

Your ref:

Our ref: ADJ/DJM/11276

Date: 19th April 2022

Mr. G. Rawlings
Marbeg Properties Limited

Dear Garry

Brooke Street, Cleckheaton - Ground Gas Risk Assessment Report No. 4185

The risks associated with ground gases have been considered in accordance with British Standard BS 8485:2015 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings", CIRIA report C665, "Assessing Risks Posed by Hazardous Ground Gases to Buildings" and NHBC Report No. 4 "Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present".

Following the provision of Michael D Joyce Associates LLP's report number 4185, the geological and Geoenvironmental setting has been reviewed, together with the results from six subsequent site monitoring visits.

In-situ Gas Monitoring

The in-situ gas testing was with a portable meter, which measures the methane content as its percentage volume in air. The corresponding oxygen, carbon dioxide and Volatile Organic Compounds (VOC) concentrations are also measured. No hydrogen sulphide or VOC gases were detected. Carbon dioxide ranged from 6.9% to 10.4% by volume and methane from 0% to 1.9% by volume. No flows were recorded.

Methane is the dominant constituent of landfill gas, and can form an explosive mixture in air at concentrations of between 5% and 15%. Thus 5% methane in air is known as the Lower Explosive Limit (LEL). Concentrations less than this do not normally ignite. Carbon dioxide can also be a potential problem, where it occurs in concentrations greater than 5%.

Calculated Gas Screening Value (GSV)

Due to the nominal ground gas concentrations recorded, the below Ground Gas Risk Assessment is regarded as adequate for appraising risk to the above site. The GSV is calculated on the basis of the worst case scenario in order to establish appropriate gas protection measures

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The worst-case ground gas regime identified on the site during the monitoring period was a maximum steady carbon dioxide concentration of 10.4% v/v, and methane of 1.9% v/v.

Consequently, the GSV for carbon dioxide and methane are calculated accordingly. GSV (litres of gas per hour) = 0 l/hr x 0.049% v/v = 0 l/hr for carbon dioxide, and 0 l/hr x 0.019% v/v = 0 l/h for methane. However given the slightly elevated levels of methane and carbon dioxide, British Standard BS 8485:2015 "Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings" **states that basic gas protection measures required for the new properties.**

Yours sincerely

A D Joyce

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Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 4 th February 2022		
Client Marbeg Properties Limited		Report No: 4185				
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 1009 mB stable				Air Temperature: 3°C		
Weather Cold and overcast						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	0.9	8.2	14.2	0	0	0
WS5	0	8.1	14.4	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**

Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 23 rd February 2022		
Client Marbeg Properties Limited				Report No: 4185		
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 1014 mB stable				Air Temperature: 5°C		
Weather Dry and cold						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	1.0	6.9	15.9	0	0	0
WS5	0	7.4	15.6	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**

Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 7 th March 2022		
Client Marbeg Properties Limited				Report No: 4185		
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 1030 mB falling				Air Temperature: 4°C		
Weather Cold and overcast						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	1.0	7.0	15.5	0	0	0
WS5	0	8.1	15.6	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**

Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 21 st March 2022		
Client Marbeg Properties Limited				Report No: 4185		
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 1029 mB rising				Air Temperature: 6°C		
Weather Cold and overcast						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	1.2	8.0	14.6	0	0	0
WS5	0	9.1	14.4	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**

Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 4 th April 2022		
Client Marbeg Properties Limited		Report No: 4185				
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 998 mB falling				Air Temperature: 10°C		
Weather Overcast						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	1.3	8.2	11.0	0	0	0
WS5	0	10.4	10.5	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**

Michael D Joyce Associates LLP Geotechnical and Geoenvironmental Consultants				GAS MEASUREMENTS		
				Date: 13 th April 2022		
Client Marbeg Properties Limited				Report No: 4185		
Site Brooke Street						
Location Cleckheaton						
Barometric Pressure 1011 mB rising				Air Temperature: 14°C		
Weather Dry and sunny						
Instrument Gas Data GFM436						
Borehole No.	Methane (% gas)	Carbon Dioxide (% gas)	Oxygen (% gas)	PID (ppm)	Carbon Monoxide (ppm)	Flow (l/h)
WS1	1.9	8.0	14.0	0	0	0
WS5	0	7.5	14.9	0	0	0
L.E.L. = Lower Explosive Limit, equivalent to 5% methane in air, i.e. 20% LEL is 1% gas Normal Oxygen concentration is 20.9% of air						

***NR = NOT RECORDED**