

Our ref: HLL-PPC-00-XX-G-RP-0014/10891/RA/FGRA rev1

Mr H. Tse
McCarthy Stone
100 Holdenhurst Road
Bournemouth
BH8 8AQ

13 June 2023

Dear Horace,

**FINAL GAS RISK ASSESSMENT
HUYTON LANE, LIVERPOOL**

Further to our Phase II Site Appraisal Report dated November 2022 the gas monitoring at the above site is now complete and the final gas risk assessment is outlined below.

The Phase I Desk Study confirmed that there are no active or former landfill sites within 500m of the site, the only possible source of ground gas highlighted by the desk study searches was graveyard to the west of the site; however, this was considered to pose a negligible risk and overall the risk from ground gases was considered negligible. The ground investigation recorded made ground across the site to a maximum depth of 0.8m below existing ground level (begl) which comprised granular sub-base type deposits.

The gas monitoring programme was designed in general accordance with CIRIA C665 (2007) and BS8576 (2013). In accordance with CIRIA C665 the proposed end use of retirement apartments is a moderate sensitivity end use and based on the desk study and ground investigation findings the generation potential of the source is considered very low; as such CIRIA C665 states that the monitoring program should comprise six visits over four months (as per tables 5.5a and 5.5b). BS8576 outlines that gas monitoring might not be necessary for sites with very generation source potential as is the case on this site. As such four preliminary visits have been completed to assess whether additional monitoring would be required.

Three gas and groundwater monitoring standpipes were installed across the site (WS02, WS07 and WS11) to 3.00m begl with the response zones all within natural ground. The locations of which are shown on the appended site plan. The installations were accessible and intact throughout the scheduling monitoring period. As such, the results are considered representative of the gas regime across the whole site.

The standpipes were monitored over four visits between the 3 November 2022 and 20 December 2022 using a GA5000 Multi-Function Gas Analyser; the complete set of gas monitoring results are enclosed for reference.

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In summary, a maximum steady concentration of 2.70% v/v carbon dioxide and a minimum oxygen level of 14.50% v/v have been recorded. Traces of hydrogen sulphide were recorded on site. Carbon monoxide was recorded a maximum value of 3ppm during the monitoring. A maximum methane concentration of 0.20% v/v was recorded. As the gas levels were consistent across the monitoring visits it was considered that additional visits would not be required.

The risk from ground gases has been assessed using 'Situation B' as outlined in CIRIA C665. Using a maximum steady flow rate of 2.1 l/hr and the maximum carbon dioxide concentration of 2.70% v/v equates to a GSV of 0.0567 l/hr. Using a maximum steady flow rate of 2.1 l/hr and the maximum methane concentration of 0.20% v/v equates to a GSV of 0.0042 l/hr.

In accordance with BS8485, the end use classifies the proposed development as a Type B Building. The calculated GSV for carbon dioxide and methane classify the entire site as Characteristic Situation 1. It is considered that this classification is suitable and in line with BS 8485:2015+A1:2019 as carbon dioxide and methane concentrations are well below the threshold values for an increase (> 5% v/v (Carbon Dioxide) and 1% v/v (Methane)).

With respect to the recorded carbon monoxide concentrations, there are no specific limits in a residential environment, however the long-term workplace limits for these gases are 20ppm and therefore does not pose a risk to the proposed development.

The site is not recorded to be within an area where radon protection measures are required.

This letter should be submitted to the relevant authority. We trust the above meets your requirements, should you have any queries or questions please do not hesitate to contact the undersigned.

Yours sincerely,



Rich Allen
Engineer

enc. 10891 Gas Monitoring Results
10891 Exploratory Borehole Location Plan

Ground Gas and Groundwater Monitoring Record Sheet

JOB DETAILS:

Client: McCarthy Stone
Site: Huyton Lane, Liverpool
Date: 03/11/2022

Job No: 10891
Visit No: 1 of 4
Operator: BR

Project Manager: HA

[illegible]**METEOROLOGICAL AND SITE INFORMATION:**

(Select correct box with X or enter data, as applicable)

State of ground:

Wind:

Cloud cover:

Precipitation:

Barometric pressure (mbar):

Pressure trend:

Air Temperature (Deg. C):

Ground Gas and Groundwater Monitoring Record

JOB DETAILS:

Client: McCarthy Stone
 Site: Huyton Lane, Liverpool
 Date: 30/11/2022

Job No: 10891
 Visit No: 3 of 4
 Operator: BR

Project Manager: HA

	GAS CONCENTRATIONS												VOCs		GAS FLOWS			WELL AND GROUNDWATER DATA					Comments	
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady								
WS02	0.2	0.1			0.8	0.5	0	0	0	0	19.8	20.3			0.0	0.0			2.18	2.96				
WS07	0.2	0.2			0.5	0.5	0	0	0	0	16.9	16.9			0.0	0.0			2.68	3.03				
WS11	0.2	0.2			2.6	2.6	2	2	0	0	18.9	18.9			2.1	2.1			1.1	2.88				
Max	0.2	0.2	0	0	2.6	2.6	2	2	0	0	19.8	20.3			2.1	2.1			2.68	3.03				
Min	0.2	0.1	0	0	0.5	0.5	0	0	0	0	16.9	16.9			0.0	0.0			1.06	2.88				
GSV (l/hr)	0.0042				0.0546																			

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

Wind:

Cloud cover:

Precipitation:

Barometric pressure (mbar):

Pressure trend:

Air Temperature (Deg. C):

☒ Dry
☐ Calm
☐ None
☒ None

☒ Moist
☒ Light
☒ Slight
☐ Slight
 1023 Before
☐ Falling
 7 Before

(Select correct box with X or enter data, as applicable)

☐ Wet
☐ Moderate
☐ Cloudy
☐ Moderate
☐ Steady

☐ Snow
☐ Strong
☐ Overcast
☐ Heavy
 1025 After
☒ Rising
 7 After

☐ Frozen

Ground Gas and Groundwater Monitoring Record

JOB DETAILS:

Client: McCarthy Stone
 Site: Huyton Lane, Liverpool
 Date: 20/12/2022

Job No: 10891
 Visit No: 4 of 4
 Operator: BR

Project Manager: HA

	GAS CONCENTRATIONS												VOCs		GAS FLOWS				WELL AND GROUNDWATER DATA					Comments
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady								
WS02	0.2	0.2			1.2	1.2	0	0	0	0	16.1	16.1			0.0	0.0			2.03	2.96				
WS07	0.2	0.2			0.5	0.5	0	0	0	0	14.5	14.5			-0.2	-0.2			2.34	3.03				
WS11	0.2	0.2			2.7	2.6	2	2	0	0	17.1	17.1			-0.1	-0.1			1.0	2.88				
Max	0.2	0.2	0	0	2.7	2.6	2	2	0	0	17.1	17.1			0.0	0.0			2.34	3.03				
Min	0.2	0.2	0	0	0.5	0.5	0	0	0	0	14.5	14.5			-0.2	-0.2			0.96	2.88				
GSV (l/hr)	0				0																			

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

☐ Dry

Wind:

☐ Calm

Cloud cover:

☐ None

Precipitation:

☒ None

Barometric pressure (mbar):

Pressure trend:

Air Temperature (Deg. C):

(Select correct box with X or enter data, as applicable)

☒ Moist

☒ Light

☒ Slight

☐ Moderate

1000 Before

☐ Falling

7 Before

☐ Wet

☐ Moderate

☐ Cloudy

☐ Moderate

☒ Steady

☐ Snow

☐ Strong

☐ Overcast

☐ Heavy

1000 After

☐ Rising

7 After

☐ Frozen

Summary of Ground Gas and Groundwater Monitoring

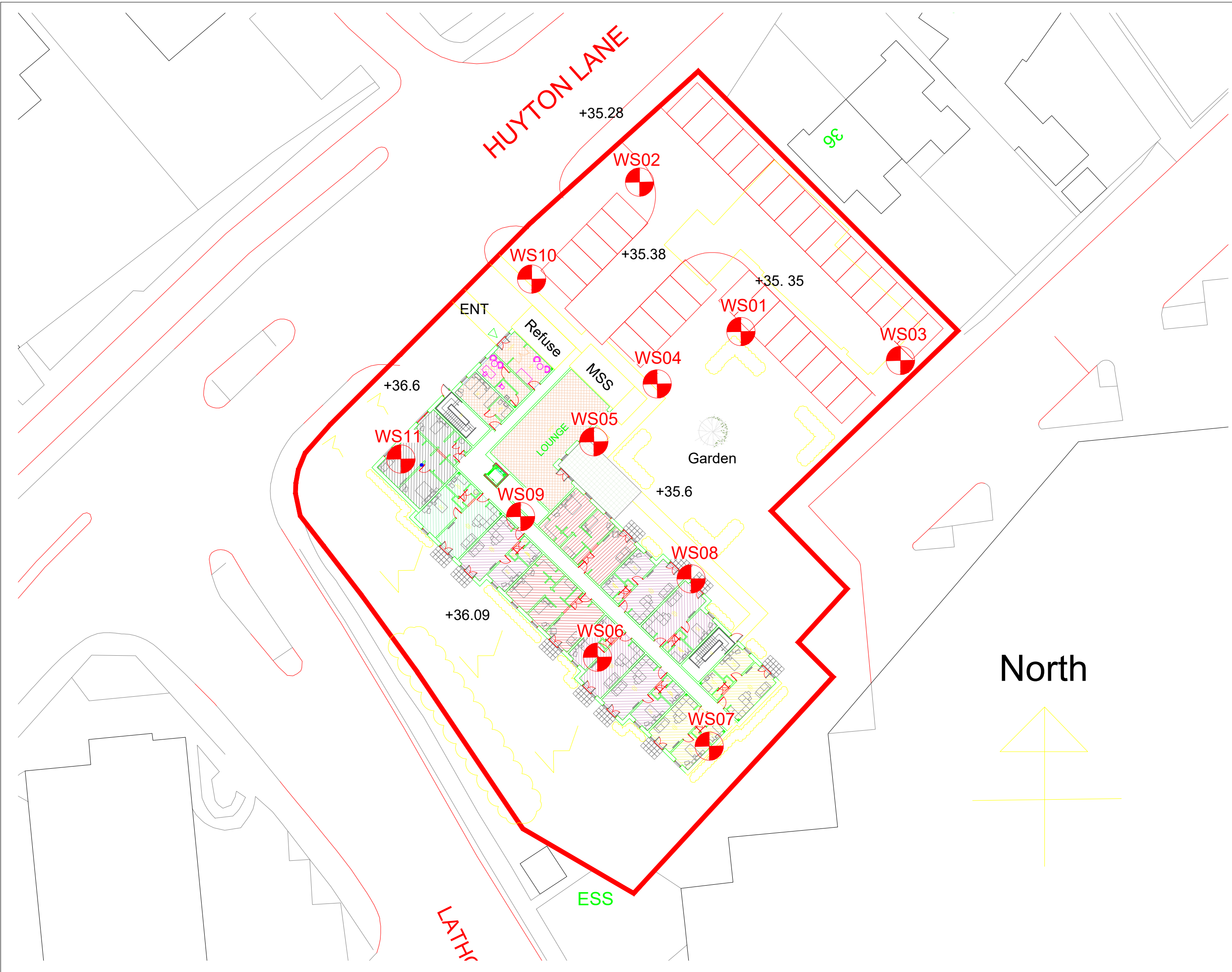
JOB DETAILS:

Client: McCarthy Stone
Site: Huyton Lane, Liverpool

Job No: 10891

Project Manager: HA

	GAS CONCENTRATIONS										VOLATILES		FLOW DATA		WELL AND WATER DATA					Comments	
Monitoring Point	Methane (%v/v)		Carbon dioxide (%v/v)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%v/v)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Differential borehole Pressure (Pa)	Average Water level (mbgl)	Depth of well (m)	Reduced level (mAOD)	Water level (mAOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady			Peak	Steady							
WS02	0.20	0.20	1.20	1.20	0	0	1	1	16.10	16.10	-	-	0.4	0.4	-	2.10	2.95	-	-	-	
WS07	0.20	0.20	0.50	0.50	0	0	1	1	14.50	14.50	-	-	0.6	0.6	-	2.34	3.03	-	-	-	
WS11	0.20	0.20	2.70	2.60	3	3	0	0	17.10	17.10	-	-	2.1	2.1	-	0.98	2.70	-	-	-	
Max	0.20	0.20	2.70	2.60	3	3	1	1	17.10	17.10			2.1	2.1		2.34	3.03				
Min	0.00	0.00	0.00	0.00	0	0	0	0	0.00	0.00			0.0	0.0		0.98	2.70				
GSV (l/hr)	0.0042		0.0546																		



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Rev.	Amendments	Date	Drg	Chg
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Revisions



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10891 - Huyton Lane

Drawing

Exploratory Hole Location Plan

Scales NTS At original size A1

Date	5/12/2022	Drawn by	Checked by
		HA	JPB

Status **Draft**

Drawing No. HLL-PPC-00-XX-DR-G-704 Rev. 1