

By Email

Our ref. 23-879.01L

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27th March 2024

Dear Jeff,

Re: Proposed Extension, Ocean Road Community Association, South Shields, NE33 2DW – Hazardous Ground Gas Risk Assessment Addendum Report

This letter report is an addendum to the Ground Investigation Report (Project ref. 23-879, January 2024) undertaken for the proposed development at the above location.

Please find enclosed:

- ARC Environmental Ground Gas Monitoring Certificate

Monitoring was undertaken using Gas Data GFM 435 infra-red gas analyser with integral flow meter, and an electronic dipmeter.

Based on the findings of the intrusive investigation works, in accordance with CIRIA Report C665, November 2007, Report Edition No. 04, March 2007 and BS8485:2015+A1 2019 – Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, it is felt that an adequate risk assessment can be undertaken based on the following limiting factors:

- The development has been considered as **low sensitivity** i.e. commercial development (Tables 5.5a & 5.5b – Typical/Idealised frequency and period of monitoring, after Wilson et al, 2005).
- The risk associated with the generation potential of a source is considered as **very low** (Based on the findings of intrusive works).
- Monitoring over a **minimum** of **one month** with **four recorded** readings (Tables 5.5a & 5.5b – Typical /idealised frequency and period of monitoring after Wilson et al, 2005).
- **Negligible** flow rates have been recorded during the monitoring period (Table 8.5 – Modified Wilson & Card classification).
- A targeted and phased programme of gas monitoring has been completed, which has obtained gas monitoring readings during varying atmospheric conditions, which covers the 'worst case' scenario for ground gas emissions to occur, particularly during rapid falls in atmospheric pressure (i.e. from c.1020mb and c.1010mb), and also during low atmospheric pressure events (i.e. c.1000mb and below).

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Re: Proposed Extension, Ocean Road Community Association, South Shields, NE33 2DW – Hazardous Ground Gas Risk Assessment Addendum Report (Cont'd)

Historically, site visits to undertake gas monitoring were typically carried out at regular intervals (i.e. weekly, fortnightly, monthly, etc.), however this does not always correlate with 'worst case' scenarios for falling atmospheric conditions.

Within CIRIA C665 it is suggested that a 'worst case' scenario for ground gas emissions is more likely to occur during rapid falls in atmospheric pressure, in particular from c.1020mb and c.1010mb. In addition, it has also been suggested that low atmospheric pressures (i.e. c.1000mb and below) can give rise to greater emission potential for lighter gases, in particular methane.

The monitoring visits correlate to worst case conditions with falling atmospheric pressure trends, and atmospheric pressures close to 1000mb. As such it is felt that this programme of monitoring has adequately characterised the site. The monitoring results for all 4 no. visits undertaken can be seen attached with this report.

As can be seen from the results, no concentrations of Methane (CH₄) have been detected. Concentrations of Carbon Dioxide (CO₂) have been recorded up to a maximum level of 0.6% v/v, with slightly reduced Oxygen (O₂) concentrations (minimum 19.3% v/v). Negligible flow rates of <0.1l/hr have been recorded.

For the purposes of assessing the proposed development, the site is characterised based on the limiting borehole hazardous gas flow rate (Q_{hg}) for Methane and Carbon Dioxide, known as the Gas Screening Value (GSV), which in turn determines the level of any gas protection required, in accordance with Table 2 in BS8485 and Tables 8.5 & 8.7 in CIRIA C665.

- Methane (CH₄) – Due to the lack of Methane recorded, a GSV cannot be calculated.
- Carbon Dioxide (CO₂) - multiplying the maximum concentration recorded (taken as 0.6%) by the maximum flow rate (taken as 0.1l/hr.) which gives a GSV of 0.0006 l/hr. (calculated from 0.6% (0.006) x 0.1l/hr. maximum flow rate) for CO₂.

When considering these results, in accordance with CIRIA C665, the GSV value for CO₂ is below the assessment GSV of 0.07 l/hr (Characteristic Situation 1 – CS1), resulting in no gas protection measures being required for the proposed development.

I trust the information we have provided to you is to your satisfaction. However, if you require any further information or clarification, please do not hesitate to contact us.

Yours sincerely,



For and on behalf of Arc Environmental Ltd
Darren M'Grath MEnvSc FGS Tech IOSH
Director

Arc Environmental Ground Gas & Groundwater Monitoring Certificate



Site:

Southshields

Ref:

23-879

Visit	Date	Time	Equipment	Weather	Initials	Comments	Borehole	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
										R/F/S	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H ₂ S	CO	
1	05/12/2023	1.30pm	GFM435	OVERCAST	PR		WS01	<0.1	1010	F		0.0		0.0		0.6		19.3				0.0	0.0	0.53
							WS02	<0.1	1010	F		0.0		0.0		0.4		19.6				0.0	0.0	1.21
							CP02	<0.1	1010	F		0.0		0.0		0.6		19.3				0.0	0.0	0.95
2	03/01/2024	11.30am	GFM435	OVERCAST	PR		WS01	<0.1	982	R		0.0		0.0		0.4		19.4				0.0	0.0	0.56
							WS02	<0.1	982	R		0.0		0.0		0.6		19.9				0.0	0.0	1.63
							CP02	<0.1	982	R		0.0		0.0		0.4		19.4				0.0	0.0	0.97
3	17/01/2024	2.00pm	GFM435	CLEAR	PR		WS01	<0.1	981	F		0.0		0.0		0.5		19.6				0.0	0.0	0.64
							WS02	<0.1	980	F		0.0		0.0		0.6		20.1				0.0	0.0	1.81
							CP02	<0.1	980	F		0.0		0.0		0.5		19.6				0.0	0.0	0.98
4	29/01/24	2.30pm	GFM435	RAIN	PR		WS01	<0.1	1015	S		0.0		0.0		0.6		19.7				0.0	0.0	0.6
							WS02	<0.1	1015	S		0.0		0.0		0.4		19.8				0.0	1.0	1.8
							CP02	<0.1	1015	S		0.0		0.0		0.4		20.1				0.0	0.0	1.0
5																								
6																								

Notes:

Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.1l/hr

Monitoring order is from**Left to Right** across table

Monitoring should be for**Not Less** than 3 minutes However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes

N/A = Not applicable = Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accurate measure of the total hydrocarbons in the borehole when methane is present

Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.

PID = Photo Ionisation Detector (Calibrated to Isobutylene)