



**Castledine
Environmental**

LAND CONTAMINATION SURVEYS

Ground Gas Risk Assessment

for

Proposed Demolition of Existing Dwelling and Outbuildings and Erection of a Replacement Dwelling and Detached Garage

on the site of

**Little Moat, Newbold Road,
Kirkby Mallory, Leicester
LE9 7QG**

Date: May 2023

Status:

Final Report

Reference:

3424D P2 Gas Hall – Kirkby Mallory

Date:

15/05/2023

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EXECUTIVE SUMMARY

The site has been assessed for hazardous ground gasses following a regime of ground gas monitoring carried out between 6th of February 2023 and 18th April 2023.

The maximum steady flowrates and maximum concentrations of Methane and Carbon Dioxide in each monitoring well have been used to calculate the Gas Screening Value (GSV).

The ground gas monitoring readings can found as Appendix A and the Characteristic Situation calculations can be found as Appendix B. Ground gas readings and subsequent calculations show that the site is classified as Characteristic Situation one and as such, no protective measures are considered necessary for this development.

A Watching Brief should be carried out by the site supervisor during the course of demolition, site clearance and construction works for any obvious contamination (e.g. oil spillage in ground, buried waste, possible asbestos containing material). Should previously unreported or undiscovered contamination be identified, then development should stop and Castledine Environmental should be contacted to determine if further assessment or changes to the remediation scheme are required.

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1.0 QUALITY ASSURANCE

Castledine Environmental confirm that all reasonable efforts have been made to ensure that the information outlined within this report is accurate.

Castledine Environmental would further confirm that due care, attention and technical skill were used in the creation of this report.

For and on behalf of Castledine Environmental

Kevin Castledine

(Director)

2.0 LIMITATIONS

The conclusions and recommendations made in this report are limited to those based on the findings of the investigation. Where comments are made based on information obtained from third parties, Castledine Environmental assumes that all third-party information is true and correct. The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practice at the time.

There may be other conditions prevailing at the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

3.0 INTRODUCTION

Castledine Environmental have been appointed by Mr T J Hall to undertake Ground Gas investigation at Little Moat (No.12 Newbold Road), Newbold Road, Kirkby Mallory, Leicestershire LE9 7QG.

A Phase 1 and 2 report were carried out by Castledine Environmental:

- Phase 1 Land Contamination Risk Assessment for site at Newbold Road, Kirkby Mallory, Leicestershire. Produced by Castledine Environmental in August of 2022 and referenced: 3338D
- Phase 2 Land Contamination Risk Assessment for site at Newbold Road, Kirkby Mallory, Leicestershire. Produced by Castledine Environmental in February of 2023 and referenced: 3424D

4.0 SCOPE

Castledine Environmental have prepared this report for the sole use and reliance of Mr T J Hall and their appointees for the purpose of ensuring compliance with BS8485-2015+A1:2019.

This report may not be used or relied upon by any unauthorised third party, or for any other proposed use than that specified above, without the explicit written agreement of Castledine Environmental.

This report consists of Ground Gas Risk Assessment in accordance with:

- BS10175:2011+A2:2017, Investigation of potentially contaminated sites. Code of practice
- BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings
- CLR11 "Model Procedures for the Management of Land Contamination".
- LCRM "Land Contamination Risk Management".
- CIRIA C665 "Assessing risks posed by hazardous ground gases to buildings"

The objectives of the report are:-

To assess the ground gas monitoring readings to ascertain the Characteristic Situation of the site and thus the level of protection required (if any).

5.0 SITE DESCRIPTION

The site is located in Kirkby Mallory, Leicestershire at National Grid Reference: 445349,301639 and is approximately 0.51ha in area.

The site is rectangular in shape and is orientated north east to south west and connected to Newbold Road to the west via a connecting access spur. The site is located in a predominantly rural area and is directly bounded by a small, fielded area with an associated dwelling and grounds beyond to the north, field beyond a hedgerow to the east, further field south and west with Newbold Road to the west and a small lake beyond this.

6.0 SUMMARY OF GAS RISKS

A number of potential ground gas generation sources have been identified nearby to site, including a number of large moats or ponds located approximately 85-90m north (present from circa.1959 to circa.1980 and 2001); and a historical, unlicensed landfill located 149m south west of site and accepting inert, industrial and liquid sludge wastes (in effect from circa.1951-74). Whilst the site is located atop a predominantly low permeability bedrock formation (the Gunthorpe Member), the formation is recorded as possessing fracture pathways, which may provide a route to site. Furthermore, superficial geological deposits (Glaciofluvial Deposits) in the local area are recorded to be very high to high in permeability, thus offering potential pathways to site. As the moats and potentially the historical landfill are likely to be relatively shallow and located within superficial deposits, this raises the risk. Furthermore, the age since infill of the moats or ponds would indicate that - should these features be producing hazardous ground gases - the generational peak has likely not been passed at this stage.

7.0 CONCLUSION

The site has been assessed for hazardous ground gasses following a regime of ground gas monitoring carried out between 6th of February 2023 and 18th April 2023.

The maximum steady flowrates and maximum concentrations of Methane and Carbon Dioxide in each monitoring well have been used to calculate the Gas Screening Value (GSV).

The ground gas monitoring readings can be found as Appendix A and the Characteristic Situation calculations can be found as Appendix B. Ground gas readings and subsequent calculations show that the site is classified as Characteristic Situation one and as such, no protective measures are considered necessary for this development.

APPENDIX A

GAS MONITORING DATA



LAND CONTAMINATION SURVEYS

Date 06/02/23
 Client TJ Hall Ltd
 Site Kirky Mallory
 Job No 3424D
 Visit One

Ground Dry
 Wind Calm
 Cloud None
 Rain None

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.2	0.2	ND	ND	1.6	0.8	13	0	0	0	19.8	20.7
WS02	0.2	0.2	ND	ND	1.8	1.8	5	0	0	0	19.4	19.4
WS04	0.3	0.2	ND	ND	0.7	0.7	2	0	0	0	20.6	20.6
Max	0.3	0.2	0	0	1.8	1.8	13	0	0	0	20.6	20.7
Min	0.2	0.2	0	0	0.7	0.7	2	0	0	0	19.4	19.4

Monitoring Point	VOLATILES	FLOW DATA		WELL AND WATER DATA		
	PID Peak	Flow rate		Water level	Depth of well	Comments
	(ppm)	(l/hr)		(mbgl)	(m)	
		Peak	Steady			
WS01	NR	0.1	0.0	Dry	1.6	
WS02	NR	0.1	0.0	Dry	2.0	
WS04	NR	0.1	0.0	1.4	3.4	
Max	0	0.1	0.0			
Min	0	0.1	0.0			

Barometric Pressure

1025
1025
1025

CS by Site Characteristic

CS	Hazard Potential
CS1	Very Low
CS2	Low
CS3	Moderate
CS4	Moderate to High
CS5	High
CS6	Very High

Visit One Result Methane: CS1
 Visit One Result Carbon Dioxide: CS1



Date 21/02/23
 Client TJ Hall Ltd
 Site Kirky Mallory
 Job No 3424D
 Visit Two

Ground Moist
 Wind Light
 Cloud Overcast
 Rain None

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.2	0.2	ND	ND	1	1	8	0	0	0	20.8	20.8
WS02	0.3	0.2	ND	ND	1.8	1.8	2	0	0	0	19.8	19.8
WS04	0.2	0.2	ND	ND	1.5	0.8	1	0	0	0	19.9	20.6
Max	0.3	0.2	0	0	1.8	1.8	8	0	0	0	20.8	20.8
Min	0.2	0.2	0	0	1	0.8	1	0	0	0	19.8	19.8

	VOLATILES	FLOW DATA		WELL AND WATER DATA					CS by Site Characteristic	
Monitoring Point	PID Peak	Flow rate		Water level	Depth of well				CS	Hazard Potential
	(ppm)	(l/hr)		(mbgl)	(m)	Comments				
		Peak	Steady				Barometric Pressure			
WS01	NR	0.1	-0.1	Dry	1.6		1001		CS1	Very Low
WS02	NR	0.1	-0.1	Dry	2.0		1001		CS2	Low
WS04	NR	0.1	-0.1	1.1	3.3		1001		CS3	Moderate
									CS4	Moderate to High
									CS5	High
									CS6	Very High
Max	0	0.1	-0.1						Visit Two Result Methane:	CS1
Min	0	0.1	-0.1						Visit Two Result Carbon Dioxide:	CS1



LAND CONTAMINATION SURVEYS

Date 07/03/23
 Client TJ Hall Ltd
 Site Kirky Mallory
 Job No 3424D
 Visit Three

Ground Dry
 Wind Calm
 Cloud Slight
 Rain None

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.3	0.3	ND	ND	1.1	1.1	3	0	0	0	20.2	20.3
WS02	0.2	0.2	ND	ND	1.8	1.8	1	0	0	0	20.2	20.2
WS04	0.2	0.2	ND	ND	0.9	0.9	1	0	0	0	20.5	20.6
Max	0.3	0.3	0	0	1.8	1.8	3	0	0	0	20.5	20.6
Min	0.2	0.2	0	0	0.9	0.9	1	0	0	0	20.2	20.2

Monitoring Point	VOLATILES	FLOW DATA		WELL AND WATER DATA		
	PID Peak (ppm)	Flow rate (l/hr)		Water level (mbgl)	Depth of well (m)	Comments
		Peak	Steady			
WS01	NR	0.1	0.0	Dry	1.6	
WS02	NR	0.1	0.0	Dry	2.0	
WS04	NR	0.1	0.0	1.1	3.3	
Max	0	0.1	0.0			
Min	0	0.1	0.0			

Barometric Pressure

CS by Site Characteristic

CS	Hazard Potential
CS1	Very Low
CS2	Low
CS3	Moderate
CS4	Moderate to High
CS5	High
CS6	Very High

Visit One Result Methane: CS1

Visit One Result Carbon Dioxide: CS1



Date 21/03/23
 Client TJ Hall Ltd
 Site Kirky Mallory
 Job No 3424D
 Visit Four

Ground Dry
 Wind Light
 Cloud Overcast
 Rain None

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.3	0.3	ND	ND	1.2	1.2	2	0	0	0	17.8	17.8
WS02	0.3	0.3	ND	ND	1.3	1.3	1	0	0	0	19.4	19.4
WS04	0.3	0.3	ND	ND	1.3	1.3	1	0	0	0	18.7	18.7
Max	0.3	0.3	0	0	1.3	1.3	2	0	0	0	19.4	19.4
Min	0.3	0.3	0	0	1.2	1.2	1	0	0	0	17.8	17.8

	VOLATILES	FLOW DATA		WELL AND WATER DATA					CS by Site Characteristic		
Monitoring Point	PID Peak	Flow rate		Water level	Depth of well				CS	Hazard Potential	
	(ppm)	(l/hr)		(mbgl)	(m)	Comments					
		Peak	Steady				Barometric Pressure				
WS01	NR	0.1	0.3	Dry	1.6		991		CS1	Very Low	
WS02	NR	0.1	0.4	Dry	2.0		991		CS2	Low	
WS04	NR	0.1	0.3	1.2	3.2		991		CS3	Moderate	
									CS4	Moderate to High	
									CS5	High	
									CS6	Very High	
Max	0	0.1	0.4							Visit One Result Methane:	CS1
Min	0	0.1	0.3							Visit One Result Carbon Dioxide:	CS1

Visit One Result Methane: CS1
 Visit One Result Carbon Dioxide: CS1



Date 06/04/23
 Client TJ Hall Ltd
 Site Kirky Mallory
 Job No 3424D
 Visit Five

Ground Wet
 Wind Light
 Cloud Cloudy
 Rain None

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.3	0.3	ND	ND	2.2	2.2	2	0	0	0	17.5	17.5
WS02	0.4	0.2	ND	ND	1.7	1.7	2	0	0	0	17.3	17.7
WS04	0.2	0.2	ND	ND	2.3	2.3	1	1	0	0	17.8	17.8
Max	0.4	0.3	0	0	2.3	2.3	2	1	0	0	17.8	17.8
Min	0.2	0.2	0	0	1.7	1.7	1	0	0	0	17.3	17.5

Monitoring Point	VOLATILES	FLOW DATA		WELL AND WATER DATA		
	PID Peak	Flow rate		Water level	Depth of well	Comments
	(ppm)	(l/hr)		(mbgl)	(m)	
		Peak	Steady			
WS01	NR	0.1	0.3	Dry	1.5	Barometric Pressure 998
WS02	NR	0.1	0.2	0.4	2.0	
WS04	NR	0.1	0.2	1.4	3.2	
Max	0	0.1	0.3			
Min	0	0.1	0.2			

CS by Site Characteristic
CS Hazard Potential
 CS1 Very Low
 CS2 Low
 CS3 Moderate
 CS4 Moderate to High
 CS5 High
 CS6 Very High

Visit One Result Methane: CS1
 Visit One Result Carbon Dioxide: CS1



Date	18/04/23	Ground	Dry
Client	TJ Hall Ltd	Wind	Light
Site	Kirky Mallory	Cloud	Slight
Job No	3424D	Rain	None
Visit	Six		

Monitoring Point	GAS CONCENTRATIONS											
	Methane		%LEL		Carbon dioxide		Carbon monoxide		Hydrogen sulphide		Oxygen	
	(%v/v)				(%v/v)		(ppmv)		(ppmv)		(%v/v)	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady
WS01	0.2	0.2	ND	ND	2.8	2.8	3	1	0	0	16.0	16.0
WS02	0.2	0.2	ND	ND	2.5	2.2	1	1	0	0	17.4	17.4
WS04	0.2	0.1	ND	ND	2.7	2.7	2	1	0	0	17.3	17.4
Max	0.2	0.2	0	0	2.8	2.8	3	1	0	0	17.4	17.4
Min	0.2	0.1	0	0	2.5	2.2	1	1	0	0	16.0	16.0

Monitoring Point	VOLATILES	FLOW DATA		WELL AND WATER DATA		
	PID Peak (ppm)	Flow rate (l/hr)		Water level (mbgl)	Depth of well (m)	Comments
		Peak	Steady			
WS01	NR	0.1	0.2	Dry	1.4	
WS02	NR	0.0	0.2	0.3	2.0	
WS04	NR	0.0	0.1	0.7	3.1	
Max	0	0.1	0.2			
Min	0	0.0	0.1			

CS by Site Characteristic

CS	Hazard Potential
CS1	Very Low
CS2	Low
CS3	Moderate
CS4	Moderate to High
CS5	High
CS6	Very High

Visit One Result Methane: CS1

Visit One Result Carbon Dioxide: CS1

APPENDIX B

CHARACTERISTIC SITUATION CALCULATIONS



Summary of Results

Client| TJ Hall Ltd
 Site| Kirky Mallory
 Job No| 3424D

Overall Result:
CS01

		Readings		Calcs	CS No
		Max	Min		
Visit 1	Methane	0.3	0.2	0.00030	CS1
	Carbon Dioxide	1.8	0.7	0.00180	CS1
	Carbon Monoxide	13	0		
	Hydrogen Sulphide	0	0		
	Oxygen	20.7	19.4		
	Flow	0.1	0		

Visit 2	Methane	0.3	0.2	0.00030	CS1
	Carbon Dioxide	1.8	0.8	0.00180	CS1
	Carbon Monoxide	8	0		
	Hydrogen Sulphide	0	0		
	Oxygen	20.8	19.8		
	Flow	0.1	-0.1		

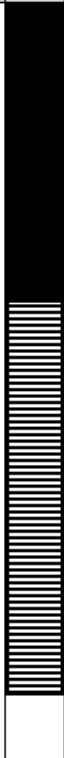
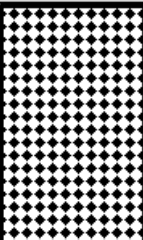
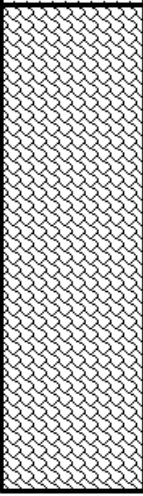
Visit 3	Methane	0.3	0.2	0.00030	CS1
	Carbon Dioxide	1.8	0.9	0.00180	CS1
	Carbon Monoxide	3	0		
	Hydrogen Sulphide	0	0		
	Oxygen	20.6	20.2		
	Flow	0.1	0		

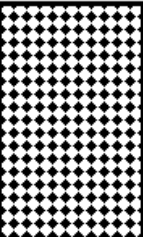
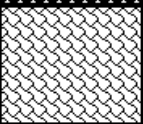
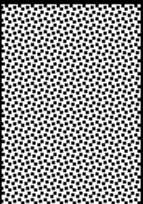
		Readings		Calcs	CS No
		Max	Min		
Visit 4	Methane	0.3	0.3	0.00120	CS1
	Carbon Dioxide	1.3	1.2	0.00520	CS1
	Carbon Monoxide	2	0		
	Hydrogen Sulphide	0	0		
	Oxygen	19.4	17.8		
	Flow	0.4	0		

Visit 5	Methane	0.4	0.2	0.00120	CS1
	Carbon Dioxide	2.3	1.7	0.00690	CS1
	Carbon Monoxide	2	1		
	Hydrogen Sulphide	0	0		
	Oxygen	17.8	17.3		
	Flow	0.3	0		

Visit 6	Methane	0.2	0.1	0.00040	CS1
	Carbon Dioxide	2.8	2.2	0.00560	CS1
	Carbon Monoxide	3	1		
	Hydrogen Sulphide	0	1		
	Oxygen	17.4	16		
	Flow	0.2	0		

APPENDIX C GAS INSTALLATION LOGS

Project.		Little Moat, No.12 Newbold Rd, Kirkby Mallory			WS		
					WS01		
Client.		Mr. T. J. Hall			Date		
					24/01/2023		
Method.					Project Reference.		
		Dynamic window-sampler rig			3424D		
GW	Install	Depth (m)	Description of Strata	Legend	Samples		
					Type	Depth (m)	
						From	To
No GW encountered during drilling works.		0.30	Dark brown very gravelly, clayey, sandy MADE GROUND with gravel sized fragments of subangular to subrounded, fine to coarse of igneous road planings, quartzite, brick, sandstone and rootlets.		ES01	0.10	0.15
		1.50	Light brown very sandy, slightly clayey subrounded to rounded, fine to coarse GRAVEL of mixed natural lithologies.		ES02	0.60	0.65
Blows			Key			 Castledine Environmental LAND CONTAMINATION SURVEYS	
1m:7,10,11,12,12,13			Logged By	Scale	Sheet		
1.5m:7,11,12,12,13,13 Refusal			DW	Not to Scale	1 of 1		

Project.		Little Moat, No.12 Newbold Rd, Kirkby Mallory			WS		
					WS02		
Client.		Mr. T. J. Hall			Date		
					24/01/2023		
Method.					Project Reference.		
Dynamic window-sampler rig					3424D		
GW	Install	Depth (m)	Description of Strata	Legend	Samples		
					Type	Depth (m)	
						From	To
No GW encountered during drilling works.		0.50	Dark brown very gravelly, very clayey, sandy MADE GROUND with gravel sized fragments of subangular to subrounded, fine to coarse of igneous road planings, quartzite, glass, brick, plastic, concrete and rootlets.		ES01	0.20	0.25
		0.60	Brown clayey, sandy angular to subrounded, fine to coarse GRAVEL of mixed natural lithologies.				
		1.00	Light brown very gravelly, slightly clayey coarse SAND gravel is subrounded to rounded, fine to medium of sandstone and mixed natural lithologies.		ES02	0.80	0.85
		2.00	Orangish brown very clayey, subrounded to rounded, fine to coarse GRAVEL of mixed natural lithologies (drilling refusal at this depth on cobble)				
Remarks			Key			 Castledine Environmental LAND CONTAMINATION SURVEYS	
2m:7,10,12,12,13,13 Refusal			Logged By	Scale	Sheet		
			DW	Not to Scale	1 of 1		

Project.		Little Moat, No.12 Newbold Rd, Kirkby Mallory			WS		
					WS04		
Client.		Mr. T. J. Hall			Date		
					24/01/2023		
Method.					Project Reference.		
Dynamic window-sampler rig					3424D		
GW	Install	Depth (m)	Description of Strata	Legend	Samples		
					Type	Depth (m)	
						From	To
GW encountered at 2m depth.		0.20	Light brown very sandy MADE GROUND comprised of ménage coarse sands and plastic fragments.		ES01	0.10	0.15
		0.40	Light brown very sandy MADE GROUND comprised of ménage coarse sands.		ES02	0.25	0.30
		1.30	Orange, brown to cream slightly clayey coarse SAND .				
		3.00	Reddish brown clayey, slightly gravelly SAND , gravel is surrounded to rounded, fine to medium of mixed natural lithologies.				
		4.00	Brown very clayey, sandy, subrounded to rounded, fine to coarse GRAVEL of mixed natural lithologies.				
Remarks			Key				
1.5m P			Logged By	Scale	Sheet		
1.5m S			DW	Not to Scale	1 of 1		
 Castledine Environmental LAND CONTAMINATION SURVEYS							