## HERTS & ESSEX SITE INVESTIGATIONS

'THE OLD POST OFFICE', WELLPOND GREEN, STANDON, WARE, HERT'S, SG11 1NJ

TELEPHONE FAX 01920 822233 01920 822200

GEOTECHNICAL ASSESSMENTS - ENVIRONMENTAL ASSESSMENTS - DESKTOP STUDY - CONTAMINATED LAND

30<sup>th</sup> June 2020 Our Ref : CSG/14798

LPS Construction 7th Floor 90 York Way London N1 9AG

## For the attention of S.Hare Esq.,

Dear Sir,

## Re : Site at 73 Maygrove Road, West Hampstead, London NW6 2EG : GAS INVESTIGATION REPORT

Further to our site investigation works, we have visited the above site to assess the extent of land gas risk.

The purpose of this visit was to establish whether reasonable assessments and investigative works could be undertaken within the proposed site works to confirm the extent and nature of gas risk and any mitigation measures could or would need to be implemented. This was based on infilled land which included an infilled pond area through the centre of the site.

Gas monitoring installations were then installed within the site within a single borehole.

Gas testing results were recorded over six monitoring rounds initially with an additional six monitoring rounds to confirm the extent of ground gas and limit the potential for spikes in ground gas regime at the site. These have been presented within the table below.

Considering the results of the gas testing and taking into account the worst case readings from the gas testing undertaken, it remains the case that no flow rates were recorded within the site and as such, the site and surrounding area is not degrading at a fast rate.

With this in mind, we can confirm the following calculations can be made :-

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

q = is the measured flow rate, (in litres per hour) of combined gases from the monitoring standpipe

Chg = is the measured hazardous gas concentration, (in percentage volume / volume)

Therefore :-

$$Qhg = 0.0 \left( \frac{4.5}{100} \right) = 0.0$$

As such, the Hazardous Gas Flow Rate has been calculated as 0.00 and we would therefore suggest gas generation within the site area is minimal, although, slightly elevated Carbon Dioxide values were recorded up to 5.9% and as such, risk cannot be ruled out with differing atmospheric pressures. As such, and in line with comments within BS8485:2015 we would suggest that a Characteristic Situation of 1 could be given to the site based on the ground gases measured.



We have considered a number of factors in the assessment and decision making in relation to ground gases which are detailed below which has broadly been derived from RB17, (An Pragmatic Approach to Ground Gas Risk Assessment – November 2012): -

- Conceptual Site Model.
- Soil Type, (made ground, clay, gravel, organic, peat, chalk) in relation to permeability.
- CO<sup>2</sup> and CH4 concentration.
- O2 concentration in conjunction with CO<sup>2</sup> and CH4, (i.e. any other vapours present hydrocarbons etc which reduce O2 levels and see no CO<sup>2</sup> gases or methane, therefore what's utilizing the O2).
- Source of ground gas.
- Distance from site.
- Atmospheric Pressure.
- Total Organic Carbon, (where available).
- Groundwater presence / absence.
- Response Zones.
- Variable Stratum.
- Proposed construction.

Based on the above, the following criteria should be considered: -

- 1. The soil types in place have been identified as Made Ground which overlies London Clay. The made ground forms the only source of ground gases on the site and as such, initial risks are considered low.
- 2. The O2 and CO² levels correlate relatively well in respect to a slight drop in the normal level of O2 and a slight increase in CO².
- The London Clay will restrict any off site sources of ground gas from migrating onto the site.
- 4. A visual assessment of the made ground confirms that this is considered a reworked clay FILL for the majority of the site which would promote a low risk of ground gases being produced. The underlying geology is identified as a Mottled dark grey, black CLAY and as such, is likely the source of the low levels of CO2 produced in the records and as such, is unlikely to increase to a level where risk is in place
- 5. The samples record relatively low organic matter within nearly all samples tested.
- 6. The response zones would promote an accurate depiction of the ground gas regime at the site as this is an entirely permeable stratum and would allow for ground gas movement if being generated.

Based on this information, we can confirm that the classification for ground gas regime is low and classified as CS1.

I hope the foregoing is sufficient for your requirements, although please do not hesitate to contact us should require any further information regarding the above.

Yours Faithfully

C.S.Gray M.Sc Contract Engineer



Table 1	Gas Monitoring Data Sheet
I UDIC I	Ous Monitoring Data Officer

Site	Site at 73 N NW6 2EG	laygrove R	oad, Wes	st Hamp	stead, L	ondon,		Wea	ther							Cloudy					Opera	tives	RAC/CSG
				Flow	Rate		C	oncentra	tion, (Cl	H4)	Co	oncentrat	ion, (CO2	2)		Concentr	ation, (O2)	)	- Qhg, CH4	Oha CO2		Flooded	
Doto	Times	DU ID	Dook		Steady	,	Dook		Steady		(Dook)A)		Steady		Dook		Steady		- Qiig, Cn4	Qhg, C0 <sup>2</sup>	Stratum	Response Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Pook)A)	(Book)A)	Screened	(Vac / Na)	-
			L/h	L/h	L/h	L/h		9	%			%	5			9	%		– (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>		(Yes / No)	тВ
10/01/2020	10.05am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.1	4.2	4.3	18.5	18.5	17.2	16.5	0.0	0.0	MADE GROUND	Yes	1001

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table 2	Gas Monitoring Data Sheet 2
---------	-----------------------------

Site	Site at 73 N NW6 2EG	laygrove R	oad, Wes	st Hamp	stead, L	ondon,		Wea	ther							Cloudy					Opera	tives	RAC/CSG
				Flow	Rate		C	oncentra	tion, (CF	H4)	Co	ncentrat	ion, (CO2	2)		Concentr	ation, (O2	)	Oha CUA	Oh~ C02		Flooded	
Data	Time	DI ID	Dook		Steady		Dook		Steady		(Dook)4)		Steady		Daak		Steady		- Qhg, CH4	Qhg, C0 <sup>2</sup>	Stratum	Response Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Pack)A)	(Book)A)	Screened	(Vac / Na)	
			L/h	L/h	L/h	L/h		9	%			%	5			ģ	%		– (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>		(Yes / No)	тВ
13/01/2020	10.05am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	1.8	3.8	4.5	18.4	18.4	17.1	16.5	0.0	0.0	MADE GROUND	Yes	1003

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table 3	Gas Monitoring Data Sheet 3
---------	-----------------------------

Site	Site at 73 l London, N		Road, We	st Hamp	stead,			Wea	ther							Cloudy					Opera	tives	RAC/CSG
				Flow	Rate		Co	oncentra	tion, (CF	14)	Со	ncentrat	ion, (CO2	2)		Concentr	ation, (O2)	)	Oha CUA	Oha C02		Flooded	
Data	Time	5445	Doolo		Steady		D/-		Steady		(D (-)A)		Steady		D/-		Steady		- Qhg, CH4	Qhg, C0 <sup>2</sup>	Stratum	Response Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Pank)A)	(Dook)A)	Screened	(Vac / Na)	
			L/h	L/h	L/h	L/h		9	6			%				9	%		- (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>		(Yes / No)	тВ
16/01/2020	9.55am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	2.1	3.5	4.1	17.9	17.9	17.1	16.8	0.0	0.0	MADE GROUND	Yes	1004



## Table 4 Gas Monitoring Data Sheet 4

Site	Site at 73 M NW6 2EG	laygrove R	oad, Wes	st Hamp	stead, L	ondon,		Wea	ther							Cloudy					Opera	tives	RAC/CSG
				Flow	Rate		Co	oncentra	tion, (CF	H4)	Co	oncentrati	ion, (CO2	2)		Concent	ration, (O2	)	- Qhg, CH4	Qhg, C0²		Flooded Response	_
Doto	Time	BH ID	Pook		Steady		Peak		Steady		(Book)A)		Steady		Peak		Steady		Qiig, CH4	Qiig, Co	Stratum	Zone	Barometric Pressure
Date	rime	вп І	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	- (Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	- <i>(Peak)<sup>A)</sup></i>	(Peak) <sup>A)</sup>	Screened	(Yes / No)	
			L/h	L/h	L/h	L/h		9	6			%	,				%		- (Peak)	(Peak)**		(Tes/No)	тВ
20/01/2020	10.50am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	2.8	3.3	4.2	18.1	18.1	17.4	16.5	0.0	0.0	MADE GROUND	Yes	999

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table 5	Gas Monitoring Data Sheet 5
---------	-----------------------------

Site	Site at 73 l London, N		Road, We	st Hamp	stead,			Wea	ather							Cloudy					Opera	tives	RAC/CSG
				Flow	Rate		Co	oncentra	ntion, (Cl	H4)	Co	oncentrat	ion, (CO2	))		Concentr	ation, (O2)	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded	
Data	Timo	BU ID	Dook		Steady		Dook		Steady		(Book)A)		Steady		Dook		Steady		- Qilg, CH4	Qrig, Co-	Stratum	Response Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Book)A)	(Book)A)	Screened	(Yes / No)	
			L/h	L/h	L/h	L/h		9	%			%				ģ	%		- (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>		(Tes / No)	тВ
23/01/2020	9.25am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.9	2.4	3.1	3.9	18.2	18.2	17.8	17.5	0.0	0.0	MADE GROUND	Yes	1001

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table 6	Gas Monitoring Data Sheet 6
---------	-----------------------------

Site	Site at 73 l London, N		Road, We	st Hamp	stead,			Wea	ther							Cloudy					Operat	tives	RAC/CSG
				Flow	Rate		Co	oncentra	tion, (Cl	H4)	Co	oncentrati	ion, (CO2	2)		Concentr	ation, (O2)	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response	-
Data	Time	BUID	Steady		Dook		Steady		(Book)A)		Steady		Dook		Steady		Qilg, Cri4	Qiig, Co	Stratum	Zone	Barometric Pressure		
Date	ate Time BH ID Peak 15				30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	- (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>	Screened	(Yes / No)	
			L/h	L/h	L/h	L/h		9	6			%	,			9	%		(reak)	(reak)		(Tes/No)	mB
27/01/2020	9.15am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	2.5	3.4	4.1	18.2	17.5	16.9	16.9	0.0	0.0	MADE GROUND	Yes	1003



Table	7	Gas Monitor	ring Data	Sheet 1																			
Site	Site at 73 I NW6 2EG	Maygrove F	Road, We	st Hamp	stead, L	ondon,		Wea	ther							Raining					Opera	tives	RAC/CSG
				Flow	/ Rate		С	oncentra	tion, (Cl	H4)	Co	ncentrat	ion, (CO2	2)		Concentr	ation, (O2	))	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response	
Doto	Steady  Date Time BH ID Peak								Steady		(Dook)A)		Steady		Dook		Steady		Qiig, Oil4	Qiig, oo	Stratum	Zone	Barometric Pressure
Date	rime	БП ІО	Peak	15 secs	30 Secs	45 Secs	- Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	– (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>	Screened	(Yes / No)	
			L/h	L/h	L/h	L/h		9	%			%	5				%		(Feak)	(reak)		(Tes / No)	тВ
22/04/2020	9.30am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	1.8	2.2	3.4	19.1	19.1	18.7	17.9	0.0	0.0	MADE GROUND	Yes	1001

Works and table completed in accordance with **BS 8485**: **2015**, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table	8 (	Sas Monitor	ing Data	Sheet 2																			
Site	Site at 73 NW6 2EG	Maygrove F	Road, We	st Hamp	stead, L	ondon,		Wea	ther							Raining					Opera	tives	RAC/CSG
				Flow	/ Rate		Co	ncentra	tion, (Cl	H4)	Co	oncentrat	ion, (CO2	))		Concentr	ation, (O2	)	- Qhg, CH4	Qhg, C0²		Flooded Response	
Doto	Time	DU ID	Daale		Steady	,	Dook		Steady		(Dook)A)	Steady			Dook	Steady			Qiig, Cii4	wng, co	Stratum	Zone	Barometric Pressure
Date		BH ID	Peak	15 secs	30 Secs	45 Secs	Peak -	15 secs	30 Secs	30 45	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	s — <i>(Peak)<sup>A)</sup></i>	(Dank)A)	Screened	Over (Ne)	
			L/h	L/h	L/h	L/h		9	6			%	5			9	%		- (Peak) <sup>-</sup>	(Peak) <sup>A)</sup>		(Yes / No)	тВ
1/05/2020	9.25am	WS5	0.0			0.0	0.0	0.0	0.0	0.0	2.8	1.1	1.7	2.8	19.0	19.0	18.7	18.5	0.0	0.0	MADE GROUND	Yes	1005

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table	9 (	Sas Monito	ring Data	Sheet 3	}																		
Site	Site at 73 London, N	stead,			Wea	ather							Overcast					Opera	tives	RAC/CSG			
				Flow	Rate		С	oncentra	ntion, (Cl	H4)	Co	ncentrat	ion, (CO2	2)		Concentr	ation, (O2	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response Zone	
D-4-	Time	D.L. I.D.	D/-		Steady		D1-		Steady		(D (-)A)		Steady		Doolo		Steady		wilg, Oli4	ung, co	Stratum		Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	5 30 45	(Peak) <sup>A)</sup>	15 30 secs Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	- (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>	Screened	(Yes / No)			
			L/h	L/h	L/h	L/h		9	%			%				9	%	-	(Peak)	(Peak)**		(Tes / No)	тВ
12/05/2020	10.15am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.8	2.4	3.4	19.2	19.2	18.4	17.4	0.0	0.0	MADE GROUND	Yes	1007



Table 10

Gas Monitoring Data Sheet 4

Site	Site at 73 I NW6 2EG	Maygrove R	Road, Wes	st Hamp	stead, L	ondon,		Wea	ther						Opera	RAC/CSG							
				Flow	Rate		Co	oncentra	tion, (Cl	H4)	Co	oncentrat	ion, (CO2	2)		Concentr	ation, (O2)	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response	
Date	Time	BH ID	Peak		Steady		- Peak		Steady		- (Peak) <sup>A)</sup>	Steady			Peak		Steady		- Qilg, CH4	Qng, co-	Stratum	Zone	Barometric Pressure
Date	Time	ъп І	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	- (Peak)	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Book)A)	(Peak) <sup>A)</sup>	Screened	(Vac / No)	
			L/h	L/h L/h L/h		L/h		%		%				%		- (Peak) <sup>A)</sup>	(Peak)**		(Yes / No)	mB			
21/05/2020	10.05	WS5	0.0 0.0 0.0 0.0				0.0	0.0	0.0	0.0	3.6	1.4	2.7	3.6	19.4	19.4	18.6	18.2	0.0	0.0	MADE GROUND	Yes	1008

Works and table completed in accordance with **BS 8485**: **2015**, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

Table	1	1
-------	---	---

Gas Monitoring Data Sheet 5

Site	Site Site at 73 Maygrove Road, West Hampstead, London, NW6 2EG							Wea	nther					Operat	tives	RAC/CSG							
				Flow	Rate		C	oncentra	tion, (CF	H4)	Co	ncentrat	ion, (CO2	2)		Concentra	ation, (O2)	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response	
Data	Time	DUID	Dook		Steady		Dook		Steady		(Dook)A)	Steady			Dook	Steady			Qilg, Cri4	Qiig, Co	Stratum	Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	(Peak) <sup>A)</sup>	15 secs	30 Secs	45 Secs	Peak -	15 secs	30 Secs	45 Secs	(Book)A)	(Book)A)	Screened	(Vac / Na)	
			L/h	L/h	L/h	L/h		9	%			%				9	%		- (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>		(Yes / No)	тВ
4/06/2020	2020 9.05am WS5 0.0 0.0 0.0				0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.6	2.4	4.1	19.1	19.1	18.4	17.2	0.0	0.0	MADE GROUND	Yes	1009

Works and table completed in accordance with **BS 8485**: 2015, (Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings). Table prepared after Table F2, (Gas Monitoring Data).

	_	_	_	_	_
- 7	Га	h	l۸	1	2
	a	v			_

Gas Monitoring Data Sheet 6

Site	Site at 73 l London, N		Road, We	st Hamp	ostead,			Wea	ther						s	unny Hot					Operat	tives	RAC/CSG
				Flow	Rate		C	oncentra	tion, (Cl	H4)	C	oncentrati	ion, (CO2	)		Concentr	ation, (O2)	)	- Qhg, CH4	Qhg, C0 <sup>2</sup>		Flooded Response	_
Data	Time	BUUD	Dook		Steady		Dook		Steady		· (Peak) <sup>A)</sup>		Steady		Deels	Steady			wilg, crit	ung, co	Stratum	Zone	Barometric Pressure
Date	Time	BH ID	Peak	15 secs	30 Secs	45 Secs	Peak	15 secs		45 Secs	(Feak)	15 secs	30 Secs	45 Secs	Peak	15 secs	30 Secs	45 Secs	— (Peak) <sup>A)</sup>	(Peak) <sup>A)</sup>	Screened	(Yes / No)	
			L/h	L/h	L/h	L/h		9	6			%				g	%		(reak)	(reak)		(Tes/No)	тВ
17/06/2020	9.45am	WS5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	1.8	3.2	4.1	19.2	19.2	18.1	17.8	0.0	0.0	MADE GROUND	Yes	1011