.4 °C	68.5mv	555 µs/cm	

Weather Conditions

Predominantly dry with slight cloud cover and occasional sunny spells

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH Date Sampled: 03/05/2005

Location No	Sampling Level mAOD	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	7.28	80.4% / 7.65ppm	13.4°C	67.8mv	344µs/cm	
SP2	11.32	7.70	79.8% / 7.97ppm	11.8°C	79.4mv	590µs/cm	
SP3	7.12	6.31	12.5% / 1.2ppm	11.9°C	81.0mv	435µs/cm	
SP4	5.04	7.58	69.8% / 6.57ppm	12.6°C	17.6mv	483µs/cm	
SP5	3.07	7.29	67.3% / 6.19ppm	13.2°C	93.6mv	447µs/cm	

Weather Conditions

Warm and sunny with slight cloud cover

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH
 Date Sampled: 27/05/2005

Location No	Sampling Level mAOD	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	7.17	76.6% / 7.73ppm	15.6°C	145.1mv	390us/cm	River level has dropped since last visit
SP2	11.32	7.04	51.5% / 5.47ppm	14.2°C	206.7mv	594us/cm	Water level has dropped since last visit.
SP3	7.12	6.84	0.0% / 0.0ppm	14.0°C	-253.6mv	418us/cm	No noticeable change on flow
SP4	5.04	6.93	64.8% / 6.40ppm	15.3°C	-1.1mv	442us/cm	No noticeable change on flow
SP5	3.07	7.11	64.2% / 6.28ppm	16.2°C	996.1mv	596us/cm	River level has dropped since last visit

Weather Conditions

Dry, sunny and very hot

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH Date Sampled: 04/07/2005

Location No	Sampling Level mAOD	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	9.02	81.2%/8.23ppm	14.0°C	188mv	188µs/cm	River level has risen since last visit
SP2	11.32	8.07	80.0%/8.10ppm	13.8°C	238mv	688µs/cm	Water level has risen since last visit.
SP3	7.12	7.32	0.0%/0.00ppm	13.0°C	-27.2mv	558µs/cm	Increase in flow since last visit
SP4	5.04	7.46	47.9%/4.64ppm	17.2°C	63.8mv	577µs/cm	Increase in flow since last visit
SP5	3.07	8.19	86.0%/8.54ppm	15.5°C	161mv	420µs/cm	River level has risen since last visit

Weather Conditions

Sunny, windy with occasional cloud

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD
LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: **PEMBERTON DEVELOPMENT SECOND G.I** Project No.: **7932**
 Instruments Used: **Dissolved Oxygen, Redox Potential, Electrical Conductivity.**
 Monitoring Engineer: **KH** Date Sampled: **28/07/2005**

Location No	Sampling Level mAOD	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	6.59	92.0%/8.65ppm	17.5°C	153mv	432µs/cm	River level has risen since last visit
SP2	11.32	6.68	88.7%/8.58ppm	17.1°C	210mv	196.2µs/cm	Water level has risen since last visit.
SP3	7.12	5.73	0.3%/0.02ppm	13.8°C	-20mv	434µs/cm	Increase in flow since last visit
SP4	5.04	7.31	77.7%/7.65ppm	16.8°C	-163mv	238µs/cm	Increase in flow since last visit
SP5	3.07	7.04	52.0%/5.01ppm	16.5°C	88mv	429µs/cm	River level has risen since last visit

Weather Conditions

Overcast and showery

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH Date Sampled: 19/09/2005

Location No	Sampling Level mAOB	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	6.97	89.2%/6.87ppm	16.9°C	138mv	390us/cm	River level has risen since last visit
SP2	11.32	6.99	77.8%/7.68ppm	17.67°C	202mv	237us/cm	Water level has risen since last visit.
SP3	7.12	6.88	0.8%/0.07ppm	12.8°C	-13mv	401us/cm	Increase in flow since last visit
SP4	5.04	7.05	88.7%/6.65ppm	16.9°C	27mv	268us/cm	Increase in flow since last visit
SP5	3.07	7.10	72.4%/7.18ppm	16.2°C	110mv	378us/cm	River level has risen since last visit

Weather Conditions

Sunny and windy

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH Date Sampled: 03/05/2005

Location No	Sampling Level mAOB	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	7.28	80.4% / 7.85ppm	13.4°C	67.8mv	344µs/cm	
SP2	11.32	7.70	79.8% / 7.97ppm	11.8°C	79.4mv	590µs/cm	
SP3	7.12	6.31	12.5% / 1.2ppm	11.9°C	81.0mv	435µs/cm	
SP4	5.04	7.58	89.8% / 8.57ppm	12.6°C	17.6mv	463µs/cm	
SP5	3.07	7.29	87.3% / 8.18ppm	13.2°C	93.6mv	447µs/cm	

Weather Conditions

Warm and sunny with slight cloud cover

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I. Project No.: 7932
 Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.
 Monitoring Engineer: KH
 Date Sampled: 27/05/2005

Location No	Sampling Level mAOB	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	7.17	76.6% / 7.73ppm	15.6°C	145.1mv	390µs/cm	River level has dropped since last visit
SP2	11.32	7.04	51.5% / 5.47ppm	14.2°C	206.7mv	594µs/cm	Water level has dropped since last visit.
SP3	7.12	6.94	0.0% / 0.0ppm	14.0°C	-253.8mv	416µs/cm	No noticeable change on flow
SP4	5.04	6.93	64.8% / 6.40ppm	15.3°C	-1.1mv	442µs/cm	No noticeable change on flow
SP5	3.07	7.11	64.2% / 6.28ppm	16.2°C	896.1mv	596µs/cm	River level has dropped since last visit

Weather Conditions

Dry, sunny and very hot

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

QUANTUM (GREAT BRITAIN) LTD
LAND GAS AND GROUNDWATER MONITORING RESULTS



Project Name: PEMBERTON DEVELOPMENT SECOND G.I Project No.: 7932 Date Sampled: 31/03/2005

Instruments Used: Dissolved Oxygen, Redox Potential, Electrical Conductivity.

Monitoring Engineer: KH

Location No	Sampling Level mAOB	pH Value	Dissolved Oxygen Content	Temperature	Redox Potential	Electrical Conductivity	Remarks
SP1	3.00	6.84	813.5% / 82.7ppm	9.7 °C	68.4mv	620 µs/cm	
SP2	11.32	7.27	232.8% / 22.9ppm	12.7 °C	67.4mv	713 µs/cm	
SP3	7.12	6.45	3.3% / 0.28ppm	11.8 °C	67.6mv	548 µs/cm	
SP4	5.04	7.15	114.8% / 13.4ppm	11.6 °C	67.6mv	636 µs/cm	
SP5	3.07	6.92	846.5% / 85.5ppm	10.4 °C	68.5mv	555 µs/cm	

Weather Conditions

Predominantly dry with slight cloud cover and occasional sunny spells

Calibration
 All meters calibrated on site to suppliers guidelines prior to water testing

		TP204	TP213	TP215	TP222	SP1	SP2	SP3	SP4	SP5
	Units	20/05/2005	20/05/2005	20/05/2005	20/05/2005	20/05/2005	20/05/2005	20/05/2005	20/05/2005	20/05/2005
aluminium	mg/l					0.03	0.04	0.02	0.02	0.03
Arsenic	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium	mg/l	0.04	0.15	0.13	0.12					
Beryllium	mg/l	<0.01	<0.01	<0.01	<0.01					
boron (soluble)	mg/l	<0.05	0.17	0.23	0.24					
Cadmium	ug/l	<2	<2	<2	<2	<2	<2	<2	<2	<2
Chromium	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10
ferrous iron fixed with HCL	mg/l					1.15	0.87	7.64	4.6	1.25
Copper	ug/l	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	mg/l					0.68	<0.01	<0.01	0.17	0.44
Lead	ug/l	<50	<50	<50	<50	<50	<50	<50	<50	<50
Magnesium	mg/l					9.4	11	20	12	12
Manganese	mg/l					<0.01	0.07	1.3	0.24	0.09
Mercury	ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	ug/l	<20	22	<20	<20	<20	<20	<20	<20	<20
Potassium	mg/l					6.1	4.5	5	4.1	6.8
Selenium	ug/l	<2.0	<2.0	<2.0	<2.0					
sodium	mg/l					16	28	19	24	17
sulphur	mg/l	11	69	58	71					
vanadium	mg/l	<0.01	<0.01	<0.01	<0.01					
zinc	ug/l	310	270	100	90	12	<10	<10	<10	<10
cyanide (Complex)	mg/l	<0.05	<0.05	<0.05	<0.05					
cyanide (free)	mg/l	<0.05	<0.05	<0.05	<0.05					
Cyanide (total)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.65	0.57	0.05
Sulphate as SO4	mg/l	<24	130	100	110					
nitrate as N	mg/l	<0.5	<0.5	0.67	8					
nitrate as No3	mg/l	<2	<2	3	35					
Sulphide as S	mg/l	<0.01	<0.01	<0.01	<0.01					
pH	pH units	6.9	6.8	6.9	7	7.5	7.9	6.8	8.2	8
Alkalinity as CaCO3	mg/l					74	180	150	170	94
Ammonia as N	mg/l					0.13	<0.1	<0.1	<0.1	<0.1
Chloride as CL-	mg/l					24	33	21	29	24
EC @ 20C	uS/cm					340	520	370	400	340
suspended Solids	mg/l					<2	7	34	53	8

		SP1	SP2	SP3	SP4	SP5	SP1	SP2	SP3	SP4	SP5
	Units	04/04/2005	04/04/2005	04/04/2005	04/04/2005	04/04/2005	31/05/2005	31/05/2005	31/05/2005	31/05/2005	31/05/2005
aluminium	mg/l	0.13	0.04	0.12	0.04	0.03	0.1	0.01	<0.01	0.03	<0.01
Arsenic	ug/l	<10	<10	<10	<10	<10					
Barium	mg/l										
Beryllium	mg/l										
boron (soluble)	mg/l										
Cadmium	ug/l	<2	<2	<2	<2	<2					
Chromium	ug/l	<10	<10	<10	<10	<10					
ferrous iron fixed with HCL	mg/l	<0.5	<0.5	<0.5	<0.5	1.23	1.33	<0.5	7.41	1.3	1.19
Copper	ug/l	12	<10	<10	<10	<10					
Iron	mg/l	4.1	0.35	21	18	3.5	5.3	0.52	2.2	2.5	4.7
Lead	ug/l	<50	<50	<50	<50	<50					
Magnesium	mg/l	9.4	11	22	15	12	12	12	21	18	17
Manganese	mg/l	0.25	<0.01	1.3	0.43	<0.01	0.43	0.01	1.3	0.46	0.02
Mercury	ug/l	<1	<1	<1	<1	<1					
Nickel	ug/l	<20	<20	28	<20	<20					
Potassium	mg/l	5.6	4.2	6.3	4.4	6.9					
Selenium	ug/l										
sodium	mg/l	14	31	17	20	16					
sulphur	mg/l										
vanadium	mg/l										
zinc	ug/l	66	<10	170	42	<10	180	35	28	110	47
cyanide (Complex)	mg/l										
cyanide (free)	mg/l										
Cyanide (total)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05					
Sulphate as SO4	mg/l						0.04	0.04	0.03	0.02	0.04
nitrate as N	mg/l										
nitrate as No3	mg/l						<0.01	<0.01	<0.01	<0.01	<0.01
Sulphide as S	mg/l						<0.01	<0.01	<0.01	<0.01	<0.01
pH	pH units	3.1	7.6	3	6.1	7.1	<2	8	6.9	<2.0	7.6
Alkalinity as CaCO3	mg/l	<10	260	<10	47	140					
Ammonia as N	mg/l	0.29	0.15	0.21	0.23	0.18	<0.1	<0.1	<0.1	<0.1	0.79
Chloride as CL-	mg/l	130	29	200	130	24	23	28	23	24	25
EC @ 20C	uS/cm	650	520	800	500	410	5800	510	340	6200	470
suspended Solids	mg/l	27	29	33	100	69	11	14	17	5	58

Table 3
Mott MacDonald Groundwater Results

TROSTRE LANDFILL SITE, LLANELLI

SITE INVESTIGATION REPORT

AUGUST 2010

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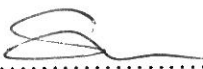
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TROSTRE LANDFILL SITE, LLANELLI

SITE INVESTIGATION REPORT

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1.0 INTRODUCTION

Previous investigations at a former inert landfill site in Trostre, Llanelli; *Land off Trostre Works Link Road*, NGR: 252799 199700, owned by Carmarthenshire County Council (CCC), conducted by Mott MacDonald in 2005 indicated elevated levels of the following determinands:

- barium, naphthalene, indeno[1,2,3-cd]pyrene and benzo[a]pyrene in soil samples
- cyanide, barium, selenium and antimony in groundwater samples

The levels of these determinands exceed Soil Guideline Values (SGV's), Generic Assessment Criteria (GAC's) and Environmental Quality Standards (EQS's) listed in Tables 2 and 3.

Monthly gas monitoring between May 2005 and October 2005 indicated consistently elevated levels of carbon dioxide (CO₂) and methane (CH₄).

A site investigation was commissioned by Carmarthenshire County Council (CCC) and conducted by ExCAL Limited at the former inert landfill site on 11 and 25 to 26 August 2010 to establish the nature of the waste deposited and provide a point of comparison for continued monitoring.

The site location is shown in Drawing 44-05-01.D02.

2.0 SITE DETAILS

2.1 Site Description

A description of the site has been generated from a review of the existing information (Preliminary Risk Assessment (PRA) (October 2009).

The site is surrounded by commercial and industrial land and is bisected by access roads and a roundabout. It is bounded to the south and west by mature trees and shrubs and to the north by shrubs and tall grasses. The access roads predominantly cover the central western portion of the site. The area of the site to the west of the roads is elevated above the remainder of the site and comprises tall grasses and shrubs. The area east of the roads is surfaced with crushed aggregate and bunded with soil.

The nearest surface water is contained within a part culverted drainage trench, which runs parallel to the northern boundary of the site, passing beneath the roads and elevated ground to meet the River Dafen to the west.

Trostre Tin Plate Works exists approximately 100m to the south of the site and the A484 road passes northwest to southeast adjacent to the north-eastern boundary of the site.

Information supplied by the client on the contamination status of the site states that material obtained on-site and used for surface re-profiling is within the lower threshold concentration limits quoted in *Guidance for the disposal of contaminated soils*. This is evidenced in the Environment Agency letter dated 24 June 2002 (reference DJ/CL/SITE/Trostre).

The site licence was issued on 2 March 1994 and the site ceased to accept waste on the 26 February 2000.

2.2 Site History

Analysis of the available historical maps provides a basis for the assessment of potential historic contamination through associated land-use. A summary of the history of the site is provided in Table 1 below.

Table 1 – Significant features, changes and developments on-site and in surrounding areas

Dates	Scale	Significant features, changes and developments	
		On site	Surrounding areas
1878 – 1901	1:1,250 & 1:10,560	Undeveloped farmland with two water courses; one running southwest across the site to the River Dafen and another running through the centre of the site to a small pond on the southern site boundary.	Residential dwellings surround the site to the northeast, east, south and southwest – <i>Forest Villa</i> is adjacent to the eastern boundary of the site and <i>Maes ar Ddafen Fach</i> is 50m south. River Dafen bounds the site to the west. Access track west of the site. Surface water (pond) 100m south.
1901 – 1907	1:1,250 & 1:10,560	No change.	Coal shaft 5m south and an air shaft 60m southeast.
1907 – 1916	1:1,250 & 1:10,560	No change.	Coal shaft mapped as <i>Old Shaft (Coal)</i> indicating that it is now disused. 3no. additional buildings adjacent to south.
1916 – 1953	1:1,250 & 1:10,560	No change.	Cefncaeau residential development 200m northeast. Works and electricity sub-station 110m south. Buildings adjacent to southeast.
1953 – 1969	1:1,250 & 1:2,500	No change.	Buildings to southeast replaced by tennis courts, bowling green and pavilion. Works 110m south developed with additional buildings.
1969 – 1994	1:1,250 & 1:10,000	No change.	Construction of A484 and access roads to north. Further development at Works 110m south. Garage and buildings 150m northwest.
1994 – 2000	N/A	Site used as an inert waste landfill (Licence No. LLN/WD/007)	Major development north and west including retail park, sports stadium (<i>Parc Y Scarlets</i>) and other commercial properties.
2000 – 2011	1:1,250 & 1:10,000	Development of access roads and roundabout. Area east of access roads used as a car park. Concrete lined drainage ditch and watercourse running through centre of site redirected to join watercourse running southwest across site into River Dafen.	

2.2.1 Summary

The site remained undeveloped until 1994 when the land was used as an inert waste landfill. The landfill ceased to accept waste in 2000 and was subsequently used for infrastructure to surrounding developments. Notable developments in the surrounding areas include the presence of a coal shaft 5m south (1901 – 1907) and the Works 110m south (1916 – present) of the site boundary. None of the historical uses of the site should cause site to become contaminated by the determinants found in the Mott MacDonald report 2005.

3.0 ENVIRONMENTAL SETTING

3.1 Geology

GroundSure Reports did not identify any Made Ground in the area. The Mott MacDonald ground investigation (2005), however, confirmed Made Ground in all exploratory holes to a maximum proven depth of 3.00m below ground level (bgl). Typically, Made Ground comprised brick, concrete, ceramics, timber, metal, glass, coal, slag and coal tar.

The superficial geology of the western half of the site is Alluvium (Quaternary age) comprising clay, silt, sand and gravel. The superficial geology of the eastern half of the site is Devensian Till (Quaternary age) comprising a mixture (diamicton) of glacially derived materials. Silty clay was encountered at depths between 1.40m bgl and a maximum proven depth of 6.50m bgl during Mott MacDonald's ground investigation (2005).

The underlying bedrock is the Swansea Member (Carboniferous age), which is described in the British Geological Survey (BGS) Lexicon of Named Rock Units as comprising green-grey lithic arenites ("Pennant Sandstones") with thin mudstone/siltstone and seatearth interbeds and mainly thin coals.

Bedrock was encountered during the ground investigation undertaken by Mott MacDonald (2005) and proven from 6.50m bgl to a maximum depth of 50.00m bgl. Sandstone, mudstone and coal were encountered at various depths.

3.2 Hydrogeology

The Environment Agency (EA) website shows that the site is not located in a groundwater Source Protection Zone (SPZ).

The superficial deposits (Alluvium and Devensian Till) are shown by the EA website to be a Secondary (undifferentiated) aquifer. The bedrock (Swansea Member) is shown to be a Secondary 'A' aquifer.

A Secondary 'A' aquifer is defined as containing permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

A Secondary (undifferentiated) aquifer is assigned in cases where it has not been possible to attribute either category 'A' or 'B' to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Catchment areas for source protection zones are located approximately 8km southwest of the site. There is no known groundwater abstraction located within 1km of the site.

3.3 Hydrology

The nearest surface water is an unnamed tributary of the Afon Dafen (River Dafen) crossing the site from northeast to southwest and joining the Afon Dafen immediately adjacent to the western boundary of the site. The source of the tributary is located approximately 100m north of the site and is culverted beneath recently constructed access roads and a roundabout.

The site is within 250m of a Zone 2 and Zone 3 floodplain. There is a groundwater flooding susceptibility within 50m of the site and the BGS confidence rating for this susceptibility area is moderately low.

3.4 Designated Environmentally Sensitive Sites

There are no environmentally sensitive sites within 500m of the site.

4.0 SITE INVESTIGATION

4.1 Introduction

The site investigation comprised 6no. trial pits completed on 11th August 2010 and 4no. cable percussion boreholes completed between 25th and 26th August 2010.

4.2 Sampling Strategy

Sample locations were chosen based on the PRA (October 2009) to assess the following key contaminants of concern: -

- Metals and Metalloids (including their compounds)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Total Petroleum Hydrocarbons (TPH)
- BTEX (Benzene, Toluene, Ethylbenzene, Xylene)
- Phenols
- Cyanide (Free)
- Total Organic Content (TOC)
- Sulphur
- Sulphide
- pH
- Asbestos
- Methane (CH₄)
- Carbon Dioxide (CO₂).

Future monitoring of contaminants in groundwater and gas was facilitated through the installation of monitoring wells within the cable percussion boreholes.

4.3 Laboratory Analysis

Samples of soil and groundwater from the trial pits were analysed for the following suite of chemicals: -

- Cyanide (total)
- Sulphide
- Organic matter
- Boron (hot water soluble)
- Sulphate (2:1 water soluble) as SO₄
- Sulphate (total) by BS1377 (HCl extract)
- Arsenic
- Barium
- Beryllium
- Cadmium
- Chromium
- Copper
- Lead
- Mercury
- Nickel

- Selenium
- Vanadium
- Zinc
- Total Petroleum Hydrocarbons
- pH.

5.0 Results

The analysis results are given in Table 6 and 7 below.

The results of the soil sample analyses were compared to the values provided in Table 2. Where no guideline values are available or analysis results are below detection limits only the raw data is reported. Values exceeding SGV's / GAC's are highlighted in yellow.

5.1 Introduction

Chemical analysis of soil and water samples has been compared to available guidelines; CLEA Soil Guideline Values (SGV's), LQM/CIEH Generic Assessment Criteria (GAC) and Environmental Quality Standards (EQS's). Tables 2 and 3 summarise the list of compiled values and sources of the guidelines used for comparison.

Table 2 – SGV's and GAC's for Soil

Contaminant	SGV / GAC
Cyanide (total) (mg/kg)	3.7 ^{*4}
Sulphide (mg/kg)	-
Organic matter (%)	-
Boron (hot water soluble) (mg/kg)	-
Sulphate (2:1 water soluble) as SO ₄ (g/L)	-
Sulphate (total) by BS1377 (HCl extract) (%)	-
Arsenic (mg/kg)	32 ^{*1}
Barium (mg/kg)	230 ^{*2}
Beryllium (mg/kg)	N/A
Cadmium (mg/kg)	1.8 ^{*3}
Chromium (mg/kg)	130 ^{*1}
Copper (mg/kg)	2,300 ^{*4}
Lead (mg/kg)	450 ^{*1}
Mercury (mg/kg)	8.0 ^{*3}
Nickel (mg/kg)	130 ^{*1}
Selenium (mg/kg)	120 ^{*3}
Vanadium (mg/kg)	-
Zinc (mg/kg)	3,800 ^{*3}
TPH (mg/kg)	-
pH	-
^{*1} CLEA Soil Guideline Value (SGV) – residential ^{*2} CLEA SGV – commercial ^{*3} CLEA SGV – allotments ^{*4} LQM & CIEH. 2009. <i>The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd Ed.)</i>	

Table 3 – EQS and GAC's for Water Samples

Determinand	EQS / GAC	Determinand	EQS / GAC
pH	6.5 – 10 ^{*2}	Anthracene	0.021 mg/l ^{*5}
Biological Oxygen Demand	<5 mg/l ^{*3}	Fluoranthene	0.23 mg/l ^{*5}
Chemical Oxygen Demand	30 mg/l ^{*3}	Pyrene	0.13 mg/l ^{*5}
Electrical Conductivity	N/A	Benzo[a]anthracene	0.0038 mg/l ^{*5}
Alkalinity	None	Chrysene	0.0020 mg/l ^{*5}
Chloride	250 mg/l ^{*2}	Benzo[b]fluoranthene	0.0020 mg/l ^{*5}
Ammoniacal Nitrogen	0.5 mg NH ₄ /l ^{*2}	Benzo[k]fluoranthene	0.0008 mg/l ^{*5}
Cyanide (total)	0.05 mg/l ^{*1}	Benzo[a]pyrene	0.0038 mg/l ^{*5}
Iron (dissolved)	2,000 µg/l ^{*1}	Dibenzo[a,h]anthracene	0.0006 mg/l ^{*5}
Iron (total)	2,000 µg/l ^{*1}	Indeno[1,2,3-cd]pyrene	0.0002 mg/l ^{*5}
Sulphide	N/A	Benzo[g,h,i]perylene	0.00026 mg/l ^{*5}
Total Organic Carbon	None	PCBs as Aroclor	None
Sulphate	250 mg/l ^{*1}	Catechols	None
Antimony	5 µg/l ^{*2}	Phenol	None
Arsenic (dissolved)	10 µg/l ^{*2}	Cresols	None
Arsenic	10 µg/l ^{*2}	Xylenols	None
Barium	100 µg/l ^{*1}	Naphthols	None
Beryllium	None	Trimethyl phenols	None
Boron	1,000 µg/l ^{*2}	2-sec-Butyl-4-6-dinitrophenol	None
Cadmium	5 µg/l ^{*1}	4-Chloro-3-methylphenol	None
Chromium (dissolved)	50 µg/l ^{*1}	2-Chlorophenol	None
Chromium (total)	50 µg/l ^{*1}	2,4-Dichlorophenol	None
Copper (dissolved)	50 µg/l ^{*1}	2,6-Dichlorophenol	None
Copper	50 µg/l ^{*1}	2,4-Dimethylphenol	None
Lead (dissolved)	50 µg/l ^{*1}	2,4-Dinitrophenol	None
Lead	50 µg/l ^{*1}	2-Methyl-4-6-dinitrophenol	None
Mercury	1 µg/l ^{*2}	2-Methylphenol	None
Nickel (dissolved)	20 µg/l ^{*2}	3-Methylphenol	None
Nickel	20 µg/l ^{*2}	4-Methylphenol	None
Selenium	10 µg/l ^{*1}	2-Nitrophenol	None
Antimony (dissolved)	5 µg/l ^{*2}	4-Nitrophenol	None
Antimony	5 µg/l ^{*2}	Pentachlorophenol	None
Vanadium (dissolved)	20 µg/l ^{*4}	Phenol	None
Vanadium	20 µg/l ^{*4}	2,3,4,5-Tetrachlorophenol	None
Zinc (dissolved)	3,000 µg/l ^{*1}	2,3,4,6-Tetrachlorophenol	None

Determinand	EQS / GAC	Determinand	EQS / GAC
Zinc	3,000 µg/l ^{*1}	2,3,5,6-Tetrachlorophenol	None
TPH (Aqueous Phase)	50 µg/l ^{*1}	2,3,4-Trichlorophenol	None
PAH (total EPA 16)	None	2,3,5-Trichlorophenol	None
Naphthalene	19 mg/l ^{*5}	2,3,6-Trichlorophenol	None
Acenaphthylene	4.2 mg/l ^{*5}	2,4,5-Trichlorophenol	None
Acenaphthene	3.2 mg/l ^{*5}	2,4,6-Trichlorophenol	None
Fluorene	1.9 mg/l ^{*5}	3,4,5-Trichlorophenol	None
Phenanthrene	0.53 mg/l ^{*5}		
*1 Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996			
*2 Water Supply (Water Quality) Regulations 2000			
*3 Council Directive concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (Surface Water Directive) (Repealed)			
*4 Water Research Council (WRC). 1984. <i>Determination of pollutants in effluents: Proposed environmental quality standards for vanadium in water and associated materials.</i>			
*5 LQM & CIEH. 2009. <i>The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment</i> (2 nd Ed.)			

5.2 Ground Conditions

Made Ground typically comprising brick, coal ash, clinker, plastic, ceramics and concrete was encountered in all exploratory holes from ground level to a maximum proven depth of 8.90m bgl.

Superficial deposits comprising clay, silt, sand and gravel, but predominantly silty clay were encountered in all exploratory holes from a minimum depth of 2.00m bgl to a maximum proven depth of 15.00m bgl.

No bedrock was encountered during the site investigation.

Groundwater was encountered in BH1 between 12.20m and 12.30m bgl and in TP2 at 3.50m bgl.

Olfactory indications of contamination were noted in TP1 within Made Ground.

Table 4– Analysis results for soil samples.

Soil - 11 August 2010													
Contaminant	SGV / GAC	TP1 1.50 m	TP1 3.50 m	TP2 1.50 m	TP2 3.50 m	TP3 0.50 m	TP3 2.50 m	TP4 1.50 m	TP4 2.50 m	TP5 1.50 m	TP5 2.50 m	TP6 0.50 m	TP6 3.50 m
Cyanide (total) (mg/kg)	3.7 ^{*4}	6.1	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphide (mg/kg)	-	6.6	12	4.2	9.8	11	9.7	10	14	9.6	4.9	7.6	3.4
Organic matter (%)	-	21	14	11	16	24	14	10	13	8.8	1.6	8.1	9.5
Boron (mg/kg)	-	2.5	4.7	0.8	0.9	0.9	1.5	0.7	1.2	1.2	0.6	0.5	0.7
Sulphate (2:1 water soluble) (g/L)	-	0.37	0.20	0.06	0.10	0.22	0.83	0.59	0.22	0.40	0.01	0.09	0.02
Sulphate (total) (HCl extract) (%)	-	0.11	0.03	0.04	0.05	0.09	0.21	0.14	0.09	0.12	0.02	0.07	0.07
Arsenic (mg/kg)	32 ^{*1}	31	28	24	17	<u>34</u>	<u>35</u>	24	30	23	10	10	<u>34</u>
Barium (mg/kg)	230 ^{*2}	190	<u>260</u>	140	120	<u>440</u>	<u>300</u>	<u>250</u>	210	140	40	110	81
Beryllium (mg/kg)	N/A	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium (mg/kg)	1.8 ^{*3}	0.22	1.8	0.19	0.20	0.54	0.30	0.14	0.57	0.30	0.10	0.25	0.37
Chromium (mg/kg)	130 ^{*1}	14	41	19	18	30	22	15	27	45	21	13	22
Copper (mg/kg)	2,300 ^{*4}	84	110	75	58	180	190	99	84	38	17	40	60
Lead (mg/kg)	450 ^{*1}	200	180	98	90	340	<u>1200</u>	140	170	79	17	56	70
Mercury (mg/kg)	8.0 ^{*3}	0.34	0.41	0.16	0.13	0.61	0.75	0.40	0.23	0.19	0.10	0.10	0.10
Nickel (mg/kg)	130 ^{*1}	25	33	28	21	42	26	18	31	17	20	18	11
Selenium (mg/kg)	120 ^{*3}	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.36	<0.2	<0.2
Vanadium (mg/kg)	-	18	41	19	15	28	26	14	28	52	21	9.2	29

Soil - 11 August 2010

Contaminant	SGV / GAC	TP1 1.50 m	TP1 3.50 m	TP2 1.50 m	TP2 3.50 m	TP3 0.50 m	TP3 2.50 m	TP4 1.50 m	TP4 2.50 m	TP5 1.50 m	TP5 2.50 m	TP6 0.50 m	TP6 3.50 m
Zinc (mg/kg)	3,800 ^{*3}	140	250	140	120	290	270	180	320	120	37	110	80
TPH (mg/kg)	-	290	430	200	190	210	170	270	130	590	< 10	73	< 10
pH	-	8.3	8.2	8.1	8.2	8.0	9.4	7.8	8.0	8.2	6.8	7.8	6.8

All measurements in metres represent metres below ground level.

*1 CLEA Soil Guideline Value (SGV) – residential

*2 CLEA SGV – commercial

*3 CLEA SGV – allotments

*4 LQM & CIEH. 2009. *The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment* (2nd Ed.)

The Mean Value Tests indicate that the US₉₅ value for arsenic is 28.23 mg/kg, lead is 220.30 mg/kg and for barium is 244.67 mg/kg, and therefore the site is below the SGV for arsenic and lead and above the SGV for barium.

Groundwater was sampled within TP2 and results of the analyses have been compared to EQS / GAC (see Table 3) as presented in Table 7.

Table 5– Analysis results for ground water samples.

Water		11 August 2010
Contaminant	EQS / GAC	TP2 3.50m bgl
Cyanide (total) (mg/l)	0.05 ^{*1}	< 0.05
Sulphide (mg/l)	None	<0.050
Total Organic Carbon (mg/l)	N/A	34
Sulphate (mg/l)	250 ^{*1}	12
Arsenic (µg/l)	10 ^{*2}	1.5
Barium (µg/l)	100 ^{*1}	180
Beryllium (mg/l)	N/A	<1
Boron (µg/l)	1000 ^{*2}	260
Cadmium (µg/l)	5 ^{*1}	<0.08
Chromium (total) (µg/l)	50 ^{*1}	<1.0
Copper (µg/l)	50 ^{*1}	<1.0
Lead (µg/l)	50 ^{*1}	<1.0
Mercury (µg/l)	1 ^{*2}	<0.50
Nickel (µg/l)	20 ^{*2}	<1.0
Selenium (µg/l)	10 ^{*1}	<1.0
Vanadium (µg/l)	None	<1.0
Zinc (µg/l)	3000 ^{*1}	46
Total Petroleum Hydrocarbons (TPH) (µg/l)	50 ^{*1}	<10

pH	6.5 – 10 ^{*2}	7.1
*1 Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996		
*2 Water Supply (Water Quality) Regulations 2000		

6.0 CONCLUSIONS AND RECOMMENDATIONS

Soil samples taken during the site investigation on 11th August 2010 indicated elevated levels of arsenic, barium and lead that pose a potential risk to human health.

The groundwater sample taken during the site investigation on 11th August 2010 indicated elevated levels of barium that poses a risk to human health.

It is recommended that further samples are obtained for analysis due to elevated levels indicated above.

7.0 REFERENCES

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