



# Gas and Groundwater Monitoring Results

Project Number:		Greyriggs, Falkirk															
Site:		19.2.2013															
Date:		ND															
Readings taken by:		Weather Conditions: Dry, bright															
		Ground Conditions (dry/wet): Damp															
		Air Temperature (°C): 4															
		Atmospheric Pressure (mB) (start): 994															
		Atmospheric Pressure (mB) (finish): 994															
		O <sub>2</sub> (%): 21.2															
		CO <sub>2</sub> (%): 0															
		CH <sub>4</sub> (%): 0															
		N <sub>2</sub> (%): 0															
Background Data																	
Borehole No.	Time (hh:mm)	O <sub>2</sub> (%)		CO <sub>2</sub> (%)		CH <sub>4</sub> (%)		H <sub>2</sub> S (%)		CO (ppm)		Flow (l/hr)		Groundwater		Sampling	
		P <sup>1</sup>	SS <sup>2</sup>	P <sup>1</sup>	SS <sup>2</sup>	P <sup>1</sup>	SS <sup>2</sup>	P <sup>1</sup>	SS <sup>2</sup>	P <sup>1</sup>	SS <sup>2</sup>	LEL		Wd <sup>3</sup> (mbgl)	DoW <sup>4</sup> (m)	P <sup>5</sup>	S <sup>6</sup>
COMP 1		21.6		0.0		0.0		0.0					0	0.10	2.75		
COMP 3		21.4		0.0		0.0		0.0					0	0.10	2.17		
Remarks																	
Borehole Damage Record/Installation Record		Key: 1 - Peak 2 - Steady state 3 - Groundwater depth 4 - Depth of well 5 - Purged well volumes 6 - Recharge (yes/no) 7 - Sampled (yes/no)															
Borehole Condition Statement		We confirm that the boreholes were left sealed correctly by Mason Evans personnel in accordance with good working practices on the above date.															
Gas Monitor Model:		Serial No: 1899 Recalibration Due: 5 <sup>th</sup> Sept 2013															
LMSXi																	



**mason evans**  
geo-environmental consultants

## Gas and Groundwater Monitoring Results

<b>Project Number:</b> G2012/356																							
<b>Site:</b> Greviggs, Falkirk																							
<b>Date:</b> 11.03.2013																							
<b>Readings taken by:</b> MF																							
<b>Background Data</b>	<b>Weather Conditions:</b> Cold, snow, strong wind.																						
	<b>Ground Conditions (dry/wet):</b> Frozen																						
	<b>Air Temperature (°C):</b> 0																						
	<b>Atmospheric Pressure (mB) (start):</b> 994																						
	<b>Atmospheric Pressure (mB) (finish):</b> 994																						
	<b>O<sub>2</sub> (%):</b> 21.0																						
	<b>CO<sub>2</sub> (%):</b> 0.0																						
<b>CH<sub>4</sub> (%):</b> 0.0																							
<b>N<sub>2</sub> (%):</b> -																							
<b>Borehole No.</b>	<b>Gas</b>										<b>Groundwater</b>		<b>Sampling</b>										
	<b>O<sub>2</sub> (%)</b>		<b>CO<sub>2</sub> (%)</b>		<b>CH<sub>4</sub> (%)</b>		<b>H<sub>2</sub>S (%)</b>		<b>CO (ppm)</b>		<b>Flow (l/hr)</b>		<b>Wd<sup>1</sup> (mbgl)</b>		<b>DoW<sup>4</sup> (m)</b>		<b>P<sup>5</sup></b>		<b>R<sup>6</sup></b>		<b>S<sup>7</sup></b>		
<b>P<sup>1</sup></b>		<b>SS<sup>2</sup></b>		<b>P<sup>1</sup></b>		<b>SS<sup>2</sup></b>		<b>P<sup>1</sup></b>		<b>SS<sup>2</sup></b>		<b>LEL</b>		<b>0.20</b>		<b>2.75</b>		<b>1.5</b>		<b>No</b>		<b>No</b>	
<b>COMP 1</b>		<b>-</b>		<b>20.3</b>		<b>-</b>		<b>0.0</b>		<b>-</b>		<b>-</b>		<b>-</b>		<b>0.10</b>		<b>2.17</b>		<b>0</b>		<b>-</b>	
<b>COMP 3</b>		<b>-</b>		<b>20.7</b>		<b>-</b>		<b>0.0</b>		<b>-</b>		<b>-</b>		<b>-</b>		<b>-</b>		<b>-</b>		<b>-</b>		<b>-</b>	
<b>Remarks</b>		Comp 1: Remove 7.10L next time before sampling. Comp3: Installation too narrow to remove water with bailer.																					
<b>Borehole Damage Record/Installation Record</b>		Boreholes OK.																					
<b>Borehole Condition Statement</b>		We confirm that the boreholes were left sealed correctly by Mason Evans personnel in accordance with good working practices on the above date.																					
<b>Gas Monitor Model:</b>		<b>Serial No:</b> 10309										<b>Recalibration Due:</b> 30 <sup>th</sup> October 2013											
GFM 400																							

Key:

- 1 - Peak
- 2 - Steady state
- 3 - Groundwater depth
- 4 - Depth of well

- 5 - Purged well volumes
- 6 - Recharge (yes/no)
- 7 - Sampled (yes/no)

<b>Project Number:</b>		G2012/356															
<b>Site:</b>		Greyriggs, Falkirk															
<b>Date:</b>		19.03.2013															
<b>Readings taken by:</b>		MF															
<b>Background Data</b>		<b>Weather Conditions:</b>															
		Ground Conditions (dry/wet):															
		Air Temperature (°C)															
		Atmospheric Pressure (mB) (start):															
		Atmospheric Pressure (mB) (finish):															
		O <sub>2</sub> (%)															
		CO <sub>2</sub> (%)															
		CH <sub>4</sub> (%)															
		N <sub>2</sub> (%)															
<b>Borehole No.</b>	<b>Time (hh:mm)</b>	<b>Gas</b>										<b>Groundwater</b>		<b>Sampling</b>			
		O <sub>2</sub> (%)	CO <sub>2</sub> (%)	CH <sub>4</sub> (%)	H <sub>2</sub> S (%)	SS <sup>1</sup>	P <sup>1</sup>	SS <sup>2</sup>	P <sup>2</sup>	SS <sup>3</sup>	P <sup>3</sup>	Wd <sup>1</sup> (mbgl)	DoW <sup>4</sup> (m)	P <sup>5</sup>	R <sup>6</sup>	S <sup>7</sup>	
COMP 1		-	21.1	0.1	0.0	-	0.0	-	-	-	-	0.25	2.75	1.5	No	No	
COMP 3		-	21.4	-	0.0	-	0.0	-	-	-	-	0.05	2.17	0	-	No	
<b>Remarks</b>		Comp 1: Remove 5.10L next time before sampling. Comp3: Installation too narrow to remove water with bailer.															
<b>Borehole Damage Record/Installation Record</b>		Boreholes OK.															
<b>Borehole Condition Statement</b>		We confirm that the boreholes were left sealed correctly by Mason Evans personnel in accordance with good working practices on the above date.															
<b>Gas Monitor Model:</b>		<b>Serial No:</b>										<b>Recalibration Due:</b>					
GFM 400		10309										30 <sup>th</sup> October 2013					

**Key:**  
1 - Peak  
2 - Steady state  
3 - Groundwater depth  
4 - Depth of well  
5 - Purged well volumes  
6 - Recharge (yes/no)  
7 - Sampled (yes/no)





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## Gas and Groundwater Monitoring Results

<b>Project Number:</b> G2012/356											
<b>Site:</b> Greyriggs, Falkirk											
<b>Date:</b> 28.03.2013											
<b>Readings taken by:</b> HM											
<b>Weather Conditions:</b> Sunny, very cold											
<b>Ground Conditions (dry/wet):</b> Snow/ice											
<b>Air Temperature (°C):</b> 0											
<b>Atmospheric Pressure (mB) (start):</b> 989											
<b>Atmospheric Pressure (mB) (finish):</b> 987											
<b>O<sub>2</sub> (%):</b> 21.5											
<b>CO<sub>2</sub> (%):</b> 0.0											
<b>CH<sub>4</sub> (%):</b> 0.0											
<b>N<sub>2</sub> (%):</b> -											
<b>Background Data</b>											
<b>Borehole No.</b>	<b>Time (hh:mm)</b>										
COMP 1											
COMP 3											
<b>Remarks</b>		Comp1: Ready to sample next time. Comp3: Installation too narrow to remove water with bailer.									
<b>Borehole Damage Record/ Installation Record</b>		Boreholes OK.									
<b>Borehole Condition Statement</b>		We confirm that the boreholes were left sealed correctly by Mason Evans personnel in accordance with good working practices on the above date.									
<b>Gas Monitor Model:</b>		<b>Serial No:</b> 10309									
<b>Recalibration Due:</b>		30 <sup>th</sup> October 2013									

Key:  
1 - Peak  
2 - Steady state  
3 - Groundwater depth  
4 - Depth of well  
5 - Purged well volumes  
6 - Recharge (yes/no)  
7 - Sampled (yes/no)



Gas and Groundwater Monitoring Results

Project Number: G2012/356																									
Site: Greyriggs, Falkirk																									
Date: 10.04.2013																									
Readings taken by: HM																									
Weather Conditions: Overcast, rainy, cold																									
Ground Conditions (dry/wet): Wet																									
Air Temperature (°C): 5																									
Atmospheric Pressure (mB) (start): 1006																									
Atmospheric Pressure (mB) (finish): 1006																									
O <sub>2</sub> (%): 21.5																									
CO <sub>2</sub> (%): 0.0																									
CH <sub>4</sub> (%): 0.0																									
N <sub>2</sub> (%): -																									
Background Data																									
	Time (hh:mm)		Gas						Groundwater				Sampling												
			O <sub>2</sub> (%)		CO <sub>2</sub> (%)		CH <sub>4</sub> (%)		H <sub>2</sub> S (%)		CO (ppm)		Flow (l/hr)		Wd <sup>3</sup> (mBgl)		Dw <sup>4</sup> (m)		P <sup>5</sup>		R <sup>6</sup>		S <sup>7</sup>		
			P <sup>1</sup>		SS <sup>2</sup>		P <sup>1</sup>		SS <sup>2</sup>		P <sup>1</sup>		SS <sup>2</sup>		P <sup>1</sup>		SS <sup>2</sup>		P <sup>1</sup>		SS <sup>2</sup>		P <sup>1</sup>		SS <sup>2</sup>
COMP 1	13:45 to	-	21.3	-	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	0.80	2.60	1.5	no	-	-	-	-	Yes	
COMP 3	14:15	-	21.7	-	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	0.90	2.30	0	-	-	-	-	-	-	
Remarks		Comp3: Installation too narrow to remove water with bailer.																							
Borehole Damage Record/Installation Record		Boreholes OK.																							
Borehole Condition Statement		We confirm that the boreholes were left sealed correctly by Mason Evans personnel in accordance with good working practices on the above date.																							
Gas Monitor Model:		Serial No: 1899												Recalibration Due: 3 <sup>rd</sup> September 2013											
LMSxi																									

Key:  
1 - Peak  
2 - Steady state  
3 - Groundwater depth  
4 - Depth of well  
5 - Purged well volumes  
6 - Recharge (yes/no)  
7 - Sampled (yes/no)

### 13.0 CONCLUSIONS AND RECOMMENDATIONS

#### 13.1 GENERAL

- 13.1.1 Mason Evans Partnership Limited has performed an intrusive investigation to identify ground risks that have potential to impact on future development at the site.
- 13.1.2 The ground conditions encountered during the investigation were generally consistent with the anticipated ground conditions as shown on published geological maps

#### 13.2 CHEMICAL CONTAMINATION AND GAS EMISSIONS

- 13.2.1 Based on chemical analysis and assessment to determine risks to the proposed development it is concluded no remedial measures are required with respect to chemical contamination.
- 13.2.2 Risks associated with ground gas are considered to be present and gas protection measures are recommended.

#### 13.3 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

- 13.3.1 Based on our interpretation of the ground conditions identified, it is recommended the foundations are placed at depths of approximately 1m to 2.5m below existing ground level where a bearing capacity of 75kN/m<sup>2</sup> to 100kN/m<sup>2</sup> could be achieved.

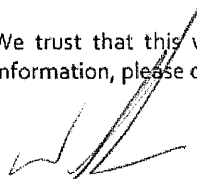
#### 13.4 MINING

- 13.4.1 It is concluded the site is subject to potential surface instability due to shallow abandoned mineworkings in the Lower Drumgray Coal. Stabilisation of the mineworkings is recommended by means of drilling and pressure grouting.

#### 13.5 CONSULTATIONS WITH PUBLIC AUTHORITIES

- 13.5.1 It should be noted that various local authority departments may become involved in the review of the site conditions, including the issues of contaminated land. While measures proposed are consistent with conventional practice we would advise that before design works are advanced to any considerable stage appropriate approvals are received from the relevant Council departments. We would be pleased to liaise with the Council's representatives in this regard.

We trust that this will meet with your current requirements. However, should you require any further information, please do not hesitate to contact us.



Neil M Thomson BSc FGS  
Director



26/07/2013

Livingstone Design

**SCOTTISH WATER**  
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Customer Connections  
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Central Support Team  
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W: [www.scottishwater.co.uk](http://www.scottishwater.co.uk)  
E: [DCT@scottishwater.co.uk](mailto:DCT@scottishwater.co.uk)

Dear Grant Livingstone

**Falkirk Greyrigg Reservoirs  
Development Enquiry Application  
Our Ref: 630087**

**Please quote our reference in all future correspondence**

Thank you for your DIA Form regarding the above proposed development. Following an assessment of our assets I can now confirm that at this present time:

**Water:** There is sufficient capacity in the Carron Valley Water Treatment Works and also the local network to service the demands from your development.

Scottish Water's current minimum level of service for water pressure is 1.0 bar or 10m head in the public main. Any property which cannot be adequately serviced using this pressure may require private pumping arrangements installed, subject to compliance with the current water byelaws.

**Wastewater:** Unfortunately there are no Waste Water Treatment Works within the vicinity of your site. Private arrangements must be sought for discharging Foul and Surface Water drainage. Please liaise with SEPA when assessing your proposals.

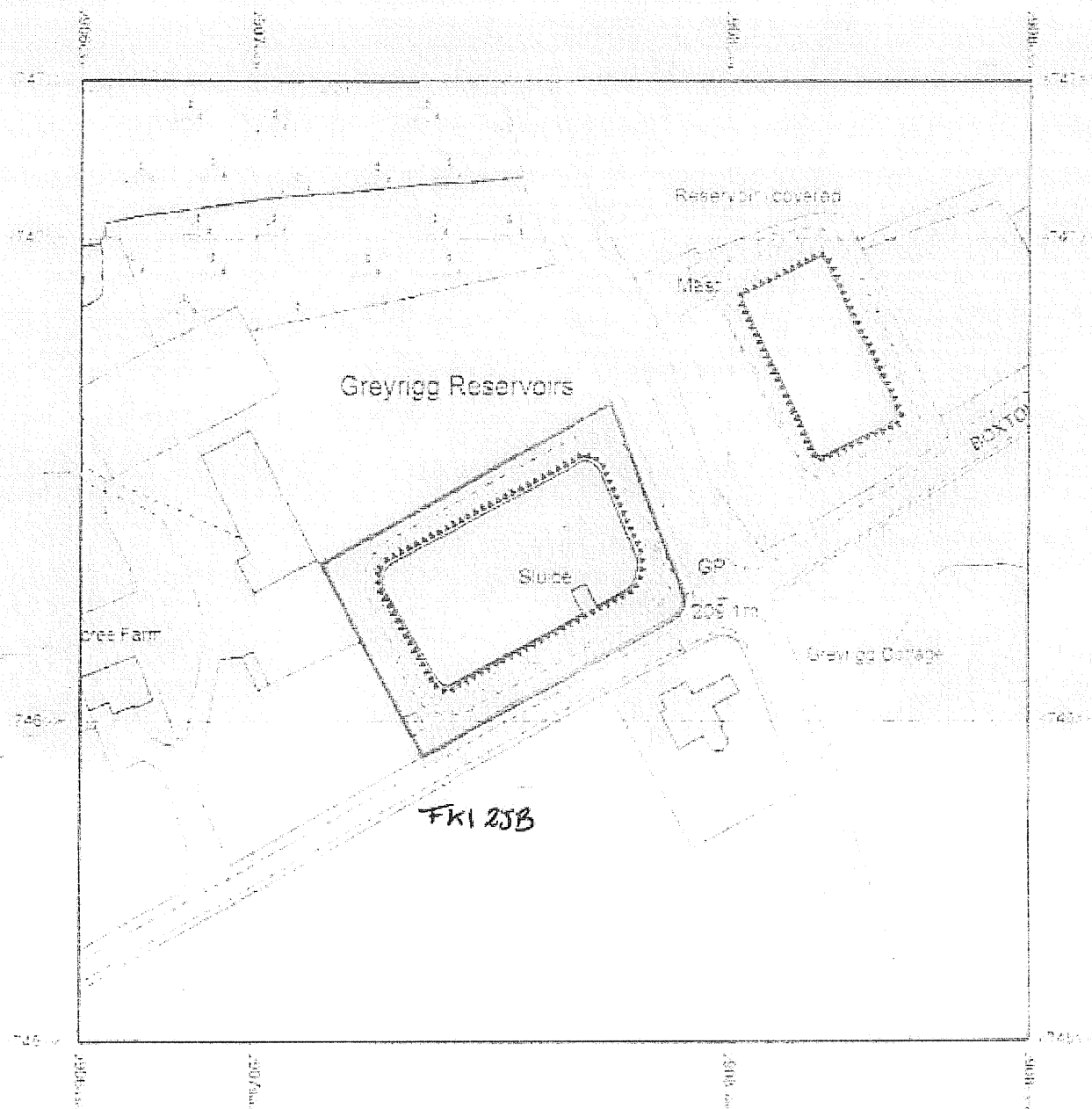
However, it is important to note that Scottish Water is unable to reserve capacity and connections to the water & wastewater networks can only be granted on a first come first served basis. For this reason we may have to review our ability to serve the development on receipt of an application to connect.

You will be required to seek technical approval for your water & wastewater infrastructure from our technical design team. The relevant application/connection forms are available on our website at [www.scottishwater.co.uk](http://www.scottishwater.co.uk). please complete them and return to the above address together with all relevant documentation. You will also find many useful guides on Scottish Water processes including a step by step guide to filling out the necessary forms.

I trust that the above is acceptable however, if you have any questions relating to the above do not hesitate to contact me at the above address.

Yours sincerely

**John Neeson**  
Customer Connections Administrator  
Tel: 0141 355 5169  
[John.Neeson@scottishwater.co.uk](mailto:John.Neeson@scottishwater.co.uk)



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FALKIRK COUNCIL  
DEVELOPMENT  
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02 NOV 2009

APPLICATION NUMBER

F/09/0790/PPP