

Gary Rafferty
Lidl Great Britain Ltd
Iport Unit 4
Ontario Drive
DN11 0BF

Dear Gary,

Post Remediation Ground Gas Assessment, Lidl Birstall, West Yorkshire

Remada Ltd was commissioned by Lidl Great Britain Ltd (the "Client") to update the earlier Ground Gas Risk Assessment for the proposed Lidl and Home Bargains stores on land off Bankwood Way, Birstall, West Yorkshire WF17 9TD. Remada was separately appointed by Stonedale Construction Ltd to prepare a Verification Report for the remediation works at Birstall as set out in Remada's Combined Remediation Strategy Drilling & Grouting Plan ref: 1080.07.01.

Remada's appointment by Stonedale excluded the post remediation ground gas monitoring requirement as set out in Kirklees Councils EHO response WK/202523429 and as detailed in Remada's Combined Remediation Strategy Drilling & Grouting Plan ref: 1080.07.03

This letter provides an addendum to Remada's Verification Report 1080.08.01 for whom the client was StoneDale Construction Ltd.

1. Previous Reports

A summary of all available reports have been tabulated and summarised by Remada in Section 2 of the 1080.07.03 Combined Remediation Strategy, Drilling and Grouting Plan, January 2025.

A few portions of Section 2.1.3 are stated: '*Historical landfill was indicated on-site across the majority of the site area and extending off-site to the southwest in 1970. Landfill operations were considered to have continued until the mid-1980s*', and '*Made Ground was found to vary spatially, with thicker Made Ground in the east of the site, shallowing rapidly in the northeast, and with thinner deposits of Made Ground in the west and north of the site*', and '*Weathered and solid bedrock was encountered at depths of less than 2.0m bgl outside the footprint of the historic landfill, and at a depth of 14.5m bgl within the footprint of the landfill.*'

The former reports state the site would be initially CS2 before adjusting to a CS4 designation for the entire site.

Where the landfill had been on site, deep Made Ground was encountered to a maximum depth of 14.5m and in the western portion of the site outside the former landfill, Made Ground was encountered to 2.0m bgl.

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A Cut and Fill drawing is presented within Remada's Remediation Strategy and indicates that a cut of up to 3m will be formed in the west of the site whilst the eastern half of the site will be raised up to 2.4m.

2. Stonedale Remediation Works

The scope of remediation works implemented by Stonedale Construction Ltd is described in Remada's Verification Report 1080.08.01. In general there was a cut which exposed natural ground as a formation in the zone of the proposed Home Bargains store, whilst ground levels were raised over existing existing Made Ground/Waste in the zone of the proposed Lidl store.

3. Post Remediation Ground Gas Monitoring

3.1 Scope

The scope of post remediation ground gas monitoring is summarised in the Kirkless Council correspondence WK/202523429 and comprises:

A minimum of three 3 No. ground gas monitoring wells are to be installed within each proposed building footprint to a depth of 5m below the proposed formation level. The concentrations of Methane, carbon dioxide, oxygen and the gas flow rate are to be measured at each well for a minimum of four (4 No.) monitoring events over a four week period during periods of low and high atmospheric pressure. The results of the ground gas monitoring will form an updated Ground Gas Risk Assessment and to confirm the extent of ground gas protection measure prior to construction of the buildings.

3.2 Methodology

3.2.1 Installations

Combined ground gas and groundwater monitoring standpipes were installed in selected wells with a 50mm diameter slotted HDPE pipe and packed with gravel surround as recorded on the exploratory logs. Wells were completed with 0.5 – 1.0m of plain HDPE pipe and bentonite seal, with a gas bung and tap being installed at the top of the pipe.

3.2.2 Monitoring

Ground gas monitoring was undertaken using a GasData GFM436 gas analyser for the parameters reported below. Groundwater levels were measured with a GeoSense OWP30 oil water interface probe.

Permanent ground gas monitoring involved the measurement of the following in the prescribed order:

- Pressure difference between the monitoring well and the atmosphere,
- Peak and steady flow rates of gas into or out of the monitoring well;
- Peak and steady concentrations of carbon dioxide, Methane, oxygen (minimum and steady recorded), carbon monoxide, hydrogen sulphide; and
- Depth to groundwater.

Four ground gas monitoring visits were undertaken at one weekly intervals over a four week period.

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Boreholes BH1 to BH3 were advanced beneath the proposed Home Bargains store to the west of the site whilst boreholes BH4 to BH6 were advanced to the east beneath the proposed Lidl store, in the area of the former landfill.

The Exploratory Hole Location plan, Window Sample Borehole Logs and Gas and Groundwater Monitoring Results are all presented in the Enclosures.

4. Ground Conditions

Boreholes BH1 to BH3 were advanced to a maximum depth of 5.0m bgl and were found to comprise Made Ground of a granular nature in BH1 only, to 0.8m bgl. This was overlaying cohesive Made Ground, similar to the Made Ground encountered from ground level in BH2 and BH3. The Made Ground was encountered to a maximum depth of 2.8m which overlay CLAY and locally SAND. Black COAL was encountered within BH3 only between 3 and 4m.

Boreholes BH4 to BH6 encountered a gravelly clayey sand and locally a sandy gravelly clay in BH6 only. All three boreholes were terminated at 1.0m bgl due to refusal of the liner during the drilling process.

5. Ground Gas Monitoring Results & Assessment for Home Bargains

5.1 Monitoring

The results of the ground gas and groundwater monitoring programme are summarised below:

- A maximum steady state concentration of Methane was recorded as 3.8% v/v in BH3 on 2nd February 2026. Methane concentrations were recorded at less than the instrument detection limit in the remaining two monitoring wells;
- A maximum steady state concentration of Carbon Dioxide was recorded as 2.7% v/v in BH3 on 6th January 2026 only. Carbon Dioxide concentrations were recorded at less than the instrument detection limit in all other monitoring wells;
- A minimum steady stated concentration of Oxygen was recorded 0.5 % v/v in BH3 on 26th February 2026;
- Ground gas flow rates were recorded at less than the instrument detection limit in all monitoring wells except in BH3 on 26th January 2026 when a negative flow was encountered;
- Groundwater was encountered within all of the standpipes over the course of the monitoring programme between depths of 1.5 and 4.08m bgl; and,
- Atmospheric pressure at the time of sampling varied between a high of 995 millibar (mbar) on 6th January 2026 and a low of 979 mbar on 12th January 2026. The monitoring visits were undertaken during periods of rising, steady and falling pressure trends over the preceding forty-eight hours.

5.2 Assessment

In order to understand the gassing regime at the site, a Characteristic Situation (as defined in CIRIA C665 and BS8576:2013) is determined for the site. CIRIA C665 and BS8576 provides definitions for each Characteristic Situation based on Gas Screening Values (GSV) which are calculated as follows:

- $GSV = \text{Gas Concentration (\% v/v)} \times \text{Measured Borehole Flow Rate (l/hr)}$

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BS8576 makes a distinction between the GSV and the Hazardous Gas Flow Rate (Q_{hg}) which is also calculated using the above calculation. BS8576 states that Q_{hg} is calculated for each individual borehole for each monitoring visit, whereas the GSV is taken as the representative value for the site or site zone.

As a worst case assessment, the GSV for the site is therefore taken as the maximum steady-state carbon dioxide/Methane concentration recorded in the boreholes which is multiplied by the maximum flow rate recorded during the same monitoring event.

- Methane GSV = 3.8 % x 0.1 l/hr = 0.0038 l/hr (flow rate taken as equal to the instrument detection limit of 0.1%).
- Carbon Dioxide GSV = 4.0 % x 0.1 l/hr = 0.004 l/hr

The calculated GSV of less than 0.07 l/hr for Methane and carbon dioxide places the site into Characteristic Situation 1. BS 8485:2015+A1:2019 states that for Characteristic Situation 1 the Methane concentration would typically be less than 1% and carbon dioxide less than 5% and that if concentrations are above these limits then consideration should be given to placing the site into **Characteristic Situation 2**.

6. Ground Gas Monitoring Results & Assessment for Lidl

6.1 Monitoring

The results of the ground gas and groundwater monitoring programme are summarised below:

- A maximum concentration of Methane was recorded as 27.4% v/v in BH4 on 26th January 2026. Methane concentrations were recorded at less than the instrument detection limit in the remaining two monitoring wells;
- A maximum steady state concentration of Carbon Dioxide was recorded as 0.4% v/v in BH4 on 6th January 2026 only. Carbon Dioxide concentrations were recorded at less than the instrument detection limit in all other monitoring wells;
- A minimum steady stated concentration of Oxygen was recorded 0.0 % v/v in BH4 and BH5 on 19th January 2026 and once each again on 26th January and 2nd February 2026 respectively;
- Ground gas flow rates were recorded at less than the instrument detection limit in all monitoring wells;
- Groundwater was not encountered within any of the standpipes over the course of the monitoring programme; and,
- Atmospheric pressure at the time of sampling varied between a high of 996 millibar (mbar) on 6th January 2026 and a low of 979 mbar on 12th January 2026. The monitoring visits were undertaken during periods of rising, steady and falling pressure trends over the preceding forty-eight hours.

6.2 Assessment

- Methane GSV = 27.4 % x 0.1 l/hr = 0.0274 l/hr (flow rate taken as equal to the instrument detection limit of 0.1%).
- Carbon Dioxide GSV = 0.1 % x 0.1 l/hr = 0.0001 l/hr (Carbon Dioxide rate taken as equal to the instrument detection limit of 0.1%).

The calculated GSV of less than 0.07 l/hr for Methane and carbon dioxide places the site into Characteristic Situation 1. BS 8485:2015+A1:2019 states that for Characteristic Situation 1 the Methane concentration would typically be less than 1% and carbon dioxide less than 5% and that if concentrations are above these limits then consideration should be given to placing the site into **Characteristic Situation 2**.

The results of the gas and groundwater monitoring programme are presented as **Table 1** and **Table 2** for the Home Bargains and Lidl stores respectively.

7. Radon Protection Measures

The UKHSA updated radon maps in December 2022. Reports written prior to December 2022 may have been correct at the time of writing but Remada has requested an up-to date site-specific radon search from British Geological Survey. The report is appended and indicates that the site is generally in an area where 5 to 10% of homes are estimated to be at or above the action level. This site-specific report states that basic radon protection measures i.e. a radon resistant membrane should be incorporated with the proposed stores on site.

8. Example Membrane

An example of a combined methane and radon resistant membrane is **appended**.

Yours sincerely,

Krysia Szybut
Senior Geo-Environmental Consultant
Remada Ltd

Enclosures:

Limitations
Logs
Figure
Tables 1 & 2
Radon Map
Example Membrane

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STUDY LIMITATIONS

IMPORTANT. This section should be read before reliance is placed on any of the information, opinions, advice, recommendations or conclusions contained in this report.

1. This report has been prepared by Remada, Ltd with all reasonable skill, care and diligence within the terms of the Appointment and with the resources and manpower agreed with (the 'Client'). Remada does not accept responsibility for any matters outside the agreed scope.

2. This report has been prepared for the sole benefit of the Client unless agreed otherwise in writing.

3. Unless stated otherwise, no consultations with authorities or funders or other interested third parties have been carried out. Remada is unable to give categorical assurance that the findings will be accepted by these third parties as such bodies may have published, more stringent objectives. Further work may be required by these parties.

4. All work carried out in preparing this report has used, and is based on, Remada's professional knowledge and understanding of current relevant legislation. Changes in legislation or regulatory guidance may cause the opinion or advice contained in this report to become inappropriate or incorrect. In giving opinions and advice pending changes in legislation, of which Remada is aware, have been considered. Following delivery of the report Remada has no obligation to advise the Client or any other party of such changes or their repercussions.

5. This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report.

6. Whilst this report and the opinions made are to the best of Remada's belief, Remada cannot guarantee the accuracy or completeness of any information provided by third parties.

7. This report has been prepared based on the information reasonably available during the project programme. All information relevant to the scope may not have received.

8. This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of changes in the condition of the site since the time of the investigation.

9. The content of this report represents the professional opinion of experienced environmental consultants. Remada does not provide specialist legal or other professional advice. The advice of other professionals may be required.

10. Where intrusive investigation techniques have been employed they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature of sampling, no investigation technique is capable of identifying all conditions present in all areas. In some cases the investigation is further limited by site operations, underground obstructions and above ground structures. Unless otherwise stated, areas beyond the boundary of the site have not been investigated.

11. If below ground intrusive investigations have been conducted as part of the scope, service tracing for safe location of exploratory holes has been carried out. The location of underground services shown on any drawing in this report has been determined by visual observations and electromagnetic techniques. No guarantee can be given that all services have been identified. Additional services, structures or other below ground obstructions, not indicated on the drawing, may be present on site.

12. Unless otherwise stated the report provides no comment on the nature of building materials, operational integrity of the facility or on any regulatory compliance issues.

13. Unless otherwise stated, samples from the site (soil, groundwater, building fabric or other samples) have NOT been analysed or assessed for waste classification purposes.

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Logs

1080.04.01
24th February 2026
Apps



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Key to exploratory hole symbols and abbreviations

SAMPLE TYPES

ACM - Asbestos sample	AMAL - Amalgamated sample	B - Bulk disturbed sample
BLK - Block sample	C - Core sample	CBR - CBR test sample
D - Disturbed sample	ES - Environmental sample	EW - Environmental water sample
G - Gas sample	J - Jar sample	L - Liner sample
TW - Pushed thin wall sample	U - Undisturbed sample	UT - Undisturbed thin wall sample
W - Water sample		

IN-SITU TESTS

HV - Hand shear vane	HV(r) - Hand shear vane residual	PID - Photo ionisation detector
PP - Hand penetrometer	SPT - Standard penetration test	SPT(C) - SPT using cone

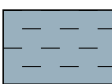
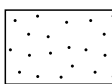
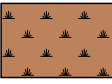
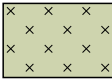
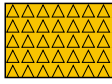
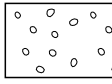
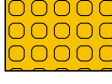
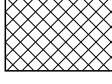
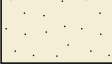
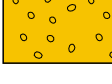
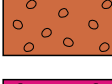
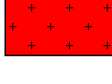
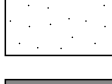
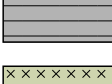
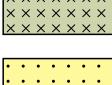
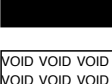
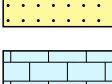
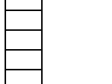
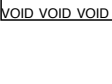
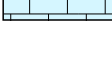
GROUNDWATER

 Groundwater strike	 Groundwater rest level
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ROTARY CORE DETAILS

TCR - Total core recovery (%)	SCR - Solid core recovery (%)	RQD - Rock quality designation (%)
FI - Fracture index	NI - Non-intact core	AZCL - Assumed zone of core loss

LEGEND

 Topsoil	 Clay	 Chalk	 Sand backfill
 Peat	 Silt	 Breccia	 Gravel backfill
 Made ground	 Sand	 Conglomerate	 Arisings
 Concrete	 Gravel	 Metamorphic	 Bentonite
 Wood	 Cobbles	 Igneous	 Concrete
 Brick	 Boulders		 Grout
 Bituminous material	 Mudstone		 Plain pipe
 Gypsum	 Siltstone		
 Coal	 Sandstone		 Slotted pipe
 Void	 Limestone		



Dynamic (Windowless) Sampler

BH1
Sheet 1 of 1

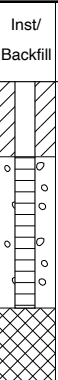
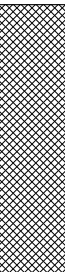
Hole Type WLS	Easting 423661.00	Northing 427443.00	Ground Level (m)	Scale 1:50
Project Name Lidl Birstall	Project No. 1080.08	Start Date 2025-12-17	End Date 2025-12-17	

Client Lidl Great Britain	Consultant Remada	Contractor
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(0.80)		MADE GROUND: Grey sandy clayey gravel. Gravel is angular to subangular fine to coarse brick, concrete, plastic and mudstone (Capping layer).	0.5
						0.80		MADE GROUND: Firm brown slightly sandy slightly gravelly clay with occasional cobbles. Gravel is angular to subangular medium to coarse sandstone. Cobbles are subangular sandstone. (Capping Layer).	1.0
						(2.00)		No Recovery (1.00 - 1.90m)	1.5
								No Recovery (2.00 - 2.45m)	2.0
						2.80 (0.20) 3.00		Very stiff dark yellowish brown laminated CLAY with mudstone lithorelicts.	3.0
								End of Borehole at 3.00m	3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks 1) Location CAT scanned prior to drilling. 2) Groundwater not encountered during drilling. 3) Borehole terminated at 3.00m bgl due to repeated collapse. 4) Borehole installed with gas and groundwater monitoring point upon completion.	Method, Plant, Stability, Dimensions	Logger
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Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (thickness) (m)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(1.80)		MADE GROUND: Soft grey sandy gravelly clay with occasional cobbles. Gravel is angular to subangular fine to coarse brick, concrete and sandstone. Cobbles are subangular brick. (Capping Layer).	0.5 1.0 1.5
								Extremely weak yellowish brown SANDSTONE.	2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0
								End of Borehole at 2.00m	

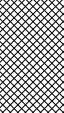
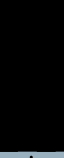
Logger

Dynamic (Windowless) Sampler

BH3
Sheet 1 of 1

Hole Type WLS	Easting 423662.00	Northing 427383.00	Ground Level (m)	Scale 1:50
Project Name Lidl Birstall		Project No. 1080.08	Start Date 2025-12-17	End Date 2025-12-17

Client Lidl Great Britain	Consultant Remada	Contractor
-------------------------------------	-----------------------------	-------------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(0.80)		MADE GROUND: Firm brownish grey sandy gravelly clay. Gravel is angular to subangular fine to coarse brick, concrete and sandstone. (Capping Layer).	0.5
						0.80 (0.20) 1.00		MADE GROUND: Brown gravelly clayey sand. Gravel is angular to subangular fine to coarse limestone. (Capping Layer).	1.0
						(2.00)		Soft to firm orangish brown mottled grey sandy gravelly CLAY. Gravel is angular to subangular fine to coarse sandstone (REWORKED NATURAL)	1.5
						3.00		Black COAL recovered as a sandy angular to subangular fine GRAVEL.	3.0
						(1.00)			3.5
						4.00		Very stiff grey slightly sandy CLAY.	4.0
						(1.00)			4.5
						5.00		End of Borehole at 5.00m	5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks 1) Location CAT scanned prior to drilling. 2) Groundwater not encountered during drilling. 3) Borehole installed with gas and groundwater monitoring point upon completion.	Method, Plant, Stability, Dimensions	Logger
---	---	---------------

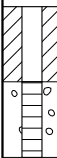


Dynamic (Windowless) Sampler

BH4
Sheet 1 of 1

Hole Type WLS	Easting 423704.00	Northing 427386.00	Ground Level (m)	Scale 1:50
Project Name Lidl Birstall	Project No. 1080.08	Start Date 2025-12-17	End Date 2025-12-17	

Client Lidl Great Britain	Consultant Remada	Contractor
------------------------------	----------------------	------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(1.00)		MADE GROUND: Grey gravelly clayey sand. Gravel is angular to subangular fine to coarse brick, concrete and sandstone.	0.5
						1.00		End of Borehole at 1.00m	1.0
									1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks 1) Location CAT scanned prior to drilling. 2) Groundwater not encountered during drilling. 3) Borehole terminated due to refusal during drilling process. 4) Borehole installed with gas and groundwater monitoring point upon completion.	Method, Plant, Stability, Dimensions	Logger
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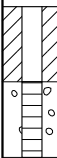


Dynamic (Windowless) Sampler

BH5
Sheet 1 of 1

Hole Type WLS	Easting 423724.00	Northing 427413.00	Ground Level (m)	Scale 1:50
Project Name Lidl Birstall	Project No. 1080.08	Start Date 2025-12-17	End Date 2025-12-17	

Client Lidl Great Britain	Consultant Remada	Contractor
------------------------------	----------------------	------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(1.00)		MADE GROUND: Grey gravelly clayey sand. Gravel is angular to subangular fine to coarse brick, concrete and sandstone.	0.5
						1.00		End of Borehole at 1.00m	1.0
									1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks 1) Location CAT scanned prior to drilling. 2) Groundwater not encountered during drilling. 3) Borehole terminated due to refusal during drilling process. 4) Borehole installed with gas and groundwater monitoring point upon completion.	Method, Plant, Stability, Dimensions	Logger
---	--------------------------------------	--------



Dynamic (Windowless) Sampler

BH6
Sheet 1 of 1

Hole Type WLS	Easting 423738.00	Northing 427428.00	Ground Level (m)	Scale 1:50
Project Name Lidl Birstall	Project No. 1080.08	Start Date 2025-12-17	End Date 2025-12-17	

Client Lidl Great Britain	Consultant Remada	Contractor
------------------------------	----------------------	------------

Inst/ Backfill	Water Levels	Samples and Tests			Level (m)	Depth (m) (thickness)	Strata		
		Depth (m)	Type/ Ref	Results			Legend	Description	
						(0.70)		MADE GROUND: Soft grey sandy gravelly clay with occasional cobbles. Gravel is angular to subangular fine to coarse brick, concrete and sandstone. Cobbles are subangular brick.	0.5
						0.70 (0.30) 1.00		MADE GROUND: Grey gravelly clayey sand. Gravel is angular to subangular fine to coarse brick, concrete and sandstone.	1.0
								End of Borehole at 1.00m	
									1.5
									2.0
									2.5
									3.0
									3.5
									4.0
									4.5
									5.0
									5.5
									6.0
									6.5
									7.0
									7.5
									8.0
									8.5
									9.0
									9.5
									10.0

Remarks 1) Location CAT scanned prior to drilling. 2) Groundwater not encountered during drilling. 3) Borehole terminated due to refusal during drilling process. 4) Borehole installed with gas and groundwater monitoring point upon completion.	Method, Plant, Stability, Dimensions	Logger
---	--------------------------------------	--------

Figure

- Specialist in Land Condition (SiLC)*
- National Quality Mark Scheme*
- Due Diligence*
- Audit*
- Desk Study*
- Intrusive Ground Investigation*
- Human Health Risk Assessment*
- Water Resource Risk Assessment*
- Mining Risk Assessment*
- Preliminary Foundation Design Recommendations*
- Remediation Strategies & Method Statements*
- Pre-acquisition Advice*
- Abnormal Cost Assessment*
- Materials Management Plans & Declarations*
- UST Decommissioning*
- Soil Bio-remediation*
- Soil Stabilisation*
- In-situ Groundwater Remediation*
- EA Remediation Permit*
- Verification & Completion Reports*
- WAMITAB*
- Waste Classification*

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Remada Ltd

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17 High Street
Henley in Arden
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08302458

Tables 1 & 2

*Specialist in Land
Condition (SiLC)*

*National Quality Mark
Scheme*

Due Diligence

Audit

Desk Study

*Intrusive Ground
Investigation*

*Human Health Risk
Assessment*

*Water Resource Risk
Assessment*

Mining Risk Assessment

*Preliminary Foundation
Design Recommendations*

*Remediation Strategies &
Method Statements*

Pre-acquisition Advice

*Abnormal Cost
Assessment*

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WAMITAB

Waste Classification

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Table 1: Gas Groundwater Monitoring Data (Home Bargains)

GAS & GROUNDWATER MONITORING DATA																																									
SITE		Birstall															Atmospheric & Ground Conditions																								
PROJECT No.		1080.08																																							
Visit 1 of 5		Atmospheric Pressure Variations During Visit															Ground Surface Conditions																								
Carried Out by:		Steve Aston															994 - 996mb																								
Date:		6.1.26															Dry																								
Instrument Details		GFM436 14048															Atmospheric Pressure Trend Over Previous 48hrs															Weather Conditions									
																	Falling															Frosty									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs)**	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments																		
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak	Steady																
BH1		50	0.0	0.0	0.0	0.0	0.0	14.8	14.8	0.0	0.0	10.0	10.0	60	0.0		NR	NR	994	Dry	#VALUE!	2.290	Home Bargains																		
BH2		50	0.0	0.0	0.0	0.0	0.9	16.9	16.9	0.0	0.0	14.0	14.0	60	0.0		NR	NR	994	Dry	#VALUE!	1.850	Home Bargains																		
BH3		50	0.0	0.0	0.0	4.0	4.0	12.5	12.5	0.0	0.0	10.0	10.0	60	0.0		NR	NR	995	3.370	-3.370	4.160	Home Bargains																		
NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level																																									

GAS & GROUNDWATER MONITORING DATA																																				
SITE		Birstall																																		
PROJECT No.		1080.08															Atmospheric & Ground Conditions																			
Visit 2 of 5																	Atmospheric Pressure Variations During Visit										Ground Surface Conditions									
Carried Out by:		Steve Aston															979 - 980mb										Damp									
Date:		12.1.26																																		
Instrument Details		GFM436 14048															Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions									
																	Falling										Cold and raining									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H2S (ppm)		CO (ppm)		Duration (secs) [^]	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments													
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak	Steady											
BH1		50	0.0	0.0	0.0	0.0	0.0	13.4	13.4	0.0	0.0	10.0	10.0	60	0.0		NR	NR	979	2.050	-2.050	2.300	Home Bargains													
BH2		50	0.0	0.0	0.0	0.0	0.0	15.1	15.1	0.0	0.0	16.0	16.0	60	0.0		NR	NR	979	1.850	-1.850	1.850	Home Bargains													
BH3		50	0.6	0.6	12.0	0.0	0.0	2.3	2.3	25.0	25.0	238.0	238.0	60	0.0		NR	NR	979	4.080	-4.080	4.160	Home Bargains													
Notes: NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level																																				

GAS & GROUNDWATER MONITORING DATA																									
SITE		Birstall														Atmospheric & Ground Conditions									
PROJECT No.		1080.08																							
Visit 3 of 5		Atmospheric Pressure Variations During Visit														Ground Surface Conditions									
Carried Out by:		Steve Aston														989 - 991mb									
Date:		19.1.26														Damp									
Instrument Details		GFM436 14048														Atmospheric Pressure Trend Over Previous 48hrs									
		Steady														Weather Conditions									
																Clear									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H2S (ppm)		CO (ppm)		Duration (secs) [^]	Flow Rate (l/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments		
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak	Steady
BH1		50	0.0	0.0	0.0	0.0	0.0	12.8	12.8	0.0	0.0	0.0	0.0	60	0.0		NR	NR	989	1.700	-1.700	2.300	Home Bargains		
BH2		50	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	0.0	0.0	0.0	60	0.0		NR	NR	989	1.860	-1.860	1.850	Home Bargains		
BH3		50	2.4	2.4	48.0	0.0	0.0	5.2	5.2	0.0	0.0	0.0	0.0	60	0.0		NR	NR	991	3.400	-3.400	4.160	Home Bargains		
Notes: NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level																									

GAS & GROUNDWATER MONITORING DATA															REMADA GEO CONSULTANTS																					
SITE		Birstall																																		
PROJECT No.		1080.08															Atmospheric & Ground Conditions																			
Visit 4 of 5															Atmospheric Pressure Variations During Visit										Ground Surface Conditions											
Carried Out by:		Steve Aston															983 - 985mb										Damp									
Date:		26.1.26															Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions									
Instrument Details		GFM436 14048															Rising										Cold and dry									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) [^]	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments													
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak	Steady											
BH1		50	0.0	0.0	0.0	0.0	0.0	14.1	14.1	0.0	0.0	11.0	11.0	60	0.0		NR	NR	984	1.500	-1.500	2.300	Home Bargains													
BH2		50	0.0	0.0	0.0	0.0	0.0	18.4	18.4	0.0	0.0	0.0	0.0	60	0.0		NR	NR	983	1.860	-1.860	1.850	Home Bargains													
BH3		50	2.5	2.4	48.0	0.0	0.0	4.2	4.2	0.0	0.0	0.0	0.0	60	-3.1		NR	NR	984	3.700	-3.700	4.160	Home Bargains													
Notes: NR = Not Recorded ^ For measurement of gas concentrations > = Above LEL WST = Water Sample Taken GL = Ground Level																																				

Table 2: Gas Groundwater Monitoring Data (Lidl)

GAS & GROUNDWATER MONITORING DATA																REMADA GEO CONSULTANTS																			
SITE		Birstall																																	
PROJECT No.		1080.08														Atmospheric & Ground Conditions																			
Visit 1 of 5																																			
Carried Out by:		Steve Aston														994 - 996mb																			
Date:		6.1.26														Dry																			
Instrument Details		GFM436 14048														Atmospheric Pressure Trend Over Previous 48hrs										Weather Conditions									
																Falling										Frosty									
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs)*	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments												
BH4		50	0.0	0.0	0.0	0.4	0.4	17.8	17.8	0.0	0.0	0.0	0.0	60	0.0		NR	NR	996	Dry	#VALUE!	1.370	Lidl												
BH5		50												Unable to test due to missing bung										Lidl											
BH6		50	0.0	0.0	0.0	0.0	0.0	16.7	16.7	0.0	0.0	0.0	0.0	60	0.0		NR	NR	994	Dry	#VALUE!	1.360	Lidl												

NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA																	REMADA GEO CONSULTANTS									
SITE		Birstall																								
PROJECT No.		1080.08		Atmospheric & Ground Conditions																						
Visit 2 of 5																										
Carried Out by:		Steve Aston		Atmospheric Pressure Variations During Visit															Ground Surface Conditions							
Date:		12.1.26																								
Instrument Details		GFM436 14048		Atmospheric Pressure Trend Over Previous 48hrs															Weather Conditions							
				Falling															Cold and raining							
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs)*	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments			
BH4		50	20.2	20.2	404.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	60	0.0		NR	NR	979	Dry	#VALUE!	1.370	Lidl		
BH5		50	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	60	0.0		NR	NR	979	Dry	#VALUE!	1.270	Lidl		
BH6		50	0.0	0.0	0.0	0.0	0.0	0.0	3.3	3.3	0.0	0.0	0.0	0.0	60	0.0		NR	NR	980	Dry	#VALUE!	1.360	Lidl		

Notes: NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA															REMADA GEO CONSULTANTS									
SITE		Birstall																						
PROJECT No.		1080.08			Atmospheric & Ground Conditions																			
Visit 3 of 5		Atmospheric Pressure Variations During Visit												Ground Surface Conditions										
Carried Out by:		Steve Aston			989 - 991mb												Damp							
Date:		19.1.26			Atmospheric Pressure Trend Over Previous 48hrs												Weather Conditions							
Instrument Details		GFM436 14048			Steady												Clear							
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs) [^]	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments	
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						Peak
BH4		50	19.4	19.4	388.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	13.0	60	0.0		NR	NR	990	Dry	#VALUE!	1.370	Lidl	
BH5		50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	60	0.0		NR	NR	990	Dry	#VALUE!	1.270	Lidl	
BH6		50	0.0	0.0	0.0	0.0	0.0	11.5	11.5	0.0	0.0	11.0	11.0	60	0.0		NR	NR	991	Dry	#VALUE!	1.360	Lidl	

Notes: NR = Not Recorded

[^] For measurement of gas concentrations

> = Above LEL

WST = Water Sample Taken

GL = Ground Level

GAS & GROUNDWATER MONITORING DATA															REMADA GEO CONSULTANTS									
SITE		Birstall																						
PROJECT No.		1080.08			Atmospheric & Ground Conditions																			
Visit 4 of 5		Atmospheric Pressure Variations During Visit													Ground Surface Conditions									
Carried Out by:																						Steve Aston		
Date:		26.1.26			Atmospheric Pressure Trend Over Previous 48hrs													Weather Conditions						
Instrument Details		GFM436 14048			Rising													Cold and dry						
Well No.	Cover Height (m AOD)	Well Diameter (mm)	CH ₄ (% v/v)		CH ₄ Steady LEL (%)	CO ₂ (% v/v)		O ₂ (% v/v)		H ₂ S (ppm)		CO (ppm)		Duration (secs)*	Flow Rate (lit/hr)	Relative Pressure (mb)	PID (ppm)		Atmospheric Pressure (mb)	Water Level (m bgl)	Water Level (m AoD)	Depth of Pipe (m bgl)	Comments	
			Peak	Steady		Peak	Steady	Minimum	Steady	Peak	Steady	Peak	Steady				Peak	Steady						
BH4		50	27.4	27.4	548.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	18.0	60	0.0		NR	NR	984	Dry	#VALUE!	1.370	Lidl	
BH5		50	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	60	0.0		NR	NR	984	Dry	#VALUE!	1.270	Lidl	
BH6		50	0.0	0.0	0.0	0.0	0.0	8.8	8.8	0.0	0.0	0.0	0.0	60	0.0		NR	NR	985	Dry	#VALUE!	1.360	Lidl	

Radon Report

*Specialist in Land
Condition (SiLC)*

*National Quality Mark
Scheme*

Due Diligence

Audit

Desk Study

*Intrusive Ground
Investigation*

*Human Health Risk
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EA Remediation Permit

*Verification & Completion
Reports*

WAMITAB

Waste Classification

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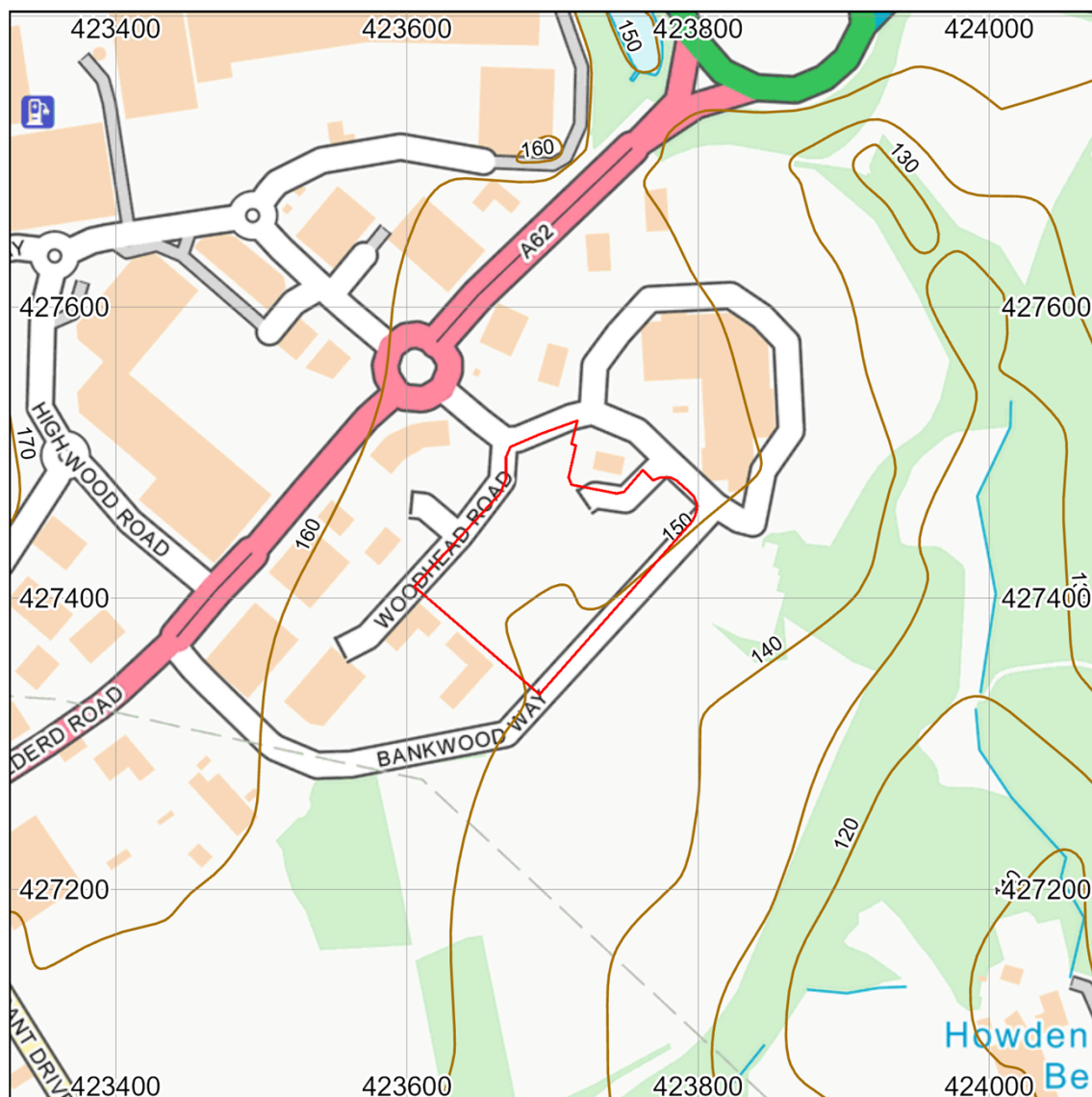
Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

Report Id: *BGS_347112/66127*

Client reference: 1080.04

Search location



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Search location indicated in red

*This report describes a site located at National Grid Reference 423702, 427428.
Note that for sites of irregular shape, this point may lie outside the site boundary.
Where the client has submitted a site plan the assessment will be based on the area given.*

Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

Requirement for radon protective measures

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2023 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2023 edition) Radon: Guidance on protective measures for new buildings?

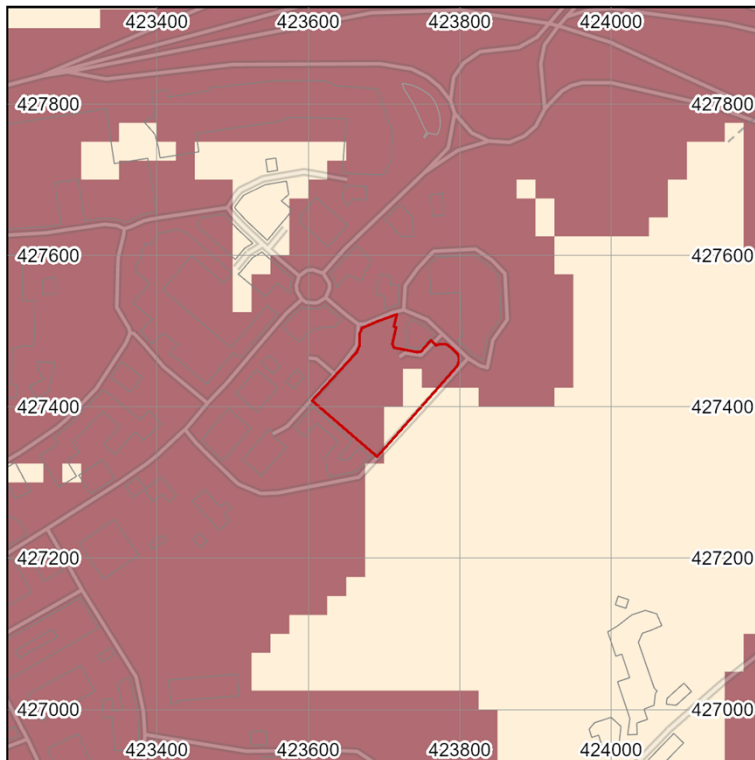
BASIC RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.

More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2023 Edition)*.

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The UKHSA provides a radon testing service which can be accessed at www.ukradon.org or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.

Radon Affected Area



% Homes estimated to be at or above the action level
0-1%
1-3%
3-5%
5-10%
10-30%
30-100%

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Scale: 1:10 000 (1cm = 100 m)
Search area indicated in red

Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be at or above the Action Level? YES

Additional Information

THE PROPERTY IS IN A RADON AFFECTED AREA WHERE 5 TO 10% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL.

The UKHSA recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air (Bq m^{-3}) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to be at or above the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a high radon level within the property; the only way to determine the radon level is to carry out a radon measurement.

The UKHSA advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels at or above the Action Level (200 Bq m⁻³) should be remediated. Householders with levels between the Target Level (100 Bq m⁻³) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. The UKHSA provides a validated radon testing service which can be accessed at www.ukradon.org.

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by the UKHSA. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were at or above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from the UKHSA at www.ukradon.org.

What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre (Bq m⁻³). The Government advises householders that, where the radon level is at or above the Action Level, measures should be taken to reduce the concentration.

Radon in workplaces

The Ionising Radiation Regulations 2017 require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: bookshop@bre.co.uk website: www.brebookshop.com

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**Report issued by
BGS Enquiry Service**

Example Membrane

*Specialist in Land
Condition (SiLC)*

*National Quality Mark
Scheme*

Due Diligence

Audit

Desk Study

*Intrusive Ground
Investigation*

*Human Health Risk
Assessment*

*Water Resource Risk
Assessment*

Mining Risk Assessment

*Preliminary Foundation
Design Recommendations*

*Remediation Strategies &
Method Statements*

Pre-acquisition Advice

*Abnormal Cost
Assessment*

*Materials Management
Plans & Declarations*

UST Decommissioning

Soil Bio-remediation

Soil Stabilisation

*In-situ Groundwater
Remediation*

EA Remediation Permit

*Verification & Completion
Reports*

WAMITAB

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Visqueen Gas Barrier NF-400

Features & benefits

- BDA Agreement Certification - third party accreditation
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations - non foil system
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019 - industry standard for methane and carbon dioxide protection
- Transparent - allows a clear view of the substrate during and post installation
- Multi functional - also acts as a radon and damp proof membrane
- Dual jointing methods - depending upon specification, lap joints can be heat welded or taped

Product description

Visqueen Gas Barrier NF-400 is a co-extruded, multi-layer thermoplastic gas membrane, 0.4mm thick (400 micron). The membrane is transparent with a blue tint and supplied 2.4m x 43.5m in a single wound roll.

Approvals and standards

- Third party accreditation (BDA Agreement Certificate BAB-24-339-P-A-UK)
- Complies with the methane gas transmission rate, mass per unit area and thickness requirements of BS 8485:2015 + A1:2019
- Suitable for all Characteristic Gas Situation (CS) ground gas regimes
- Complies with NHBC Foundation NF94 guidance for use in Type A membrane locations (non foil system)
- Conforms to the specification requirements of NHBC Amber 1 and Amber 2 applications
- Conforms to the specification requirements of BR 211:2023
- UKCA UKNI CE to EN 13967:2012
- Visqueen certified with Quality Management System ISO 9001:2015
- Visqueen certified with Occupational Health and Safety System ISO 45001:2018
- Visqueen certified with Environmental Management System ISO 14001:2015

Usage

Visqueen Gas Barrier NF-400 is suitable for use in all types of buildings to prevent the ingress of harmful levels of methane, carbon dioxide and radon.

The barrier can be positioned above or below reinforced cast in situ concrete floor slabs e.g. ground bearing, suspended or raft, or above precast suspended segmental subfloors, e.g. beam and block floor.

The barrier can also be used as a high performance radon membrane and/or damp proof membrane.

NHBC NF94 guidance: Radon, carbon dioxide, and methane protection

Visqueen Gas Barrier NF-400 when installed with either welded or taped joints complies with NHBC Foundation NF94 publication, Hazardous ground gas - an essential guide for housebuilders, in Type A membrane locations in precast suspended segmental subfloors and reinforced cast in situ concrete floor slabs (ground bearing, suspended or raft).

For site or zone characteristic gas situations of CS4 and above, contact Visqueen Technical Office.

The barrier is not intended for use where there is a risk of hydrostatic pressure.

System components

- VisqueenPro Double Sided Jointing Tape, 50mm x 10m
- VisqueenPro Detailing Strip, 300mm x 10m
- Visqueen TreadGUARD 1500, 1m x 2m
- Visqueen TreadGUARD 300, 2m x 75m
- Visqueen NF-Detailing Strip, 300mm x 10m
- Visqueen NF-60 Lap Tape, 60mm x 45m
- Visqueen NF-150 Lap Tape, 150mm x 10m

Storage and handling

When storing Visqueen Gas Barrier NF-400 care should be taken to:

- store in its original packaging;
- avoid exposure to direct sunlight and high or low temperatures for prolonged periods of time;
- store in a well-ventilated covered area to protect from rain, frost, humidity and mechanical damage;
- store away from possible ignition sources;
- store rolls of the barrier horizontally on a flat surface and not stacked.

Care should be taken to avoid accidental damage to the product when handling on site.

Care should be taken when handling the product in line with current manual handling regulations.

Preparation

Visqueen Gas Barrier NF-400

Visqueen Gas Barrier NF-400 should be installed on a smooth continuous surface e.g. grouted beam and block floor, a compacted blinding layer e.g. 50mm thick sand blinding, or smooth concrete blinding. The substrate should be free from irregularities such as loose aggregates or other sharp protrusions, voids, projections or mortar deposits.

The barrier can be cut with a sharp retractable safety knife or robust scissors.

Hand rollers are required during lap joint formation and sealing membrane detailing. Typical hand rollers include 40mm silicone pressure roller and 6mm brass penny pressure roller.

Consult the project specification to ensure the correct method of lap joint formation for the project is followed (welded or taped).

Rolls of tape should be kept in a warm, dry location prior to use to ensure the tape is workable and can be more easily applied.

Installation

Installation of Visqueen Gas Barrier NF-400 should be carried out by a competent contractor experienced with this type of product e.g. hold an NVQ Level 2 Diploma in substructure work occupations (Installation of Gas Membranes - Construction).

The installation should be subjected to third-party validation in accordance with BS 8485:2015 +A1:2019 and CIRIA C735.

Visqueen Gas Barrier NF-400 should be loose laid on the substrate ensuring that the barrier sheet edges are aligned allowing adequate overlap for jointing between the sheets. The barrier can be laid either side facing upwards.

The barrier lap area should be clean and dry at the time of jointing. The barrier has been designed to exhibit superior welding properties using hot wedge and hot air welding, therefore onsite welding of all lap joints is recommended. When hot air hand welding the lap joints, the joint should be overlapped by approximately 100mm and an approximate 35mm weld is normally achieved. During hand welding, the lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved.

When taping the lap joints, the joint should be overlapped by approximately 100mm and bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending upon the project specification. The lap joints should be firmly compressed using a hand roller during taping to ensure an adequate bond is achieved.

Gas protection should be continuous at all detailing including internal and external walls, internal and external corners, doorway thresholds, service pipes, party walls and structural columns. Visqueen NF-Detailing Strip should be used to seal these junctions. The detailing strip lap joints should be firmly compressed using a hand roller to ensure an adequate bond is achieved. Visqueen Ultimate Preformed Units are also available.

If the barrier is punctured or perforated a patch of the same material should be lapped at least 100mm beyond the limits of the puncture and either welded in position, or bonded with VisqueenPro Double Sided Jointing Tape (positioned approximately 25mm from the edge of the sheet) and sealed with Visqueen NF-60 Lap Tape or Visqueen NF-150 Lap Tape depending upon the project specification. Alternatively a patch can be formed using Visqueen NF-Detailing Strip lapped at least 150mm beyond the extents of the puncture.

Long periods of exposure to ultraviolet light will reduce the effectiveness of the barrier. The barrier should be covered by a protective layer e.g. Visqueen TreadGuard protection or other approved protection material, immediately after installation to prevent damage from following trades, ultraviolet light, etc. Care should be taken to ensure that the barrier is not punctured, stretched or displaced during or post installation.

VisqueenPro Detailing Strip is also suitable for sealing detailing junctions and patch repairs, however when the gas protection measures are to conform with the requirements of NHBC NF94 guidance, please ensure acceptance by all stakeholders prior to use.

Usable temperature range

When Visqueen Gas Barrier NF-400 is installed with taped lap joints, the air temperature should not be below 5°C or falling to prevent the risk of surface condensation affecting the tape adhesion.

When ambient temperatures are above 25°C or rising, the barrier should be covered immediately after installation.

Additional information

When used in accordance BS8485:2015 + A1:2019 a subfloor ventilation system or pressure relief may also be required.

To assist build sequencing, Visqueen Ultimate Gas DPC is available for gas protection through the wall construction.

For further information contact Visqueen Technical Office on 0333 202 6800.

Visqueen Gas Barrier NF-400

The information in this datasheet was correct at the time of publication. It is the user's responsibility to obtain the latest version of the datasheet as it is updated on a regular basis. The information contained in the latest datasheet supersedes all previously published editions.

Property	Test method	Units	Compliance criteria	Result
Dimensions	BS EN 1848-2	m	-	2.4 x 43.5
Nominal thickness	BS EN 1849-2	mm	+/-10%	0.4
Mass	BS EN 1849-2	g/m ²	>370	>370
Tensile strength - machine direction	BS EN 12311-2 method B	N/mm ²	MDV	26.3
Tensile strength - cross direction	BS EN 12311-2 method B	N/mm ²	MDV	29.4
Elongation at break - machine direction	BS EN 12311-2 method B	%	MDV	607
Elongation at break - cross direction	BS EN 12311-2 method B	%	MDV	921
Joint strength - taped joint	BS EN 12317-2	N/50mm	MDV	217
Joint strength - welded joint	BS EN 12317-2	N/50mm	MDV	405
Watertightness at 2kPa for 24 hours	BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after ageing	BS EN 1296 (12 weeks) + BS EN 1928 method A	-	Pass/Fail	Pass
Watertightness at 2kPa for 24 hours after alkali environment	BS EN 1847 (28 days) + BS EN 1928 method A	-	Pass/Fail	Pass
Resistance to impact	BS EN 12691 method A	mm	MLV	200
Low temperature flexibility	BS EN 495-5	°C	MDV	-20
Resistance to tearing (nail shank) - machine direction	BS EN 12310-1	N	MDV	265
Resistance to tearing (nail shank) - cross direction	BS EN 12310-1	N	MDV	240
Water vapour resistance	BS EN 1931 method B	MNs/g	MDV	2,296
Water vapour permeability	BS EN 1931 method B	g/m ² /d	MDV	0.08
Water vapour resistance factor	BS EN 1931 method B	μ	MDV	1,140,000
Water vapour diffusion equivalent air layer thickness	BS EN 1931 method B	SD in m	MDV	459
Methane gas transmission rate - membrane	BS ISO 15105-1	ml/m ² /day/atm	MDV	13.2
Methane gas transmission rate - welded membrane joint	BS ISO 15105-1	ml/m ² /day/atm	MDV	15
Carbon dioxide gas transmission rate	BS ISO 15105-1	ml/m ² /day/atm	MDV	22
Radon gas transmission rate - membrane	SP method	m/s	MDV	<3.0 x 10 ⁻⁹
Puncture CBR	BS EN 12236	N	MDV	1620
Tensile yield strength - machine direction	ASTM D4885-01	kN/m	MDV	8
Tensile yield strength - cross direction	ASTM D4885-02	kN/m	MDV	7.3

Visqueen Gas Barrier NF-400

Resistance to static loading	BS EN 12730 method C	kg	MDV	15
Elongation yield - machine direction	ASTM D4885-01	%	MDV	405.3
Elongation yield - cross direction	ASTM D4885-01	%	MDV	400.2
Tear resistance - trouser method A - machine direction	BS ISO 34-1	kN/m	MDV	128
Tear resistance - trouser method A - cross direction	BS ISO 34-1	kN/m	MDV	109.7
Tear resistance - angle method B - machine direction	BS ISO 34-1	N	MDV	137
Tear resistance - angle method B - cross direction	BS ISO 34-1	N	MDV	139.6

Health and safety information

Refer to the Visqueen Gas Barrier NF-400 safety datasheet (SDS).

About Visqueen

Visqueen is a leading provider of construction membrane technologies and design-based solutions for ground gas, structural waterproofing, damp proofing and fire protection.

We offer complete support at every stage of the specification, including the supply chain process. As the UK's principal technical authority, we are best placed to ensure that the principal designer and contractor specify the most technically suited, durable, and competitive solution to guarantee their project is protected for the lifetime of the building.

Visqueen is at the forefront of advanced membrane technology and innovation in the construction industry, earning the trust and loyalty of specifiers throughout the UK and Europe.

For more information, visit visqueen.com or contact our sales office at [+44 \(0\) 333 202 6800](tel:+4418003332026800) or enquiries@visqueen.com

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Air and Vapor Control



Stormwater



Damp Proof Course



Temporary Protection

Visqueen Technical Support

Visqueen offer a comprehensive full nationwide technical support. Our team of CSSW qualified technical support managers provide on site design-based solutions for specifiers, contractors and builders merchants, and will ensure that from design stage to installation the project is fully risk assessed and the specification is approved by all stakeholders.

Our Technical Office, can design, prepare and manage CAD detailing, together with assisting in quantity take offs, while offering advice on technical installations and product selection.

Competency & Design

Visqueen promotes competency in building design by ensuring that its technical team possesses the necessary skills, knowledge, experience, and ethical practices. The company adopts the "golden thread of information," ensuring all project data is digitally secure and accessible throughout a building's lifecycle. This approach aligns with the Building Safety Act and aims to foster accountability and compliance with evolving regulations, providing clients with confidence in the safety and reliability of their projects.

Visqueen CPD Seminars

Visqueen's CPD Seminars offer insights into Building Regulations, Standards, and industry guidance related to damp proofing, hazardous ground gas protection, and structural waterproofing. These one-hour seminars are tailored for construction design professionals and delivered by our Technical Support Managers. Visit our website to book a free CPD.



Visqueen Gas Barrier NF-400

Visqueen Contract Design Services

Visqueen Contract Design Services offers a bespoke design service led by our team of Certified Surveyors in Structural Waterproofing (CSSW), providing experienced and specialised waterproofing design expertise for complex projects. We provide comprehensive support throughout the entire project, ensuring that all work meets the requirements of warranty providers and adheres to the highest standards of quality, reliability and current legislation.

Visqueen Training Academy

Based at our Derbyshire facility, the Visqueen Training Academy offers a variety of training programs across the UK. These include one-day product awareness sessions for distributors and builders' merchants, and intensive two-day courses for hands-on product installation training. Contact us for more information.
