

Our Ref J3976/17/E
31st October 2017

Environmental
Geotechnical
Specialists



Davric Construction Projects Ltd
Hainsworth Road
Silsden
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Dear Andrew

Ref: Gas Monitoring at Hainsworth Road, Silsden

Further to our report on a geo-environmental investigation (J3976/17/E) which was presented in August 2017 we have now completed the gas monitoring and present our findings.

Monitoring

Gas monitoring standpipes were installed to between 3m and 3.6m depth in boreholes WS1, WS2 and WS4, the locations of which are provided on the site plan presented as Appendix 1 of the geo-environmental report. Visits were made to the site between the 1st August and 5th October 2017 . The results of this work are tabulated below.

Table 1: Gas monitoring

Location	Date	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/h)	Barometric Pressure (mb)	Water Level (m)	Standpipe Depth (m)
WS1	01.08.17	0.0	0.3	20.5	0.0	999↑	1.10	3.4
	09.08.17	0.0	0.4	20.5	0.0	1008↑	0.70	
	22.08.17	0.0	0.8	19.9	0.0	1006↓	0.65	
	29.08.17	0.0	0.6	20.2	0.0	1002↓	0.77	
	27.09.17	0.0	0.4	20.5	0.0	1004↓	0.65	
	05.10.17	0.0	0.5	20.4	0.0	1006↓	0.35	
WS2	01.08.17	0.0	1.2	18.9	0.1	1000↑	0.95	3.0
	09.08.17	0.0	0.7	20.1	0.0	1007↑	0.60	
	22.08.17	0.0	0.8	20.1	0.0	1007↓	0.57	
	29.08.17	0.0	0.5	20.6	0.0	1003↓	0.60	
	27.09.17	0.0	1.0	20.2	0.1	1005↓	0.55	
	05.10.17	0.0	0.5	20.6	0.0	1003↓	0.60	
WS4	01.08.17	0.0	1.7	18.8	0.1	1000↑	14.20	3.6
	09.08.17	0.0	1.3	19.6	0.1	1009↑	0.50	
	22.08.17	0.0	2.7	18.3	0.1	1007↓	1.00	
	29.08.17	0.0	3.5	18.1	0.1	1003↓	1.25	
	27.09.17	0.0	2.3	18.6	0.1	1003↓	1.10	
	05.10.17	0.0	0.4	20.6	0.0	1007↓	0.63	

↑ rising pressure ↓ falling pressure → steady pressure

This work was undertaken using a Geotechnical Instruments (UK) Ltd. GA5000 (serial No G503524) which was last calibrated 10th July 2017.

Gas Concentrations

With respect to ground gas, the results of the monitoring visits indicated negligible methane, with concentrations of carbon dioxide ranging between 0.3% and 3.5%, in association with oxygen levels of between 18.1% and 20.6%. It should be appreciated that on non contaminated sites there is generally about 20% by volume of oxygen, associated with low levels of carbon dioxide. In addition, a maximum flow rate of 0.1 litres per hour was recorded and will be employed in the following calculations.

The principal driving force for initiating the movement of gas in the ground is a change in barometric pressure. The most onerous gas condition on a site is usually observed on days of low or falling barometric pressure. It has been noted that measurements undertaken solely during high pressure conditions may be of lesser value. At this site the readings undertaken to date were at atmospheric pressures of between 998mb and 1009mb.

In order to establish the gas screening value (GSV) for carbon dioxide or methane, the maximum gas concentration (expressed as a decimal) is multiplied by the borehole flow rate (l/hr). In this case 0.1% (0.001) methane was recorded along with 3.5% (0.035) carbon dioxide, in association with a maximum flow rate of 0.1 l/hr. This results in a GSV of 0 l/hr for methane and a GSV of 0.0035 l/hr for carbon dioxide.

In accordance with table 2 of BS8485: 2015, *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*, the site may be characterised as Characteristic Situation Level 1. It is therefore considered that there is a very low risk of harm to end users and site operatives and no special precautionary measures are required in accordance to Table 8.6, Typical scope of gas protection measures, of CIRIA report C665. In view of the above, it may be appreciated that the continued gas monitoring has revealed a slight increase in GSV, as levels of carbon dioxide have increased slightly during the extended monitoring. However, the site still falls within the boundaries of CS1, therefore, the risk assessment and remediation strategy provided in the geo-environmental report should be considered with the comments below.

Gas Protection Measures

In order to assess the protection measures required BS8485: 2015: *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings* has been employed. In accordance with Table 3, *Building types*, of the code, the development may be considered to conform to Type A. Therefore, on the basis of Table 4 *Gas protection score by CS and type of building*, the minimum gas protection score (points) is 0. Therefore, it is concluded that no gas protection measures are required at this site.

References

- CIRIA Report C665, *Assessing risks posed by ground gasses to building*
- British Standards Institution (2015) BS8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, B.S.I., London.

We trust that this information is of interest and should you have any other requirements do not hesitate to contact us.

For Rogers Geotechnical Services Ltd,

Yours Faithfully

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