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Our Ref: P9032\GAL
Date: 13th August 2021

Davidsons Developments Ltd
Wilson House
207 Leicester Road
Ilstock
Leicestershire
LE67 6HP

Attention of Jim Udale (Land Technical Manager)

Dear Jim,

Re: Gas Addendum Letter Report for Stoke Lane, Stoke Golding

The gas monitoring programme at the above site is now complete. The assessment below supersedes the information in the Phase II Site Appraisal Report (GRM/P9032/PIISAR.1, dated July 2021) and should be submitted to the regulatory bodies for approval.

The Client proposes to develop the site with low-rise (up to 2 storey) residential properties including detached and semi-detached houses, along with associated infrastructure including access roads. The proposed end use includes private gardens / soft landscaping and areas of public open space.

The desk study assessment and Phase I conceptual site model did not identify any potential sources of ground gas and therefore it was not considered necessary to undertake a full gas monitoring programme as required by BS8576:2013. The site is not in an area where radon protective measures are required.

The ground investigation did not identify any potential sources of ground gas, confirming the Phase I conceptual site model.

As the proposed land use is classed as high sensitivity (residential with gardens), five monitoring standpipes were installed in the window sample boreholes to confirm the absence of elevated ground gases and assess the groundwater situation across the site. The standpipes had response zones in the natural strata due to the absence of made ground.

To identify potential liabilities, only two gas monitoring visits were carried out on the 21st June and the 8th July 2021, to assess if there is any risk posed to the end user from potentially harmful ground gases.

A gas monitoring location plan is presented in Appendix A, with the gas monitoring results presented in Appendix B.

The post fieldwork monitoring has been designed to identify and assess the groundwater and gas regimes below the site. The recently completed gas monitoring results are summarised below:

Land Appraisal | Environmental | Geotechnical | Design | Mining | Inspections

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
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Borehole	Response Zone (m begl) / Strata	Contamination	No. of Monitoring Visits	Methane (%v/v)	Carbon Dioxide (%v/v)	Oxygen (%v/v)	Flow (l/hr)	Atmospheric Pressure Range
WS01	0.5-1.5 / NS	None	2	0.0	1.3-1.6	19.6-20.0	0.0	1006-1013
WS02	0.6-1.6 / NS	None	2	0.0	0.9-1.4	19.5-19.9	0.0	1006-1013
WS03	1.0-2.0 / NS	None	2	0.0	1.2-1.6	19.8-19.8	0.0	1006-1013
WS04	0.5-1.5 / NS	None	2	0.0	1.3-1.9	19.0-19.5	0.0	1006-1013
WS05	0.8-1.8 / NS	None	2	0.0	0.4-0.6	20.2-20.8	0.0	1006-1013

NS = Natural Strata

Ground Gas Risk Assessment

The primary guidance document to determine if gas protection measures are required is BS8485:2015+A1:2019. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Screening Value (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors including gas concentrations and flow rates.

In summary no methane has been detected, whilst carbon dioxide of up to 1.9%v/v and oxygen of between 19.0%v/v and 20.8%v/v has been recorded. It should be noted that during the monitoring visits, the response zone for the WS05 installation had been flooded on both occasions.

The flow rate during the two monitoring visits has been consistently below the monitor's lower limit of detection. Therefore, a default flow rate of 0.1l/hr has been used in the following assessment.

As the methane concentration has been consistently below the monitor's lower limit of detection, a default methane concentration of 0.1%v/v has been used in the following assessment.

Using the default flow rate of 0.1l/hr and a default methane concentration of 0.1%v/v, a Q_{hg} of 0.0001l/hr has been calculated for methane. Using the same flow rate, the maximum steady state carbon dioxide concentration of 1.9%v/v equates to a Q_{hg} of 0.0019l/hr. On this basis, the GSV for the site is determined as 0.0019l/hr.

As the maximum concentration of methane is <1%v/v, the maximum concentration of carbon dioxide is <5%, and the maximum GSV is <0.07l/hr, the site has been assessed as 'Characteristic Situation 1' or CS1 as outlined in BS8485:2015, for which gas protection measures are not required. This is in line with the sites conceptual site model.

In addition, the desk study risk assessment determined that no radon gas protection measures are required.

This assessment supersedes that contained in the Phase II Site Appraisal Report dated July 2021.

Groundwater

Damp strata or groundwater ingresses were recorded in only six of the exploratory holes; depths varied between 1.2m and 3.2m begl. Subsequent monitoring of the groundwater in the installations has recorded standing water at depths of 0.54m begl to 1.30m begl (in two installations only). The other three installations remained dry.

From the ground investigation undertaken, it is likely that excavations will be generally stable in the short term, although some side trench collapse is inevitable particularly in the medium term and in

inclement periods. Some materials such as granular soils are liable to collapse without warning. This situation is likely to be exacerbated by water ingress. Once excavations are dug, if they are left open for any length of time, water may accumulate (depending on the presence of granular deposits) and stability will be compromised. Where excavations are entirely within clay strata, groundwater ingresses are considered unlikely.

The observed groundwater conditions suggest that the use of conventional sump pumping would be adequate.

We trust this is suitable for your current requirements, should you require any further information or would like any clarification of the points raised please do not hesitate to contact us.

Yours sincerely,
For GRM Development Solutions Ltd



Robert Crossland MSc FGS CGeol
Senior Engineering Geologist

Appendices

Appendix A – Gas Monitoring Location Plan
Appendix B – Gas Monitoring Results



A P P E N D I X A

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A P P E N D I X B

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In-Situ Gas Monitoring Results

Project Name	Stoke Lane, Stoke Golding
Project Number	P9032
Client	Davidsons Developments Ltd
Date	21/06/2021
Weather	Cloudy
Atmospheric Pressure (mb)	1013
Pressure Trend	Steady
Equipment	Gas Data LMSXi
Operator	James Wardle

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS1	1.00	1.60	NS	0.00	0.00	1.30	1.30	20.00	20.00	0.00	0.00	Not Recorded	
WS2	1.00	2.00	NS	0.00	0.00	0.90	0.90	19.90	19.90	0.00	0.00	Not Recorded	
WS3	0.50	1.00	NS	0.00	0.00	1.20	1.20	19.80	19.80	0.00	0.00	Not Recorded	
WS4	0.50	1.50	NS	0.00	0.00	1.30	1.30	19.50	19.50	0.00	0.00	Not Recorded	
WS5	1.00	2.00	NS	0.00	0.00	0.40	0.40	20.20	20.20	0.00	0.00	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.55
1.30	1.98
Not Detected	0.90
Not Detected	1.46
0.54	1.79

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D.	Not Detected
N.R.	Not Recorded
PID	Photo-Ionising Detector
%	By volume

Ground Material Key

NS Natural Strata

Key

 Response Zone Flooded



In-Situ Gas Monitoring Results

Project Name	Stoke Lane, Stoke Golding
Project Number	P9032
Client	Davidsons Developments Ltd
Date	08/07/2021
Weather	Partly Sunny
Atmospheric Pressure (mb)	1006
Pressure Trend	Steady
Equipment	Gas Data LMSXi
Operator	James Wardle

Ground Gas													
Well ID	Response Zone			Methane		CO2		Oxygen		Gas Flow		PID Reading	
	mbegl			%v/v		%v/v		%v/v		l/h		ppm	
ID	Top	Base	Strata	Peak	Steady	Peak	Steady	Low	Steady	Peak	Steady	Peak	Steady
WS1	1.00	1.60	NS	0.00	0.00	1.60	1.60	19.60	19.60	0.00	0.00	Not Recorded	
WS2	1.00	2.00	NS	0.00	0.00	1.40	1.40	19.50	19.50	0.00	0.00	Not Recorded	
WS3	0.50	1.00	NS	0.00	0.00	1.60	1.60	19.80	19.80	0.00	0.00	Not Recorded	
WS4	0.50	1.50	NS	0.00	0.00	1.90	1.90	19.00	19.00	0.00	0.00	Not Recorded	
WS5	1.00	2.00	NS	0.00	0.00	0.60	0.60	20.80	20.80	0.00	0.00	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.50
1.26	2.00
Not Detected	0.90
Not Detected	1.50
0.56	1.80

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D.	Not Detected
N.R.	Not Recorded
PID	Photo-Ionising Detector
%	By volume

Ground Material Key

NS Natural Strata

Key

 Response Zone Flooded