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

Telephone: (01283) 551249
Facsimile: (01283) 211968
Email: info@grm-uk.com
Web Site: www.grm-uk.com

Our Ref: P5440-KH2
Date: 27th May 2011

Keepmoat Homes
Received
-1 JUN

Mr Rice
Keepmoat Homes (Yorkshire) Ltd
Balby Court
Carr Hill
Doncaster
DN4 8DE

Dear Peter

Re : New Lodge Estate, Barnsley

The gas monitoring programme at the above site is now complete. The assessment below supersedes the information in the Phase II Site Appraisal report and should be submitted along with it to the regulatory bodies for approval.

Gas monitoring has been carried out to assess the risk posed to end users from harmful ground gases. The primary guidance document to determine if protection measures are required is CIRIA Report C665 'Assessing risks posed by hazardous ground gases to buildings' (2006). This uses Gas Screening Values (GSVs), which are gas concentrations multiplied by borehole flow rate, along with additional limiting factors (such as maximum methane concentrations) to classify the gas regime of a site.

The guidance document includes two methods of characterising a site. The main method 'Situation A' is based on work by Wilson and Card and is used for all types of development except low rise housing that meets the assumptions of 'Situation B'. The 'Situation B' method proposed by Boyle and Witherington for the NHBC assumes all properties have pre-cast concrete suspended floors (beam and block) with ventilated under floor voids.

For this site, as the method of ground floor construction is not yet known, but is likely to include a pre-cast concrete suspended ground floor with vented sub-floor space (beam and block), the risk from ground gases has been assessed using both 'Situation A' and 'Situation B'.

As the proposed land use is classed as high sensitivity (residential with gardens), 5 No 35mm gas/groundwater monitoring standpipes have been installed across it in window sample boreholes (WS1, 4, 7 – 9). Due to the absence of significant made ground on the site, the response zones were targeted at natural strata only to determine the local ground gas regime caused by the potential off site sources identified by the desk study.

The gas hazard is considered to be low (made ground) and therefore the monitoring programme has comprised of six visits over three months.

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.

A list of the names of the principals is available at the registered office of GRM Development Solutions Limited, Laurus House, First Avenue, Centrum 100, Burton upon Trent, Staffordshire, DE14 2WH.
Company No. 3099018 (England and Wales) VAT Reg No. 655 7005 25

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS
ACS REGISTERED ISO 9001
constructionline

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
WS1	1 -3 / Nat	None	6	0.0	1.5 –2.6	16.3-19.9	0.0	1000-1014
WS4	1 - 2 / Nat	None	6	0.0	1.4 –2.1	18.1--19.8	0.0	1000-1014
WS7	1 – 3 / Nat	None	6	0.0	0.6 –1.5	18.4-20.4	0.0	1000-1014
WS8	1 - 2 / Nat	None	4	0.0	0.2 –0.7	16.7-20.6	0.0	1000-1014
WS9	0.5 - 1 / Nat	None	1	0.0	0.4	20.2	0.0	1001

Nat=Natural Ground

No flow has been recorded during the gas monitoring and to produce a definite result a default flow rate of 0.1l/hr has been used in the following assessment.

Using the borehole flow rate of 0.1l/hr and the maximum methane concentration of 0.0%v/v, a GSV of 0.0l/hr has been calculated for methane. Using the same borehole flow rate the maximum carbon dioxide concentration of 2.6%v/v equates to a GSV of 0.0026l/hr.

Situation A

The maximum GSV is less than 0.07l/hr and the maximum recorded concentration of methane is <1%v/v. Therefore, as the levels of methane and carbon dioxide are below 1% and 5% respectively, and the GSV is <0.07l/hr. the site has been assessed as 'Characteristic Situation 1' as outlined in table 8.5 of CIRIA C665. No gas precautions are required for this characteristic situation.

Situation B

The maximum GSV for methane is <0.16l/hr, the maximum GSV for carbon dioxide is <0.78l/hr, and the maximum recorded concentration of methane is <1%. Therefore, as the levels of methane and carbon dioxide are below 1% and 5% respectively the site has been assessed as traffic light 'Green' as outlined in table 8.7 of CIRIA C665. No gas precautions are required for this traffic light situation.

As stated in the Phase II Site Appraisal Report (ref. GRM/5440/F.1) basic protection measures for radon are required for the site.

Therefore, it is considered that gas protection measures are not required for the proposed development with regards to landfill type gases (carbon dioxide and methane). Basic radon protection measures are required on the site.

Basic radon precautions should comprise of an uprated 2000 gauge DPM extended across the cavities and fully sealed service entries.

I trust that the above and enclosures are sufficient for your current requirements, however should you require any further information then please do not hesitate to contact me.

MONITORING OF SOIL GASES & GROUNDWATER

GRM Development Solutions Limited
Laurus House
First Avenue
Burton-upon-Trent
Staffordshire
DE14 2WH

Telephone: (01283) 551 249
Facsimile: (01283) 211 968
Email: mail@grm-uk.com

PROJECT NO. P5388

SITE. New Lodge Estate, Barnsley

CLIENT. *Keepmoat Homes*

DATE. 28-Mar-11

CONDITIONS. *WEATHER:* Dry
ATMOSPHERIC PRESSURE: 1000

OPERATOR. Steve Morris

EQUIPMENT. LMXSi Gas Data Recorder

RESULTS

Borehole/ Well Ref. No.	Methane (CH_4) %v/v	Carbon Dioxide (CO_2) %v/v	Oxygen (O_2) %v/v	Flow (l/hr)	L.E.L	Depth to Groundwater (mbegl)	Total Depth (mbegl)
WS1	0.0	2.1	16.3	0.0	0.0	2.6	3.3
WS4	0.0	2.0	18.1	0.0	0.0	Dry	2.3
WS7	0.0	1.5	18.4	0.0	0.0	1.9	3.1
WS8	0.0	0.70	16.70	0.00	0.00	Dry	2.0
WS9		NO ACCESS					

L.E.L	Lower Explosive Limit (100% L.E.L = 5% Flammable Gas)
N.D	Not Detected
N.R	Not Recorded
"-	By Volume

Yours sincerely

[redacted]

Geoffrey Beckett C Geol
Senior Engineering Geologist

MONITORING OF SOIL GASES & GROUNDWATER

GRM Development Solutions Limited
Laurus House
First Avenue
Burton-upon-Trent
Staffordshire
DE14 2WH

Telephone: (01283) 551 249
Facsimile: (01283) 211 968
Email: mail@grm-uk.com

PROJECT NO. P5440

SITE. New Lodge Estate, Barnsley

CLIENT. Keepmoat Homes

DATE. *13-Apr-11*

CONDITIONS. *WEATHER:* overcast/dry
ATMOSPHERIC PRESSURE: 1005

OPERATOR. stephen morris

EQUIPMENT. LMXSi Gas Data Recorder

RESULTS

Borehole/ Well Ref. No.	Methane (CH_4) %v/v	Carbon Dioxide (CO_2) %v/v	Oxygen (O_2) %v/v	Flow (l/hr)	L.E.L	Depth to Groundwater (mbegl)	Total Depth (mbegl)
WS1	0.0	2.6	19.4	0.0	0.0	2.1	3.3
WS4	0.0	2.1	19.5	0.0	0.0	DRY	2.3
WS7	0.0	1.1	20.2	0.0	0.0	1.5	3.1
WS8	0.0	0.4	20.5	0.0	0.0	DRY	2.0
WS9		NO ACCESS					

Notes

L E L	Lower Explosive Limit (100% L E.L.= 5% Flammable Gas)
N D	Not Detected
N R	Not Recorded
%	By Volume

MONITORING OF SOIL GASES & GROUNDWATER

GRM Development Solutions Limited
Laurus House
First Avenue
Burton-upon-Trent
Staffordshire
DE14 2WH

Telephone: (01283) 551 249
Facsimile: (01283) 211 968
Email: mail@grm-uk.com

PROJECT NO. P5440

SITE. New Lodge Estate, Barnsley

CLIENT. Keepmoat Homes

DATE. 27-Apr-11

CONDITIONS. *WEATHER:* SUNNY
ATMOSPHERIC PRESSURE: 1014

OPERATOR. *STEPHEN MORRIS*

EQUIPMENT. LMXSi Gas Data Recorder

RESULTS

Borehole/ Well Ref. No.	Methane (CH_4) %v/v	Carbon Dioxide (CO_2) %v/v	Oxygen (O_2) %v/v	Flow (l/hr)	L.E.L	Depth to Groundwater (mbegl)	Total Depth (mbegl)
WS1	0.0	2.5	19.9	0.0	0.0	1.8	3.3
WS4	0.0	2.1	19.4	0.0	0.0	DRY	2.3
WS7	0.0	0.7	20.4	0.0	0.0	1.2	3.1
WS8	0.0	0.7	19.9	0.0	0.0	DRY	2.0
WS9		NO ACCESS					

Notes

L.E.L	Lower Explosive Limit (100% L.E.L.= 5% Flammable Gas)
N.D	Not Detected
N.R	Not Recorded
%	By Volume

MONITORING OF SOIL GASES & GROUNDWATER

GRM Development Solutions Limited
Laurus House
First Avenue
Burton-upon-Trent
Staffordshire
DE14 2WH

Telephone: (01283) 551 249
Facsimile: (01283) 211 968
Email: mail@grm-uk.com

PROJECT NO. P5440

SITE. New Lodge Estate, Barnsley

CLIENT. Keepmoat Homes

DATE. 09-May-11

CONDITIONS. *WEATHER:* SHOWERS
ATMOSPHERIC PRESSURE: 1002

OPERATOR. STEPHEN MORRIS

EQUIPMENT. LMXSi Gas Data Recorder

RESULTS

Borehole/ Well Ref. No.	Methane (CH_4) %v/v	Carbon Dioxide (CO_2) %v/v	Oxygen (O_2) %v/v	Flow (l/hr)	L.E.L	Depth to Groundwater (mbegl)	Total Depth (mbegl)
WS1	0.0	2.0	18.1	0.0	0.0	1.8	3.3
WS4	0.0	1.7	19.6	0.0	0.0	DRY	2.3
WS7	0.0	0.6	20.3	0.0	0.0	1.2	3.1
WS8		DESTROYED					
WS9		NO ACCESS					

Notes

L.E.L	Lower Explosive Limit (100% L.E.L = 5% Flammable Gas)
N.D	Not Detected
N.R	Not Recorded
%v	By Volume

MONITORING OF SOIL GASES & GROUNDWATER

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

Telephone: (01283) 551 249
Facsimile: (01283) 211 968
Email: mail@grm-uk.com

PROJECT NO. P5440

SITE. New Lodge Estate, Barnsley

CLIENT. Keepmoat Homes

DATE. 25-May-11

CONDITIONS. *WEATHER:* *OVERCAST/DRY*
ATMOSPHERIC PRESSURE: 1005

OPERATOR. STEPHEN MORRIS

EQUIPMENT. LMXSi Gas Data Recorder

RESULTS

Borehole/ Well Ref. No.	Methane (CH_4) %v/v	Carbon Dioxide (CO_2) %v/v	Oxygen (O_2) %v/v	Flow (l/hr)	L.E.L	Depth to Groundwater (mbegl)	Total Depth (mbegl)
WS1	0.0	1.5	19.3	0.0	0.0	1.8	3.3
WS4	0.0	1.5	19.8	0.0	0.0	DRY	2.3
WS7	0.0	0.6	20.2	0.0	0.0	1.3	3.1
WS8		DESTROYED					
WS9		LOCKED					

Notes

L.E.L	Lower Explosive Limit (100% L.E.L. = 5% Flammable Gas)
N.D	Not Detected
N.R	Not Recorded
%	By Volume