



GRM Development Solutions Ltd
Laurus House
First Avenue
Centrum 100
Burton upon Trent
Staffordshire
DE14 2WH

Tel: 01283 551 249
Web: www.grm-uk.com

Our Ref: GRM/P9700/GAL.1

Date: 7th June 2022

Mohamed Moti
Vexford Homes
By Email Only

Dear Mohamed,

Re: 87 High Street, Barwell - Gas Addendum Letter

The gas monitoring programme at the above site is now complete. The assessment below supersedes the information in the Letter Report (Ref: GRM/P9700/Let.Rep, dated November 2021) and should be submitted to the regulatory bodies for approval.

The Phase I desk study identified a former pond in the south east corner of site and limited made ground associated with the former site use (residential housing).

The site is not in an area where radon protective measures are required.

The ground investigation identified the presence of limited made ground (maximum depth of 1.00m begl), but due to its generally limited thickness, it was not considered to be a potentially significant source of ground gas.

As the proposed end use has been classified as high sensitivity (residential with gardens), four gas/water monitoring standpipes were installed across the site in window sample boreholes (WS01 to WS04). In WS02 the response zone was targeted within the made ground to confirm potential liabilities. As the made ground was limited in thickness in WS01, WS03 and WS04, the response zones of these monitoring wells were targeted at the natural strata.

Gas monitoring has been carried out on eight occasions between from 9th November 2021 to 4th January 2022, to assess the risk posed to the end users from potentially harmful ground gases.

The post fieldwork monitoring has been designed to identify and assess the groundwater and gas regimes below the site. The results are enclosed for reference and 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
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

Borehole	Response Zone (m begl) / Strata	No. of Monitoring Visits	Methane (%v/v)	Carbon Dioxide (%v/v)	Oxygen (%v/v)	Flow (l/hr)
WS01	0.6-1.6 / NS	8	0.0	1.1 – 3.1	11.7 – 20.2	0.0
WS02	0.5-1.0 / MG	8	0.0	1.6 – 3.8	10.4 – 19.4	0.0
WS03	0.7-1.7 / NS	8	0.0	0.0 – 3.7	11.3 – 20.7	0.0
WS04	1.0-5.0 / NS	8	0.0	0.2 – 1.5	11.8 – 20.8	0.0
Notes: NS= Natural Strata. MG= Made Ground. Atmospheric Pressure: 985mb-1025mb						

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.

Methane concentrations and flow rates above the monitor's lower limits of detection were not detected during monitoring period. Therefore, in the following assessment the monitors lower limit of detection for methane (0.1% v/v) and flow rate (0.1l/hr) have been used.

Made Ground

Using the default methane concentration of 0.1%v/v and the default flow rate of 0.1l/hr a Q_{hg} of 0.0001l/hr has been calculated for methane. Using the maximum recorded steady state carbon dioxide concentration of 3.8%v/v and the default flow rate of 0.1l/hr a Q_{hg} of 0.0038l/hr has been calculated for carbon dioxide. On this basis the GSV for the site is determined as 0.0038l/hr.

Natural Strata

Using the default methane concentration of 0.1%v/v and the default flow rate of 0.1l/hr a Q_{hg} of 0.0001l/hr has been calculated for methane. Using the maximum recorded steady state carbon dioxide concentration of 3.7%v/v and the default flow rate of 0.1l/hr a Q_{hg} of 0.0037l/hr has been calculated for carbon dioxide. On this basis the GSV for the site is determined as 0.0037l/hr.

As the GSV in both cases is less than 0.07l/hr and the maximum recorded concentrations of methane and carbon dioxide are less than 1%v/v and 5%v/v respectively, the site has been assessed as 'Characteristic Situation 1' (very low hazard potential) as outlined in Table 2 of BS8485:2015, for which gas protection measures are not required.

It should be noted that low concentrations of oxygen have been recorded during the monitoring period. This may pose a risk to site workers particularly in confined spaces, and should be taken into account during site risk assessments.

Groundwater

The monitoring program has confirmed the general absence of shallow groundwater beneath the site. The last visit recorded groundwater in WS02 at 1.50m begl and WS04 at 1.90m begl, with no more than 0.2m of water being noted. The encountered water is not considered to representative of the local groundwater table which is considered likely to be present in the deeper geological unit.

It is considered unlikely that dewatering will be required for shallow short-term excavations. However, simple dewatering techniques (e.g. sump pumping) may be needed to control water ingress excavations left open for longer periods of time.

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

Paige Colling BSc Hons FGS
Engineering Geologist

Russell Hurcombe MGeoSci (Hons) FGS MIMMM
Senior Engineering Geologist

Enc:
P9700 Gas Monitoring Location Plan
P9700 Gas Monitoring Results



A P P E N D I X A

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

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48

Legend

Site Boundary

Exploratory Holes

Window Sample Borehole with Gas/Groundwater Monitoring Installation



NOTES:

NOTES

Heras Fencing - take
key/adjustable.

CLIENT:

VEXFORD HOMES LTD

PROJECT:

87 HIGH STREET, BARWELL

TITLE:

EXPLORATORY HOLE LOCATION PLAN

PROJECT No:

P9700

DATE:

11/2021

DESIGN/DRAWN:

AW

DRAWING NUMBER:

001

ESUE:

DRAFT

© GRM Development Solutions Ltd © Crown Copyright. AL 100014100



GRM Development Solutions Ltd

Tel: 01263 551 249
mail@grm-uk.com www.grm-uk.com



A P P E N D I X B

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

GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffs DE14 2WH
www.grm-uk.com | info@grm-uk.com | 01283 551249 Company No. 3099018 (England), VAT Reg. No. 658 1005 48



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	09/11/2021
Weather	Cloudy
Atmospheric Pressure (mb)	1008
Pressure Trend	Steady
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

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
WS01	0.6	1.6	NS	0.0	0.0	1.6	1.6	19.8	19.8	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	1.6	1.6	18.4	18.4	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	1.6	1.6	20.1	20.1	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.4	0.4	20.8	20.8	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.5
Not Detected	1.7
Not Detected	1.7
Not Detected	1.9

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	18/11/2021
Weather	Clear
Atmospheric Pressure (mb)	1011
Pressure Trend	Rising
Equipment	Gas Data GFM430
Operator	Liam Press

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
WS01	0.6	1.6	NS	0.0	0.0	1.5	1.5	11.7	11.7	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	1.8	1.8	10.4	10.4	0.1	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	1.9	1.9	11.3	11.3	-0.1	-0.1	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.4	0.4	11.8	11.8	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.6
Not Detected	1.7
Not Detected	1.7
Not Detected	2.0

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata

Key

	Threshold gas concentration exceeded
--	--------------------------------------



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	22/11/2021
Weather	Cold
Atmospheric Pressure (mb)	1021
Pressure Trend	Steady
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

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
WS01	0.6	1.6	NS	0.0	0.0	2.9	2.9	20.0	20.0	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	3.5	3.5	17.6	17.6	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	3.7	3.7	19.8	19.8	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	1.5	1.5	20.5	20.5	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.5
Not Detected	1.7
Not Detected	1.7
Not Detected	1.9

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	29/11/2021
Weather	Ice
Atmospheric Pressure (mb)	1004
Pressure Trend	Steady
Equipment	Gas Data LMSXi
Operator	Bryan Burgh

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
WS01	0.6	1.6	NS	0.0	0.0	2.6	2.6	20.2	20.2	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	3.1	3.1	19.3	19.3	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	0.3	0.3	20.3	20.3	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.3	0.3	19.4	19.4	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.5
Not Detected	1.7
Not Detected	1.8
Not Detected	1.9

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	08/12/2021
Weather	Mostly Sunny
Atmospheric Pressure (mb)	987
Pressure Trend	Rising
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
WS01	0.6	1.6	NS	0.0	0.0	2.8	2.8	19.6	19.6	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	3.4	3.4	19.4	19.4	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	0.0	0.0	20.7	20.7	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.2	0.2	20.2	20.2	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.6
Not Detected	1.7
Not Detected	1.8
Not Detected	2.0

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	14/12/2021
Weather	Mostly Sunny
Atmospheric Pressure (mb)	1025
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
WS01	0.6	1.6	NS	0.0	0.0	3.1	3.1	18.9	18.9	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	3.8	3.8	18.3	18.3	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	0.4	0.4	20.0	20.0	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	1.1	1.1	19.6	19.6	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.6
Not Detected	1.7
Not Detected	1.8
Not Detected	2.0

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	21/12/2021
Weather	Partly Sunny
Atmospheric Pressure (mb)	1010
Pressure Trend	Steady
Equipment	Gas Data GFM430
Operator	Liam Press

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
WS01	0.6	1.6	NS	0.0	0.0	1.1	1.1	19.1	19.1	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	1.8	1.8	18.0	18.0	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	2.3	2.3	18.4	18.4	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.6	0.6	18.8	18.8	-0.1	-0.1	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.6
Not Detected	1.6
Not Detected	1.8
Not Detected	2.0

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata



In-Situ Gas Monitoring Results

Project Name	87 High Street, Barwell
Project Number	9700
Client	Vexford Homes Ltd
Date	04/01/2022
Weather	Sunny
Atmospheric Pressure (mb)	985
Pressure Trend	Rising
Equipment	Gas Data GFM430
Operator	Liam Press

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
WS01	0.6	1.6	NS	0.0	0.0	1.1	1.1	19.7	19.7	0.0	0.0	Not Recorded	
WS02	0.5	1.0	MG	0.0	0.0	2.3	2.3	16.9	16.9	0.0	0.0	Not Recorded	
WS03	0.7	1.7	NS	0.0	0.0	2.7	2.7	17.1	17.1	0.0	0.0	Not Recorded	
WS04	0.5	1.8	NS	0.0	0.0	0.9	0.9	17.6	17.6	0.0	0.0	Not Recorded	

Groundwater	
Depth to Groundwater	Total Well Depth
mbegl	mbegl
Not Detected	1.6
1.5	1.7
Not Detected	1.8
1.9	2.0

Notes

L.E.L.	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)		
N.D.	Not Detected	a	Methane => 1% v/v
N.R.	Not Recorded	b	Carbon Dioxide =>5% v/v
PID	Photo-Ionising Detector	MG	Made Ground
%	By volume	NS	Natural Strata

Ground Material Key

MG	Made Ground
NS	Natural Strata