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21st March 2022

Ref: A11779/220301/L1

Prepared for:
Rivendale Homes Limited
15 Pirelli Way
Eastleigh
SO50 5GE

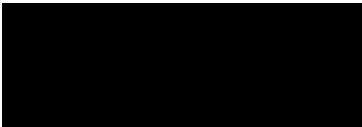
c/o Beccibrisland@rivendalehomes.co.uk

Dear Becci,

RE: Bampton House, Hursley Road, Chandlers Ford, SO53 2TA – Ground Gas Risk Assessment

Omnia were commissioned by Rivendale Home Limited, to undertake a Ground Gas Risk Assessment at the above site to provide further investigation for the planning condition imposed by the local authority. Please find set out below a summary of on-site observations from site works undertaken on Monday 31st January 2022, including presentation of gas classification.

Yours sincerely,



Hannah Spurling
Graduate Geo-Environmental Consultant

Appendix I – Limitations
Appendix II – Drawings
Appendix III – Exploratory Hole Logs

Quality Assurance

Remarks	
Date	21 st March 2022
Prepared by	H. Spurling
Signature	
Reviewed and authorised by	
Signature	
Project number	A11779/220301/L1
Comments	

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Site Address	Bampton House, Hursley Road, Chandlers Ford, SO53 2TA
National Grid Reference	443267, 120674
Site Area	0.17ha

1.0 Background

The site was located within Chandlers Ford, north of Chandler's Ford Train Station, east of Station Road, south of Hursley Road and west of Monks Brook. The area of investigation was accessed via the B3043 and comprised an approximately rectangular shaped site with the site currently being used as a car park by local residents. The topography was generally flat, with the western boundary raised approximately 0.5m higher than the rest of the site.

The proposed development comprises the:

'Change of use from Offices (Class B1(a)) to 15no. residential units (Class C3)'

Prior Approval was granted for the development by Eastleigh Borough Council in December 2021 (Application No PN/21/90906).

Ground gas risk assessment is required in order to support the application and assist with addressing comments as per the decision notice Condition 5a.

Installation of three (3no.) shallow boreholes to facilitate ground gas monitoring commenced on Monday 31st January 2022, across the site. The borehole locations are presented as Figure 3.0 in Appendix II.

2.0 Geology & Hydrogeology

The British Geological Survey (BGS) map for the site, Southampton (Sheet 315, 1:50,000 Solid and Drift, 1987) indicates that the site is underlain by the following geological sequence:

Table 2.1 Geological sequence on site

Geological Unit	Classification	Description	Aquifer Classification
Superficial Deposits	Alluvium	Clay, Silt, Sand and Gravel	Secondary A
Bedrock	Wittering Formation	Sand, Silt and Clay	Secondary A

3.0 Ground Conditions Encountered

The intrusive site investigation confirmed the published geology, encountering soils attributed to the Alluvium Deposits and the Wittering Formation within all exploratory location beneath Topsoil. Exploratory hole logs are included within Appendix III of this report.

3.1.1 Topsoil

Topsoil was encountered within all exploratory hole location, to a maximum depth of 1.00mbgl in WS101. The soils predominantly comprised soft to firm dark brown slightly sandy, slightly gravelly CLAY with frequent rootlets. Sand was fine to coarse. Gravel was fine to coarse angular to subangular flint.

3.1.2 Alluvium

Soils attributed to the Alluvium Deposits were encountered within all intrusive locations directly below Topsoil. These were typically recovered as soft to firm brown to dark orangeish brown slightly sandy to sandy, slightly gravelly CLAY. Sand was fine to coarse. Gravel was fine to coarse angular to subangular flint. The Alluvium was encountered to a maximum depth of 3.00m bgl in WS102.

3.1.3 Wittering Formation

Soils attributed to the Wittering Formation were encountered within all intrusive location directly below superficial deposits. These typically comprised greenish grey to blueish grey gravelly, clayey fine to coarse SAND. Gravel was fine to coarse angular to subangular flint to a maximum depth of 5.00m bgl in all intrusive locations.

The base of the Wittering Formation was not encountered during this investigation.

4.0 Ground Gas and Groundwater Monitoring

A total of three (3no.) ground gas monitoring rounds were completed on site between 09/02/2022 and 01/03/2022 with results presented within Table 5.1.

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using an infrared gas analyser (GA5000), calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an internal flow pod.

Gas concentrations were recorded at thirty second intervals until gas concentrations stabilised for three (3no.) consecutive readings (a minimum of ninety seconds) at each location, at which point the maximum concentrations of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

Groundwater monitoring was undertaken using an electronic dip tape to record the depth to groundwater. Ground gas and groundwater results are presented and discussed in Section 5.0.

5.0 Ground Gas Monitoring

Three (3no.) ground gas and groundwater monitoring visits have been undertaken across three (3no.) monitoring wells at the site between 09/02/2022 and 01/03/2022. The results of the gas and groundwater monitoring are presented in Table 5.1 below, and a ground gas assessment undertaken in Section 5.0.

Table 5.1 Summary of Ground Gas and Groundwater Monitoring Results

Well	Date	CH ₄ Peak %v/v	CH ₄ Steady %v/v	CH ₄ GSV l/hr	CO ₂ Peak %v/v	CO ₂ Steady %v/v	CO ₂ GSV l/hr	O ₂ %v/v	Atmos (mb)	Atmos. Dynamic	Flow (l/hr)	Depth to Base (m bgl)	Depth to Water (m bgl)
WS101	09/02/2022	0.8	0.6	0.0008	3.2	3.2	0.0032	18.3	1021	Falling	0.1	2.22	Dry
	21/02/2022	<0.1	<0.1	0.0002	4.4	4.4	0.0088	17.2	1008	Steady	0.2	2.22	1.90
	01/03/2022	<0.1	<0.1	0.0001	1.2	1.2	0.0012	20.3	1023	Rising	0.1	2.21	1.92
WS102	09/02/2022	0.7	0.6	0.0007	3.3	3.3	0.0033	18.4	1021	Falling	0.1	2.90	2.28
	21/02/2022	<0.1	<0.1	0.0002	4.1	4.1	0.0082	17.5	1008	Steady	0.2	2.90	2.11
	01/03/2022	<0.1	<0.1	0.0001	3.7	3.7	0.0037	17.8	1023	Rising	0.1	2.92	2.16
WS103	11/02/2022	<0.1	<0.1	0.0002	0.1	0.1	0.0002	20.7	1031	Rising	0.2	2.69	1.94
	21/02/2022	<0.1	<0.1	0.0001	0.1	0.1	0.0001	21.0	1008	Steady	0.1	2.70	1.54
	01/03/2022	<0.1	<0.1	0.0001	0.1	0.1	0.0001	21.3	1023	Rising	0.1	2.68	1.51

5.1 Ground Gas Assessment

Three (3no.) rounds of ground gas monitoring have been undertaken at the site in WS101, WS102 and WS103. The results of the ground gas monitoring and calculated Gas Screening Values (GSVs) are presented in Table 5.1.

As detailed within Omnia proposal (ref: A11779/220110/L1 dated 12/01/22), three (3no.) monitoring visits were proposed as per BS8485:2015+A1 (2019). Three (3no.) ground gas monitoring rounds were completed on site between 09/02/2022 to 01/03/2022. A summary of the findings to date is presented below.

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in BS8485:2015+A1 (2019) '*Code of Practice for the design of protective measures for methane and carbon dioxide ground gasses for new buildings*'. However, it is recommended that the ground gas assessment and any recommended protection measures are agreed with the local authority prior to the adoption of any protection measures on-site. Furthermore, the installation of any gas protection measures should be validated by a suitably qualified engineer.

CH₄ concentrations were recorded to a maximum concentration of 0.8% v/v at location WS101 on the 09/02/2022. CO₂ concentrations were recorded at concentrations ranging from 0.1% v/v to a maximum concentration of 4.4% v/v (WS101 on the 21/02/2022).

Ground gas flow rates ranged from 0.1 l/hr to a maximum recorded flow rate of 0.2l/hr at all locations. However, notwithstanding the above and in order to adopt a conservative approach, the hazardous gas flow rate (*Qhg*) for both CH₄ and CO₂ was calculated in accordance with guidance set out in BS8485:2015+A1 (2019) using the following equation.

$$Qhg = \left(\frac{Chg}{100} \right) \times q$$

Where:

Chg is the maximum gas concentration (%v/v) recorded at any location across the site

q is the maximum recorded flow rate (l/hr) at any location across the site

The *Qhg* is more conservative than the Gas Screening Value (GSV) as it utilises overall site maximum concentrations and flow rates whilst GSVs are calculated using concentrations and flow rates specific to each visit at each monitoring point.

The maximum *Qhg* calculated for methane was 0.0016l/hr, whilst the maximum *Qhg* calculated for carbon dioxide was 0.0088l/hr utilising maximum concentrations of 0.8% (CH₄), 4.4% (CO₂) and a maximum flow rate of 0.2l/hr.

It is understood that the proposed development is the change of use from offices to fifteen (15no.) residential units with associated infrastructure. At the time of writing, no proposed development plans were available. A red line boundary of the site is included within Figures 1.0 and 2.0 (Appendix III). Therefore, the proposed development is composed of high-rise residential units assessed under the British Standard system as a Type B Building – Private or commercial property with central building management or control of any alterations to the building.

5.1.2 British Standard – Type B – Private or Commercial Property with Central Management Control

Guidance set out in BS8485:2015 publication stipulates that, for classification as a CS-1 under the British Standard System, a site must have the characteristic GSV of <0.07l/h and individual ground gas concentrations of <1% for CH₄ and <5% for CO₂.

A review of Section 5.0 indicates that the calculation of the hazardous gas flow rate (*Qhg*) using site maximum concentrations and flow rate yielded *Qhg* values of 0.0016l/hr (CH₄) and 0.0088l/hr (CO₂), which fall below the maximum Gas Screening Values (GSVs) permitted for a Characteristic Situation 1 (CS1).

Given that the calculated *Qhg* values fall below the maximum permitted GSVs for a CS1 classification. It is therefore considered that the ground gas monitoring undertaken indicates a negligible gas regime with ground gas not considered to have the potential to present a significant risk to future residents.

As per Guidance set out in BS8485:2015+A1 (2019), CS1 classification is considered suitable for the site with no special ground gas protection measures required.

It is recommended that the above ground gas assessment is agreed with the local authority prior to commencement of works.

6.0 Conclusion

Based on three (3no.) visits of ground gas monitoring the site is considered suitable for a Characteristic Situation 1 (CS1) classification under BS-8485:2015+A1(2019).

For a CS1 classification, no special ground gas protection measures are required.

END OF REPORT

APPENDIX I

Limitations

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between OE Ltd and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination, which are enforced, by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. OE cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by OE is owned by them and no such plans or documents may be reproduced, published, or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by OE in this connection without their explicit written agreement there to by OE.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II

Figures

Key



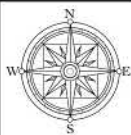
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Job Title:	Client:	Project No:	Date:	Drawing Title:
Brampton Hcuse, Chandlers Ford	Rivendale Homes Ltd	A11779	01/03/2022	
		Drawn By: H.Spurling	Authorised By: G. Larcombe	
		Scale: 1sq = 1km2	Notes: OS Licence: 100058169	Figure 1.0 - Site Location

Key



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Job Title: Bampton House, Chandlers Ford	Client: Rivendale Homes Limited	Project No: A11779	Date: 01/03/2022	Drawing Title: Figure 2.0 - Proposed Development Plan
		Drawn By: HS	Authorised By: OM	
		Scale: NTS	Notes:	

APPENDIX III

Trial Pit Logs



Borehole Log

Borehole No.

WS101

Sheet 1 of 1

Project Name: Bampton House

Project No.
A11779

Co-ords: 43250.00 - 20681.00

Hole Type
WLS

Location: Chandler's Ford

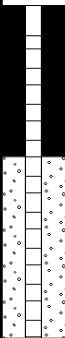
Level:

Scale
1:50

Client: Rivendale Homes Limited

Dates: 31/01/2022 - 31/01/2022

Logged By
TH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (TOPSOIL)	
		1.20		N=27 (8,8/6,8,7,6)	1.00			Brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	1
		2.00		N=39 (./16,8,9,6)	2.00			Dark orangey brown slightly gravelly sandy CLAY. Gravel is angular to sub-angular fine to medium flint. Sand is fine to coarse. (ALLUVIUM)	2
					2.70			No recovery	
		3.00		N=17 (3,5/4,4,5,4)	3.00			Greeny brown sandy CLAY. Sand is fine to coarse. (ALLUVIUM)	3
								No recovery	
		4.00		N=21 (./4/3,3,7,8)	3.90 4.00			Greeny brown gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	4
								No recovery	
		5.00		N=26 (7,5/6,5,6,9)	4.90 5.00			Greeny grey gravelly clayey coarse SAND. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	5
								End of borehole at 5.00 m	6
									7
									8
									9
									10

Remarks

Cleared by Cable Avoidance Tool





Borehole Log

Borehole No.

WS102

Sheet 1 of 1

Project Name: Bampton House

Project No.
A11779

Co-ords: 43261.00 - 20688.00

Hole Type
WLS

Location: Chandler's Ford

Level:

Scale
1:50

Client: Rivendale Homes Limited

Dates: 31/01/2022 - 31/01/2022

Logged By
TH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (TOPSOIL)	
		1.20		N=16 (4,4/4,5,3,4)	1.15			Brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	1
					1.55			Orangey red sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	
		2.00		6 (3,2/1,,,5)	2.00			Grey gravelly coarse SAND. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	2
					2.40			No recovery	
		3.00		N=10 (4,4/4,2,2,2)	3.00			Orangey brown gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to medium flint. (ALLUVIUM)	3
					3.80			Greyey brown gravelly CLAY. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	
		4.00		N=25 (3,2/4,6,7,8)	4.00			No recovery	4
					4.40			Greyey brown gravelly SAND. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	
		5.00		N=24 (4,4/6,6,6,6)	5.00			No recovery Bluey grey coarse SAND. (ALLUVIUM)	5
End of borehole at 5.00 m									
									6
									7
									8
									9
									10

Remarks

Cleared by Cable Avoidance Tool





Borehole Log

Borehole No.

WS103

Sheet 1 of 1

Project Name: Bampton House

Project No.
A11779

Co-ords: 43276.00 - 20675.00

Hole Type
WLS

Location: Chandler's Ford

Level:

Scale
1:50

Client: Rivendale Homes Limited

Dates: 31/01/2022 - 31/01/2022

Logged By
TH

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.40			Grass over dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to angular fine to coarse flint. (TOPSOIL)		
		1.20		4 (1,/,2,2)	1.20			Yellowey brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint, brick, concrete. (MADE GROUND)	1	
					1.60			Brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (MADE GROUND)		
		2.00		N=20 (4,4/3,5,6,6)				No recovery	2	
					2.40			Brown sandy clayey GRAVEL. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)		
					2.70			Bluey grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to sub-angular fine to medium flint. (ALLUVIUM)	3	
					3.10					
					3.20					
		4.00		N=6 (2,1/1,2,2,1)	4.10			Browney grey sandy clayey GRAVEL. Sand is fine to coarse. Gravel is angular to sub-angular fine to coarse flint. (ALLUVIUM)	4	
					4.20					
					4.80			Greeny brown gravelly clayey SAND. Gravel is angular to sub-angular fine to medium flint. (ALLUVIUM)	5	
					4.90					
					5.00					
								No recovery		
								Bluey grey coarse SAND. (ALLUVIUM)		
								Greyey brown silty GRAVEL. Gravel is angular to sub-rounded fine to coarse flint. (ALLUVIUM)	6	
								End of borehole at 5.00 m		
										7
								8		
								9		
								10		

Remarks

Cleared by Cable Avoidance Tool

