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Ref: 10-019-L5
Date: 9th December 2019

Chris Kelly
MULBURY HOMES
Great Oak Farm
Mag Lane
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BY Email

Dear Chris,

RESPONSE TO MANCHESTER CITY COUNCIL PLANNING CONDITIONS VINE STREET, GORTON

BACKGROUND & OBJECTIVES

E3P understands that Mulbury Homes have completed the build phase of the development at Vine Street in Gorton, Manchester for low-rise residential units and associated adopted estate roads and utility infrastructure.

Mulbury Homes have received partial approval for planning conditions associated with the planning permission (Ref: 104855/FO/2014/N2) for the site, however, Condition 9 - Contaminated Land – requires further information in order for it to be fully discharged.

Manchester City Council have stipulated the following information is required to show that the contamination identified on site within the previously completed E3P Phase II Geoenvironmental Site Investigation (Report Ref: 10-019-R2, dated May 2017) no longer present a risk to future end users:

-  The validation report to show that all dwellings were fitted with gas protection measures to CS2 (installed in line with the submitted drawing and manufacturer's specification).

E3P have previously submitted a letter (Reference 10-019-L5, dated October 2019) to discharge the above condition however further information is required.



Manchester City Council responded to the previous E3P letter with the below:

"Environmental Health have reviewed the E3P validation report reference 10-019-L3 dated 10th October and can accept the information relating to the water supply pipe risk assessment and validation of installed water pipes.

However, the information relating to the gas membrane is insufficient. The above report states that no gas protection membrane is required but a 2000 gauge membrane has been installed on the site.

Previous reports received and reviewed by this section have confirmed that gas protection measures consistent with a site characteristic rating of CS2 should have been installed.

Env Health will require the specification and product data sheet of the membrane installed and confirmation that it is sufficient to meet CS2 requirements plus any other measures adopted to score the relevant rating points for CS2 gas risk assessment.

The report advises that E3P did not validate the gas membrane installation so we will also require comment from the person(s) who validated the cover system to address the above comments."

In light of the above further risk assessment has been completed included within this report.

Ground gas protection measures have not been installed within the properties. The 2000 gauge membrane referenced in the previous E3P letter is not gas resistant but included to show the DPM that was installed within properties.

NHBC have accepted that properties did not require ground gas protection measures as properties have a sub-floor void and as such NHBC thresholds can be adopted. This report will detail this rational.

GROUND GAS PROTECTION MEASURES

BACKGROUND

E3P has previously completed a ground investigation, during which E3P installed ground gas monitoring wells across the site. Within the context of the proposed residential end use and ground gas generation potential, the gas assessment comprised nine visits over three months, undertaken between 16th May 2014 and 22nd September 2014. The results of the monitoring are summarised within Table 1.0.



TABLE 1.0 GAS MONITORING RESULTS

WELL	DATE	CH4 INITIAL %V/V	CH4 STEADY Y %V/V	CH4 GSV l/hr	CO2 INITIAL %V/V	CO2 STEADY Y %V/V	CO2 GSV l/hr	O2 %V/V	ATMOS (mB)	ATMOS. DYNAMI C	FLOW (l/hr)	RESPONSE ZONE (mbgl)	DEPTH TO BASE (mbgl)	DEPTH TO WATER (mbgl)	
WS101	16/05/14	0.10	0.10	-0.0066	0.60	0.60	-0.0393	9.70	1024	Rising	-6.55	1.00-2.50	2.55	Dry	
	21/05/14	0.10	0.10	-0.0019	0.80	0.80	-0.0149	8.40	1000	Falling	-1.86		2.50	Dry	
	28/05/14	0.10	0.10	0.0001	0.70	0.70	0.0007	8.00	1110	Steady	0.10		2.50	Dry	
	20/06/14	Unable to locate – could not monitor													
	27/06/14	0.10	0.10	-0.0036	1.70	1.70	-0.0605	11.60	1003	Steady	-3.56		2.50	Dry	
	22/08/14	0.10	0.10	-0.0036	2.40	2.40	-0.0854	2.20	1002	Rising	-3.56		2.52	0.98	
	22/09/14	0.10	0.10	0.0001	2.20	2.20	0.0022	13.10	1016	Falling	0.10		2.53	Dry	
WS102	16/05/14	0.10	0.10	-0.0015	3.40	3.40	-0.051	11.20	1024	Rising	-1.50	1.00-2.00	1.90	Dry	
	21/05/14	0.10	0.10	-0.0017	4.60	4.50	-0.0800	6.60	1000	Falling	-1.74		2.00	Dry	
	28/05/14	0.10	0.10	-0.0012	3.80	3.70	-0.0452	7.10	1110	Steady	-1.19		2.00	Dry	
	20/06/14	Unable to locate – could not monitor													
	27/06/14	0.10	0.10	-0.0042	4.80	4.80	-0.2016	0.40	1003	Steady	-4.20		1.80	Dry	
	22/08/14	0.10	0.10	-0.0027	4.70	4.70	-0.1250	0.50	1002	Rising	-2.66		1.85	Dry	
	22/09/14	0.10	0.10	0.0001	5.00	5.00	0.005	0.80	1016	Falling	0.10		1.90	Dry	
WS106	16/05/14	0.10	0.10	-0.0039	3.10	3.10	-0.1209	15.90	1024	Rising	-3.90	1.00-3.00	3.00	Dry	
	21/05/14	0.10	0.10	0.0001	2.20	2.20	0.0022	17.00	1000	Falling	0.10		3.00	Dry	
	28/05/14	0.10	0.10	0.0001	2.50	2.30	0.0025	18.00	1110	Steady	0.10		3.00	Dry	
	20/06/14	Unable to locate – could not monitor													
	27/06/14	0.10	0.10	0.0001	3.90	3.90	0.0039	16.00	1003	Steady	0.10		3.00	Dry	
	22/08/14	0.10	0.10	-0.0016	0.80	0.80	-0.0128	19.60	1002	Rising	-1.60		1.00	Dry	
	22/09/14	0.10	0.10	0.0001	1.50	1.50	0.0015	19.50	1016	Falling	0.10		2.97	Dry	
WS109	16/05/14	0.10	0.10	0.0065	2.80	2.80	0.1828	16.70	1024	Rising	6.53	1.00-2.00	2.00	Dry	
	21/05/14	0.10	0.10	-0.0015	3.40	3.40	-0.0507	15.60	1000	Falling	-1.49		2.30	1.45	
	28/05/14	0.10	0.10	-0.0015	3.00	3.00	-0.045	15.10	1110	Steady	-1.50		2.30	1.50	
	20/06/14	0.10	0.10	0.0008	3.50	3.50	0.0277	14.80	1015	Steady	0.79		2.00	Dry	
	27/06/14	0.10	0.10	0.0001	4.50	4.50	0.0045	15.90	1003	Steady	0.10		2.00	Dry	
	22/08/14	0.10	0.10	-0.0018	2.00	2.00	-0.0368	18.30	1002	Rising	-1.84		2.02	Dry	
	22/09/14	0.10	-0.10	0.0001	3.50	3.50	0.0035	17.10	1016	Falling	0.10		2.00	Dry	



WELL	DATE	CH4 INITIAL %V/V	CH4 STEADY %V/V	CH4 GSV l/hr	CO2 INITIAL %V/V	CO2 STEADY %V/V	CO2 GSV l/hr	O2 %V/V	ATMOS (mB)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (mbgl)	DEPTH TO BASE (mbgl)	DEPTH TO WATER (mbgl)
WS110	16/05/14	0.10	0.10	-0.0051	0.10	0.10	-0.0051	20.50	1024	Rising	-5.10	1.00-1.90	1.85	0.15
	21/05/14	0.10	0.10	-0.0022	0.70	0.40	-0.0153	19.90	1000	Falling	-2.18		1.80	0.78
	28/05/14	0.10	0.10	0.0001	0.80	0.70	0.0008	20.10	1110	Steady	0.10		1.80	0.80
	20/06/14	0.10	0.10	-0.0025	2.90	2.90	-0.0713	16.40	1015	Steady	-2.46		1.80	1.00
	27/06/14	0.10	0.10	-0.0011	2.80	2.80	-0.0325	15.00	1003	Steady	-1.16		1.80	1.07
	22/08/14	0.10	0.10	0.0062	3.50	3.50	0.2184	18.50	1002	Rising	6.24		1.84	0.45
	22/09/14	0.10	0.10	0.0001	2.70	2.70	0.0027	17.80	1016	Falling	0.10		1.85	Dry
WS111	16/05/14	0.10	0.10	-0.0015	0.70	0.60	-0.0105	20.10	1024	Rising	-1.50	1.00-2.50	2.35	1.50
	21/05/14	0.10	0.10	-0.0047	0.40	0.10	-0.0187	20.30	1000	Falling	-4.68		2.30	1.50
	28/05/14	0.10	0.10	-0.0023	0.40	0.00	-0.0093	20.10	1110	Steady	-2.32		2.30	1.30
	20/06/14	Unable to locate – could not monitor												
	27/06/14	Unable to locate – could not monitor												
	22/08/14	Unable to locate – could not monitor												
	22/09/14	Unable to locate – could not monitor												



GROUND GAS RISK ASSESSMENT

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 – *Assessing risks posed by hazardous ground gases to buildings* (2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

CIRIA C665 and NHBC Report No 10627-R01 provide assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site-based GSVs for steady state methane and carbon dioxide are based upon the following equation:

$$GSV = \frac{\text{concentration (by vol)}}{100} \times \text{flowrate (l / hr)}$$

The GSVs within CIRIA C665 are based upon all buildings other than standard residential houses. The NHBC GSVs are based upon standard residential houses with precast concrete floors (block and beam). The CIRIA 665 report author (Steve Wilson) since provided further clarification regarding which guidance should be adopted for residential houses that have suspended cast in-situ concrete floor slab: for the avoidance of doubt, it was confirmed that the GSVs within the CIRIA 665 guidance should be adopted.

The original ground gas addendum report completed by E3P compared the monitoring results to CIRIA C665 and no sub-floor void present within the proposed structures, where the site was classified as Characteristic Situation 2 / Amber 1. However, E3P have reassessed the monitoring results and for this development the NHBC thresholds can be adopted due to the use of a subfloor void within properties; Characteristic Situation 1-4 classification of the site is not applicable.

The thresholds for GSVs based upon NHBC guidance are provided within Table 2.0.

TABLE 2.0 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH NHBC REPORT NO 10627-R01 – RESIDENTIAL END USE

NHBC – SUBFLOOR VOID				
CLASSIFICATION	Methane ¹		Carbon Dioxide ¹	
	TYPICAL MAXIMUM CONCENTRATION ³ (%V/V)	GAS SCREENING VALUE ^{2,4} (l/hr)	TYPICAL MAXIMUM CONCENTRATION ³ (%V/V)	Gas Screening Value ^{2,4} (l/hr)
Green	< 1	< 0.16	< 5	< 0.78
Amber 1	< 5	< 0.63	< 10	< 1.56
Amber 2	< 5	< 1.56	< 30	< 3.10
Red	> 20	> 1.56	> 30	> 3.10

Notes

1. The worst-case ground gas regime identified on the site, either methane or carbon dioxide, at the worst-case temporal conditions that the site may be expected to encounter will be the decider as to what Traffic Light is allocated;
2. Gas Screening Value is the Borehole Gas Volume Flow Rate, in litres per hour, as defined in Wilson and Card (1999), which is the borehole flow rate multiplied by the concentration in the air stream of the particular gas being considered;
3. The Typical Maximum Concentrations can be exceeded in certain circumstances should the Conceptual Site Model indicate it is safe to do so;
4. The Gas Screening Value thresholds should not generally be exceeded without the completion of a detailed ground gas risk assessment taking into account site-specific conditions.

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 3.0.



TABLE 3.0 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CO ₂ (% v/v)	GSV (l/hr)	MAX CH ₄ (% v/v)	GSV (l/hr)	CLASSIFICATION
WS101	2.40	-0.08544	0.10	-0.00655	Green
WS102	5.00	-0.2016	0.10	-0.0042	Green
WS106	3.90	-0.1209	0.10	-0.0039	Green
WS109	4.50	0.18284	0.10	0.00653	Green
WS110	3.50	0.2184	0.10	0.00624	Green
WS111	0.70	-0.01872	0.10	-0.00468	Green

The GSV has been compared to the criteria outlined within NHBC to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

Based on the GSVs calculated above the site can be classified as Green, as properties have been constructed with a sub-floor void and as such no ground gas protection measures would be required.

Methane concentrations have not been recorded above the limit of detection of 0.1% v/v with all GSVs calculated below 0.16 l/hr.

Carbon dioxide concentrations have been identified at concentrations between 0.1 % v/v and 5 % v/v. All carbon dioxide GSVs calculated are below 0.78 l/hr the threshold for sites to be classified as Amber 1 in line with NHBC.

Carbon dioxide at 5 % v/v has been identified within WS105. The GSVs calculated within this monitoring well were all below the NHBC threshold of <0.78 l/hr. A GSV calculated using the highest flow (-4.20 l/hr) and highest concentration (5%) at this location is -0.21 l/hr and considered to be the worst-case scenario, however, is still below 0.78 l/hr.

The GSV calculated for the site using the highest carbon dioxide concentration and highest flow is 0.3265 l/hr. This can be considered the worst-case scenario on site and the GSV is below 0.78 l/hr, therefore characterising the site at Green.

Furthermore, as part of the enabling and remediation works soils were processed with deleterious materials removed. As properties have been constructed with a sub-floor void

NHBC are the warranty providers on this development, and they had conditioned the ground gas on the site however the ground gas risk assessment has been sufficient to pass this condition as the site has been assessed as Green.

Yours sincerely,
For and on behalf of E3P Ltd



Rebecca Hodnett
Senior Geoenvironmental Consultant

