

By Email

Our ref: 21-763.01L

Jill Thwaite
Vistry Partnerships Yorkshire
Strategic Business Centre
Blue Ridge Park
Thunderhead Ridge
Glasshoughton
WF10 4UA.



Arc Environmental Ltd
Solum House
Unit 1 Elliott House
St John's Road
Meadowfield
DH7 8PN

1st June 2022

Dear Sirs,

Re: Proposed Residential Development, Hollingworth Gate, Littleborough – Hazardous Ground Gas Addendum Report

This letter report is an addendum to the Ground Investigation Report (Factual) (Project No. 21-763, December 2021) undertaken for the proposed development at the above location.

Please find enclosed:

- ARC Environmental Ground Gas & Groundwater Monitoring Certificates
- Cable Percussive (CP) & Dynamic Sampling (MW) Borehole Record Sheets

Ground gas/vapour & water monitoring standpipes were installed in CP1 to CP7 and MW1 to MW5 to check for the possible presence of ground gas originating from below this site and / or migrating from adjacent sites and to monitor groundwater levels.

A standard 50mm diameter HDPE standpipe, with gravel and geo-wrap surround, bentonite seal, gas valve cap and security cover, were installed. The borehole installation details are presented graphically on the cable percussive and dynamic sampling borehole record sheets attached.

Ground gas and water monitoring was completed using a Gas Data gas analyser with integral flow meter and a Geotechnical Instruments electronic dipmeter. A summary of the results for the visits compared with the 'inert' background gas levels are presented on the Gas and Groundwater Monitoring Summary Sheets attached.

Concentrations of Carbon Dioxide (CO₂) have been recorded up to a maximum of 4.3% v/v, with depleted Oxygen (O₂) concentrations (minimum 15.5% v/v). In addition, concentrations of Methane (CH₄) up to 2.8% have been recorded within CP5 only. Negligible flow rates (<0.1 l/hr.) have been recorded during the monitoring visits.

Based on the results, in accordance with CIRIA Report C665, an initial risk assessment has been completed for this site, by converting the results to a gas screening value (GSV), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates (after Wilson & Card) as detailed on the following.

Re: Proposed Residential Development, Hollingworth Gate, Littleborough – Hazardous Ground Gas Addendum Report (Cont'd)

- Carbon Dioxide (CO₂) - multiplying the maximum concentration recorded (taken as 4.3%) by the maximum flow rate (taken as 0.1 l/hr) which gives a **GSV of 0.0043 l/hr** (calculated from 4.3% (0.043) x 0.1l/hr maximum flow rate) for CO₂.
- Methane (CH₄) - multiplying the maximum concentration recorded (taken as 2.8%) by the maximum flow rate (taken as 0.1 l/hr) which gives a **GSV of 0.0028 l/hr** (calculated from 2.8% (0.028) x 0.1l/hr maximum flow rate) for CH₄.

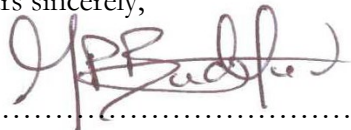
When considering these results, in accordance with CIRIA C665, the GSV's for CO₂ and CH₄ do not exceed the assessment values of 0.78l/hr and 0.16l/hr respectively (Green Classification – NHBC Traffic light system), resulting in no gas protective measures being required for the proposed development.

However, when considering the concentrations of CH₄ in CP5 exceed the action trigger level of 1%, the CIRIA 665 guidance recommends an increase in the characteristic situation by an order of 1 to take into account the gas concentrations recorded resulting in gas protection measures being required.

It is understood that, in accordance with NHBC guidance, the proposed development will comprise ventilated underfloor voids (min 150mm) and therefore it is felt that an appropriate determination for this site, would be to place the site within the NHBC Amber 1 Classification, therefore ground gas protection measures are required. Further reference can be made to BS8485:2015+A1:2019 Code of practice for the design of protective measures: for methane and carbon dioxide ground gases for new buildings.

I trust the information we have provided to you is to your satisfaction. However, if you require any further information or clarification, please do not hesitate to contact us.

Yours sincerely,



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For and on behalf of Arc Environmental Ltd
Matt Bradford *BSc (Hons) MIEEnvSc FGS*
Associate Director

Ground Gas & Groundwater Monitoring Certificates

Arc Environmental Ground Gas & Groundwater Monitoring Certificate

Site:	Littleborough
Ref:	21-763



Visit	Date	Time	Equipment	Weather	Initials	Comments	CP	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 435 only)		Other Gases (PPM)			Depth to Water (m bgl)
										R/F/S	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H ₂ S	CO	
1	12/11/2021	09.00am	GFM430	Raining	TMC		CP1	<0.1	998			0.0		0.0		0.0		19.7				0.0	0.0	DRY
							CP2	<0.1	998			0.0		0.0		4.3		15.8				0.0	0.0	DRY
							CP3	<0.1	998			0.0		0.0		0.0		19.9				0.0	0.0	0.90
							CP4	<0.1	998			0.0		0.0		0.0		19.8				0.0	0.0	0.80
							CP5	<0.1	998			0.0		0.0		0.0		20.0				0.0	0.0	DRY
							CP6	<0.1	998			0.0		0.0		1.0		19.0				0.0	0.0	1.10
							CP7	<0.1	997			0.0		0.0		0.7		18.8				0.0	0.0	0.90
2	02/12/2021	10.am	GFM430	Sunny	TMC		CP1	<0.1	997			0.0		0.0		0.0		17.7				0.0	0.0	DRY
							CP2	<0.1	997			0.0		0.0		4.1		15.7				0.0	0.0	DRY
							CP3	<0.1	997			0.0		0.0		0.0		19.7				0.0	0.0	1.12
							CP4	<0.1	997			0.0		0.0		0.0		19.9				0.0	0.0	1.10
							CP5	<0.1	997			0.0		0.0		0.0		19.8				0.0	0.0	DRY
							CP6	<0.1	997			0.0		0.0		0.8		19.1				0.0	0.0	1.30
							CP7	<0.1	997			0.0		0.0		1.0		18.8				0.0	0.0	0.90
3	14/11/2021	09:04	GFM430	Foggy	Tmc	CP6&7 Bailed then tested after 20 mins	CP1	<0.1	1006			0.0		0.0		0.0		19.7				0.0	0.0	3.54
							CP2	<0.1	1007			0.0		0.0		1.4		18.1				0.0	0.0	Dry
							CP3	<0.1	1007			0.0		0.0		0.0		19.6				0.0	0.0	1.09
							CP4	<0.1	1006			0.0		0.0		0.0		19.9				0.0	0.0	1.34
							CP5	<0.1	1005			1.9		45.7		0.0		15.5				0.0	0.0	3.70
							CP6	<0.1	1005			0.0		0.0		1.1		15.8				0.0	0.0	0.76
							CP7	<0.1	1005			0.0		0.0		0.4		15.6				0.0	0.0	0.46
4	28/01/22	10:20:00	GFM430	Overcast	TMC	CP07 BAILED THEN TESTED	CP1	<0.1	1008			0.0		0.0		0.0		19.4				0.0	0.0	DAMP BOTTOM
							CP2	<0.1	1008			0.0		0.0		4.3		16.1				0.0	0.0	DRY
							CP3	<0.1	1008			0.0		0.0		0.2		18.9				0.0	0.0	2.73
							CP4	<0.1	1008			0.0		0.0		0.0		19.8				0.0	0.0	1.41
							CP5	<0.1	1008			2.8		65.7		0.0		17.2				0.0	0.0	3.70
							CP6	<0.1	1008			0.0		0.0		1.4		16.3				0.0	0.0	1.10
							CP7	<0.1	1008			0.0		0.0		0.4		16.0				0.0	0.0	0.57
5	16/02/22	13:30	GFM430	Heavy Rain	TMC	CP07 Bailed then tested after 20 mins	CP1	<0.1	963			0.0		0.0		0.0		17.9				0.0	0.0	Damp Bottom
							CP2	<0.1	966			0.0		0.0		1.8		19.1				0.0	0.0	DRY
							CP3	<0.1	966			0.0		0.0		0.5		18.5				0.0	0.0	2.16
							CP4	<0.1	966			0.0		0.0		0.7		18.7				0.0	0.0	1.31
							CP5	<0.1	966			2.4		54.5		0.0		15.6				0.0	0.0	3.73
							CP6	<0.1	965			0.0		0.0		1.0		18.2				0.0	0.0	1.10
							CP7	<0.1	996			0.0		0.0		0.7		19.9				0.0	0.0	0.83
6	23/02/22	15:23	GFM430	Intermittent Rain	TMC	CP07 Bailed then tested after 20 mins	CP1	<0.1	968			0.0		0.0		0.1		17.9				0.0	0.0	Damp Bottom
							CP2	<0.1	968			0.0		0.0		1.9		18.3				0.0	0.0	dry
							CP3	<0.1	968			0.0		0.0		0.4		18.1				0.0	0.0	2.14
							CP4	<0.1	968			0.0		0.0		0.2		18.2				0.0	0.0	1.30
							CP5	<0.1	967			2.6		53.6		0.0		15.5				0.0	0.0	3.72
							CP6	<0.1	967			0.0		0.0		1.2		18.4				0.0	0.0	1.12
							CP7	<0.1	967			0.0		0.0		0.7		19.1				0.0	0.0	0.79

Notes:
Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.1ltr
Monitoring order is from **Left to Right** across table
Monitoring should be for **Not Less** than 3 minutes. However, if high concentrations of gases initially recorded, monitoring should be for up to 10 minutes
N/A = Not applicable = Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accurate measure of the total hydrocarbons in the borehole when methane is present
Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.
PID = Photo Ionisation Detector (Calibrated to Isobutylene)

Site:	Littleborough
Ref:	21-763

Visit	Date	Time	Equipment	Weather	Initials	Comments	Monitoring Well	Gas Flow (l/hr)	Atmospheric Pressure (mb)	Trend	Methane (% v/v)		Methane (% LEL)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		Hydrocarbons (GFM 43S only)		Other Gases (PPM)			Depth to Water (m bgl)
										R/F/S	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Hex %	PID Cf	PID (Isobutylene)	H ₂ S	CO	
1	12/11/2021	09.00am	GFM430	Raining	TMC		MW1	<0.1	988			0.0		0.0		0.5		19.6				0.0	0.0	1.87
							MW2	<0.1	988			0.0		0.0		0.0		19.9				0.0	0.0	DRY
							MW3	<0.1	988			0.0		0.0		1.0		19.8				0.0	0.0	DRY
							MW4	<0.1	988			0.0		0.0		0.0		19.9				0.0	0.0	DRY
							MW5	<0.1	989			0.0		0.0		0.0		19.9				0.0	0.0	DRY
2	02/12/2021	10:00	GFM430	Sunny	TMC		MW1	<0.1	988			0.0		0.0		0.2		18.6				0.0	0.0	1.82
							MW2	<0.1	987			0.0		0.0		0.0		19.3				0.0	0.0	DRY
							MW3	<0.1	987			0.0		0.0		0.0		16.7				0.0	0.0	DRY
							MW4	<0.1	987			0.0		0.0		1.3		16.7				0.0	0.0	DRY
							MW5	<0.1	987			0.0		0.0		0.0		19.3				0.0	0.0	DRY
3	14/12/2021	10:17	GFM430	Foggy	TMC	MW1 & 2 Bailed then tested 20 mins later	MW1	<0.1	1007			0.0		0.0		0.0		17.4				0.0	0.0	0.42
							MW2	<0.1	1007			0.0		0.0		0.0		19.6				0.0	0.0	0.52
							MW3	<0.1	1007			0.0		0.0		0.0		17.5				0.0	0.0	Damp Bottom
							MW4	<0.1	1007			0.0		0.0		0.0		19.8				0.0	0.0	Damp Bottom
							MW5	<0.1	1005			0.0		0.0		0.0		16.8				0.0	0.0	Dry
4	28/01/22	10.08	GFM430	Overcast	TMC	MW1 & 2 Bailed then tested 20 mins later	MW1	<0.1	1008			0.0		0.0		0.0		17.7				0.0	0.0	0.60
							MW2	<0.1	1008			0.0		0.0		0.0		20.1				0.0	0.0	0.86
							MW3	<0.1	1007			0.0		0.0		0.0		18.4				0.0	0.0	DRY
							MW4	<0.1	1007			0.0		0.0		0.1		20.0				0.0	0.0	DRY
							MW5	<0.1	1008			0.0		0.0		0.0		17.1				0.0	0.0	DRY
5	16/02/22	13:30	GFM430	Heavy Rain	TMC	MW1 & 2 Bailed then tested 20 mins later	MW1	<0.1	963			0.0		0.0		0.0		18.1				0.0	0.0	0.83
							MW2	<0.1	963			0.0		0.0		0.0		19.9				0.0	0.0	0.86
							MW3	<0.1	963			0.0		0.0		0.0		18.3				0.0	0.0	DRY
							MW4	<0.1	963			0.0		0.0		0.4		19.7				0.0	0.0	DRY
							MW5	<0.1	966			0.0		0.0		0.0		17.7				0.0	0.0	DRY
6	23/02/22	15:23	GFM430	Intermittent Rain	TMC	MW1 & 2 Bailed then tested 20 mins later	MW1	<0.1	967			0.0		0.0		0.0		18.0				0.0	0.0	0.89
							MW2	<0.1	967			0.0		0.0		0.0		20.1				0.0	0.0	0.50
							MW3	<0.1	967			0.0		0.0		0.0		18.2				0.0	0.0	DRY
							MW4	<0.1	967			0.0		0.0		0.5		19.0				0.0	0.0	DRY
							MW5	<0.1	967			0.0		0.0		0.0		17.6				0.0	0.0	DRY

Notes:

Detection limits - Methane = 0.0%, Carbon Dioxide = 0.0%, LEL = 0.0%, Oxygen = 0.0%, Flow = 0.1l/hr

Monitoring order is from **Left to Right** across table

Monitoring should be for **Not Less** than 3 minutes. However, if high concentrations of gasses initially recorded, monitoring should be for up to 10 minutes.

N/A = Not applicable

= Off the scale

Cf = PID compensation Factor (1-10) - Must be used to multiply the PID reading to give an accurate measure of the total hydrocarbons in the borehole when methane is present

Hex = Hexane (Valid and in range up to 2.000%) - Recorded when abnormally high methane is present.

PID = Photo Ionisation Detector (Calibrated to Isobutylene)

Cable Percussive (CP) & Dynamic Sampling (MW) Borehole Record Sheets



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St Johns Road, Meadowfield
Durham, DH7 8PN
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BOREHOLE LOG

Project Hollingsworth Gate, Littleborough				BOREHOLE No CP1	
Job No 21-763	Date 01-11-21	Ground Level (m) 153.26	Co-Ordinates () E 393,439.5 N 415,778.6		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B						Vegetation overlying dense and very dense light brown sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles. Metal noted (MADE GROUND).		
1.50-1.80	B					(3.00)			
1.50-1.80	SPT	72 Blows							
2.00-2.20	B								
2.00-2.20	SPT	75 Blows							
3.00-3.45	B			150.26		3.00			
3.00-3.45	SPT	N=35				(1.10)	Medium dense becoming dense and very dense light brown SANDSTONE (LOWER COAL MEASURES).		
4.00-4.10	B			149.16		4.10			
4.00-4.10	SPT	75 Blows					Borehole terminated at 4.10m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	3	4			Borehole remained dry on completion
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		



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BOREHOLE LOG

Project Hollingsworth Gate, Littleborough				BOREHOLE No CP2	
Job No 21-763	Date 04-11-21	Ground Level (m) 153.42	Co-Ordinates () E 393,413.2 N 415,713.4		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B					(1.70)	Vegetation overlying dense light brown sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
1.20-1.65 1.20-1.65	B SPT	N=32		151.72		1.70			
2.00-2.45 2.00-2.45	B SPT	N=16				(2.30)	Firm grey sandy gravelly CLAY (RESIDUAL SOIL).		
3.00-3.45 3.00-3.45	B SPT	N=19							
4.00-4.10	SPT	75 Blows		149.42 149.32		4.00 4.10	Yellowish brown SANDSTONE (LOWER COAL MEASURES). Borehole terminated at 4.10m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	1.7	2			Borehole remained dry on completion
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		

AGS3 UK BH LOGS 21-763.GPJ AGS3 ALL GDT 8/11/21



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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No CP3	
Job No 21-763	Date 03-11-21	Ground Level (m) 153.20	Co-Ordinates () E 393,366.3 N 415,662.3		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B						Vegetation overlying medium dense light brown sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
1.20-1.65	B								
1.20-1.65	SPT	N=12				(3.70)			
2.00-2.45	B								
2.00-2.45	SPT	N=11							
3.00-3.45	B								
3.00-3.45	SPT	N=15							
4.00-4.45	B			149.50		3.70			
4.00-4.45	SPT	N=19					Firm grey sandy gravelly CLAY (RESIDUAL SOIL).		
5.00-5.45	B								
5.00-5.45	SPT	N=20				(3.30)			
6.00-6.45	B								
6.00-6.45	SPT	N=25							
7.00-7.20	B			146.20		7.00			
7.00-7.20	SPT	75 Blows				(0.60)	Dense and very dense grey MUDSTONE (LOWER COAL MEASURES).		
7.50-7.60	SPT	75 Blows		145.60		7.60			
							Borehole terminated at 7.60m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	3.7	5			Borehole remained dry on completion
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		

AGS3 UK BH LOGS 21-763.GPJ AGS3 ALL GDT 8/11/21



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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No CP4	
Job No 21-763	Date 03-11-21	Ground Level (m) 155.87	Co-Ordinates () E 393,310.1 N 415,625.1		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B					(1.00)	Vegetation overlying light brown and grey sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
1.20-1.65	B			154.87		1.00			
1.20-1.65	SPT	N=14				(1.00)	Firm grey sandy gravelly clay with some brick (MADE GROUND).		
2.00-2.45	B			153.87		2.00			
2.00-2.45	SPT	N=13					Firm grey sandy gravelly CLAY (RESIDUAL SOIL).		
3.00-3.45	B					(6.00)			
3.00-3.45	SPT	N=17							
5.00-5.45	B								
5.00-5.45	SPT	N=19							
6.00-6.45	B								
6.00-6.45	SPT	N=20							
7.00-7.45	B								
7.00-7.45	SPT	N=22							
8.00-8.20	B			147.87		8.00			
8.00-8.20	SPT	75 Blows		147.67		8.20	Dense and very dense grey MUDSTONE (LOWER COAL MEASURES).		
							Borehole terminated at 8.20m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	1	1			Water strike at 8.00m.
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		

AGS3 UK BH LOGS 21-763.GPJ AGS3 ALL GDT 8/11/21



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BOREHOLE LOG

Project Hollingsworth Gate, Littleborough				BOREHOLE No CP5	
Job No 21-763	Date 01-11-21	Ground Level (m) 152.71	Co-Ordinates () E 393,228.2 N 415,673.9		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B						Vegetation overlying medium dense light brown and grey sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
1.50-1.95	B								
1.50-1.95	SPT	N=23				(4.00)			
2.00-2.45	B								
2.00-2.45	SPT	N=16							
3.00-3.45	B								
3.00-3.45	SPT	N=23							
4.00-4.45	B			148.71		4.00			
4.00-4.45	SPT	N=24				(1.50)	Medium dense medium brown SAND (RESIDUAL SOIL).		
5.00-5.45	B								
5.00-5.45	SPT	N=19		147.21		5.50			
5.50-5.95	SPT	N=34				(0.60)	Medium dense becoming dense and very dense grey MUDSTONE (LOWER COAL MEASURES).		
6.00-6.10	SPT	75 Blows		146.61		6.10			
							Borehole terminated at 7.60m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	4	5			Borehole remained dry on completion
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		



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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No CP6	
Job No 21-763	Date 02-11-21	Ground Level (m) 156.55	Co-Ordinates () E 393,235.3 N 415,610.1		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.40	B			156.15		0.40	Vegetation overlying light brown and grey sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
0.40-1.00	B					(1.60)	Firm grey and brown sandy clay with some sandstone (MADE GROUND).		
1.20-1.65	B	N=16							
1.20-1.65	SPT			154.55		2.00			
2.00-2.45	B	N=17				(1.00)	Stiff dark brown and grey very sandy very gravelly CLAY with occasional cobbles of sandstone (RESIDUAL SOIL).		
2.00-2.45	SPT			153.55		3.00			
3.00-3.45	B	75 Blows				(1.25)	Dense and very dense grey MUDSTONE (LOWER COAL MEASURES).		
3.00-3.45	SPT			152.30		4.25			
4.00-4.25	B	75 Blows					Borehole terminated at 4.25m due to refusal.		
4.00-4.25	SPT								

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	0.4	1			Water strike at 5.20m.
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		

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BOREHOLE LOG

Project Hollingsworth Gate, Littleborough				BOREHOLE No CP7	
Job No 21-763	Date 02-11-21	Ground Level (m) 157.42	Co-Ordinates () E 393,277.8 N 415,603.8		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B					(1.20)	Vegetation overlying light brown and grey sandy slightly clayey gravel intermixed with concrete, sandstone and cobbles (MADE GROUND).		
1.20-1.65 1.20-1.65	B SPT	N=8		156.22		1.20	Soft brown sandy CLAY with some sand bands (RESIDUAL SOIL).		
2.00-2.45 2.00-2.45	B SPT	N=15				(3.50)			
3.00-3.45 3.00-3.45	B SPT	N=11							
4.00-4.45 4.00-4.45	B SPT	N=10		152.72		4.70			
5.00-5.45 5.00-5.45	B SPT	N=17				(2.00)			
6.00-6.45 6.00-6.45	B SPT	N=18		150.72		6.70			
6.70-7.00 7.00-7.20	B SPT	73 Blows	↓	150.22		(0.50) 7.20	Dense and very dense grey MUDSTONE (LOWER COAL MEASURES).		
							Borehole terminated at 7.20m due to refusal.		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
						0	1.2	2			Water strike at 7.00m.
All dimensions in metres Scale 1:62.5			Client Vistry Partnerships Yorkshire			Method/ Plant Used Cable Percussive			Logged By MH		

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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No MW1	
Job No 21-763	Date 27-10-21	Ground Level (m) 151.62	Co-Ordinates () E 393,509.0 N 415,872.0		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
1.00-1.45	SPT	N=27		151.17		0.45	Grass overlying demolition rubble of broken bricks and concrete intermixed with brown sandy clay (MADE GROUND)		
						(0.85)	Firm (locally stiff) reddish brown (possibly reworked) sandy gravelly clay with occasional coal fragments and cobbles of sandstone (MADE GROUND)		
				150.32		1.30			
2.00-2.27	SPT	75 Blows		150.12		0.20	Stiff (high strength) reddish brown sandy gravelly CLAY with occasional cobbles of sandstone (RESIDUAL SOIL)		
						(0.77)	Yellowish brown completely weathered SILTSTONE recovered as a friable gravel (LOWER COAL MEASURES)		
				149.35		2.27			
							Borehole terminated at c.2.27m due to refusal of sampling equipment		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion
All dimensions in metres Scale 1:18.75			Client Vistry Partnerships Yorkshire			Method/ Plant Used Windowless Sampling			Logged By LJ		

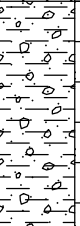
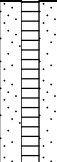
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BOREHOLE LOG

Project Hollingsworth Gate, Littleborough				BOREHOLE No MW2	
Job No 21-763	Date 27-10-21	Ground Level (m) 155.41	Co-Ordinates () E 393,481.7 N 415,801.2		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.60-0.90	SPT	75 Blows		155.11		(0.30) 0.30	Grass overlying demolition rubble of broken bricks and concrete intermixed with brown sandy clay (MADE GROUND)		
						(0.60) 0.90	Stiff (high strength) reddish brown sandy gravelly CLAY with occasional cobbles of sandstone (RESIDUAL SOIL)		
				154.51			Borehole terminated at c.0.90m due to refusal of sampling equipment		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion
All dimensions in metres Scale 1:18.75			Client Vistry Partnerships Yorkshire			Method/ Plant Used Windowless Sampling			Logged By LJ		

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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No MW3	
Job No 21-763	Date 27-10-21	Ground Level (m) 151.68	Co-Ordinates () E 393,413.2 N 415,776.0		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
1.00-1.09	SPT	75 Blows		151.58		0.10	Grass overlying demolition rubble of broken bricks and concrete intermixed with brown sandy clay (MADE GROUND)		
						(0.70)	Firm (locally stiff) reddish brown (possibly reworked) sandy gravelly clay with occasional coal fragments and cobbles of sandstone (MADE GROUND)		
				150.88		0.80			
						(0.29)	Yellowish brown slightly clayey gravel of sandstone cobbles (MADE GROUND)		
				150.59		1.09			
							Borehole terminated at c.1.09m due to refusal of sampling equipment		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion
All dimensions in metres Scale 1:18.75			Client Vistry Partnerships Yorkshire			Method/ Plant Used Windowless Sampling			Logged By LJ		

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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No MW4	
Job No 21-763	Date 27-10-21	Ground Level (m) 152.28	Co-Ordinates () E 393,196.0 N 415,664.0		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
1.00-1.45	SPT	N=8		151.98		(0.30) 0.30	Grass overlying demolition rubble of broken bricks and concrete intermixed with brown sandy clay (MADE GROUND)		
						(1.80)	Firm greyish brown sandy gravelly clay with brick, sandstone and concrete. Cobbles noted (MADE GROUND)		
2.00-2.45	SPT	N=12		150.18		2.10			
3.00-3.45	SPT	N=8				(2.20)	Stiff (high strength) brown very sandy very gravelly CLAY. Gravel is fine to coarse of sandstone (RESIDUAL SOIL).		
4.00-4.45	SPT	N=10		147.98		4.30			
4.50-4.70	SPT	75 Blows		147.58		(0.40) 4.70	Yellowish brown SANDSTONE (LOWER COAL MEASURES).		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion
All dimensions in metres Scale 1:31.25			Client Vistry Partnerships Yorkshire			Method/ Plant Used Windowless Sampling			Logged By MPB		

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BOREHOLE LOG

Project Hollingworth Gate, Littleborough				BOREHOLE No MW5	
Job No 21-763	Date 27-10-21	Ground Level (m) 150.01	Co-Ordinates () E 393,412.9 N 415,811.9		
Contractor Arc Environmental Limited				Sheet 1 of 1	

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.70-0.82	SPT	75 Blows				(0.30)	Grass overlying demolition rubble of broken bricks and concrete intermixed with brown sandy clay (MADE GROUND)		
				149.71		0.30			
						(0.52)	Black very sandy slightly clayey gravel with broken bricks and concrete (MADE GROUND)		
				149.19		0.82			
							Borehole terminated at c.0.82m due to refusal of sampling equipment		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
											Borehole remained dry on completion
All dimensions in metres Scale 1:18.75			Client Vistry Partnerships Yorkshire			Method/ Plant Used Windowless Sampling			Logged By LJ		

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