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Our ref: LTR/15677W/1CL/3/AB

27 November 2015

Mr Allan Finlay
Hartwood Estates Limited
P4 Sheffield Business Park
Europa Links
Sheffield
S9 1XU

Dear Allan

Rockingham Development, Birdwell - Ground Gas Monitoring Addendum Report

Please find enclosed the complete set of gas monitoring results for the site at Rockingham, Birdwell.

This letter report is an addendum to the Phase II Geo-Environmental Assessment (Ref: 15677/SI, dated September 2015). It is recommended that this gas monitoring addendum is read in conjunction with the Phase II Geo-Environmental Assessment.

In total, the site has been monitored on 6 occasions between August and November 2015 for methane, carbon dioxide and oxygen using a portable infra-red gas monitor. The rate of gas flow from the boreholes was also recorded using a portable flow meter and the groundwater levels were recorded using a portable dip meter.

No Methane was detected during the monitoring and carbon dioxide was recorded at a maximum concentration of 21.5% v/v. Oxygen levels varied between 0.0% and 20.1% v/v and atmospheric pressures varied between 985mb and 1017mb. Zero flow rates were detected during the monitoring which indicates a CIRIA Gas Screening Value (GSV) of <0.07l/hr for both methane and carbon dioxide.

In view of the above, CIRIA Characteristic Situation 2 is considered suitable and appropriate gas protection measures are considered necessary.

Groundwater was recorded between 1.30m and 1.99m bgl, however, this is anticipated to be perched water within the monitoring wells. Boreholes BH1 and BH4 were dry/wet at base during all monitoring visits were generally dry or wet at base. On the first and last monitoring visits BH7 was waterlogged following prolonged periods of rain.

These conclusions support the initial recommendations made in our Phase II Assessment report.

I trust that the above meets with your immediate requirements, however, should you have any queries, please do not hesitate to contact me.



Yours sincerely

A handwritten signature in blue ink, appearing to be 'Alex Bradley', with a long, sweeping underline that extends to the right.

Alex Bradley

Encl.

Gas monitoring record

3e Consulting Engineers Ltd
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Job no: 15677
Site: Rockingham, Birdwell
Date: 26/08/2015
Weather: Sunny with clouds
Pressure Trend: Rising

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	2.8	15.2	985	0.0	Dry	
BH4	0.0	11.6	3.2		0.0	DAB	
BH5	0.0	18.8	2.6		0.0	Dry	
BH7	*	*	*	*	*	*	Waterlogged to surface

DAB = Damp at Base

Date: 10/09/2015
Weather: Heavily overcast
Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	0.7	19.6	1013	0.0	Dry	
BH4	0.0	11.6	4.7		0.0	DAB	
BH5	0.0	20.9	0.7		0.0	Dry	
BH7	0.0	4.8	9.1		0.0	1.38	

Date: 25/09/2015
Weather: Clear and breezy
Pressure Trend: Rising

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	3.4	17.3	1009	0.0	Dry	
BH4	0.0	4.3	15.1		0.0	DAB	
BH5	0.0	21.2	0.8		0.0	Dry	
BH7	0.0	7.7	6.7		0.0	1.99	

Date: 05/10/2015
Weather: Raining
Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	3.2	17.0	990	0.0	Dry	
BH4	0.0	4.7	15.0		0.0	WAB	
BH5	0.0	20.9	0.7		0.0	Dry	
BH7	0.0	6.8	6.8		0.0	1.89	

WAB = Wet at base

Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	0.3	20.1	1017	0.0	Dry	
BH4	0.0	14.1	0.0		0.0	DAB	
BH5	0.0	21.5	0.3		0.0	DAB	
BH7	0.0	13.3	0.1		0.0	WAB	

WAB = Wet at base, DAB = Damp at base

Pressure Trend: Falling

BH No	Methane (%v/v)	Carbon dioxide (%v/v)	Oxygen (%v/v)	Barometric Pressure (mb)	Flow (l/hr)	Water level (m bgl)	Remarks
BH1	0.0	4.8	17.6	992	0.0	Dry	
BH4	0.0	10.6	0.4		0.0	WAB	
BH5	0.0	15.4	0.3		0.0	1.30	
BH7	*	*	*	*	*	*	Water logged at surface