



JMC/C3512/6996

03 August 2017

Graham Jones Associates Ltd
199 Monton Road
Monton
Manchester
M30 9PN

For the attention of Mr M Pimbley

Dear Matt,

Re: Jordan Street, Manchester

We write to report on the gas monitoring at the above site. Four ground gas monitoring visits have been completed. The visits were undertaken between the dates of 05th April and 19th May 2017.

The Desk Study Assessment Report issued by Scott Hughes (Ref: 2731/DTS) issued in January 2014 identified a potential on site source of ground gas relating to made ground. The risk from ground gas was considered moderate.

Three ground gas monitoring wells were installed at the site during the site investigation of 09 March 2017. These wells consist of 35mm internal diameter pipe. Plain pipe was used from ground level to 1.0m bgl and sealed with a bentonite surround. Slotted pipe with a clean gravel surround was used from 1.0m down to the base of the wells at depths of between 2.50m and 4.00m. The top of the pipe was sealed with a rubber bung and gas valve. The installations were covered with a lockable steel cover, concreted in place.

Ground gas concentrations were measured for both peak conditions (measurement of the accumulated gases on opening the valve) and steady state conditions (measurement of the stable concentrations after accumulated gases have been purged from the borehole). Groundwater levels, flow, atmospheric pressure, atmospheric oxygen and weather conditions were also recorded during each visit.

Results

No methane gas has been detected during the monitoring period.

The peak carbon dioxide concentrations ranged from 0.1%v/v to 0.7%v/v. Steady state values ranged from 0.0%v/v to 0.5%v/v, and were generally similar to the peak concentrations.

Peak oxygen concentrations ranged from 20.8%v/v to 21.7%v/v. Steady state concentrations also ranged from 3.6%v/v to 22.2%v/v and were generally similar to peak.

No Carbon monoxide gas or hydrogen sulphide gas was detected during the monitoring visits.

A maximum positive flow was recorded of 0.2 l/h during the monitoring period.

The atmospheric pressure ranged between 1016mb and 1043mb over the monitoring period.

No groundwater was recorded during the site works and subsequent monitoring visits.

Full records of the ground gas monitoring results are enclosed.



Discussion

The ground gas monitoring results do not show any elevated levels of carbon dioxide or methane. Deep made ground has been observed across the site however there was no evidence of putrescible material observed during the intrusive investigation.

Assessment

In order to assess the ground gas situation and the requirement for ground gas precautions guidance was taken from CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'.

The proposed multi storey residential end use (Type B, BS8485) dictates that the gas monitoring results are assessed in accordance with Wilson and Card (1999) as stated in CIRIA C665.

The Wilson and Card method uses the concept of a gas screening value (GSV), which is calculated using the maximum concentration of the ground gas and the flow rate. A GSV of 0.0014 l/h has been calculated for carbon dioxide. No GSV has been calculated for methane.

The ground gas levels recorded place the site within Characteristic Situation 1. Furthermore Jordan Street, Manchester is not within an area requiring radon protection.

Recommendations

On the basis of the monitoring undertaken, the assessment and guidance, ground gas precautions are not required in the new development.

If you have any queries please do not hesitate to contact the undersigned.

Yours sincerely

On behalf of Brownfield Solutions Limited

Jo Campion
Project Engineer

j.campion@brownfieldsolutions.co.uk

Enc Gas Monitoring Results
 Exploratory Hole Logs
 Borehole Location Plan

05/04/2017

**BROWNFIELD
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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O ₂)	Carbon Dioxide (CO ₂)	Methane (CH ₄)	LEL	Hydrogen Sulphide (H ₂ S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.5	0.1	0.1		0.0	ND	1029	JB	GA5000	Overcast	Steady
Finish	21.5	0.1	0.1		0.0	ND	1029				

		Percentage Concentrations				Parts Per Million		m bgl	litres/hour	mb			litres/hour	litres/hour	
Location	State (Peak/Steady)	Oxygen (O ₂)	Carbon Dioxide (CO ₂)	Methane (CH ₄)	LEL	Hydrogen Sulphide (H ₂ S)	Carbon Monoxide (CO)	Water Level	Flow	Relative Pressure	Sheen (Y/N)	Q _{hg} CO ₂	Q _{hg} CH ₄	Notes	
WS1	Peak	21.4	0.1	ND	ND	ND	ND	NGW	0.0	-0.1	No	0.00	0.00		
	Steady	21.4	ND	ND	ND	0.0	ND								
WS2	Peak	21.3	0.2	ND	ND	0.0	ND	NGW	0.2	-0.1	No	0.00	0.00		
	Steady	21.5	0.1	ND	ND	0.0	ND								
WS4	Peak	21.4	0.1	ND	ND	0.0	ND	NGW	0.1	0.0	No	0.00	0.00		
	Steady	21.4	0.1	ND	ND	0.0	ND								

20/04/207

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Key	
ND	Not Detected
NA	Not Available
NGW	No Groundwater

	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O₂)	Carbon Dioxide (CO₂)	Methane (CH₄)	LEL	Hydrogen Sulphide (H₂S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.5	0.1	0.0	0.0	0.0	NA	1043	DV	GA2000	Overcast	Steady
Finish	21.5	0.0	0.0	0.0	0.0	NA	1042				

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05/05/2017

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

Key	
ND	Not Detected
NA	Not Available
NGW	No Groundwater

	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O₂)	Carbon Dioxide (CO₂)	Methane (CH₄)	LEL	Hydrogen Sulphide (H₂S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.4	0.1	0.1	2.0	0.0	NA	1024	JB	GA5000	Clear	Steady
Finish	21.9	0.1	0.1	2.0	0.0	NA	1024				

		Percentage Concentrations				Parts Per Million		m bgl	litres/hour	mb		litres/hour	litres/hour	
Location	State (Peak/Steady)	Oxygen (O ₂)	Carbon Dioxide (CO ₂)	Methane (CH ₄)	LEL	Hydrogen Sulphide (H ₂ S)	Carbon Monoxide (CO)	Water Level	Flow	Relative Pressure	Sheen (Y/N)	Q _{hg} CO ₂	Q _{hg} CH ₄	Notes
WS1	Peak	21.2	0.2	ND	ND	0.0	NA	NGW	0.1	-0.1	No	0.00	0.00	
	Steady	21.5	0.1	ND	ND	0.0	NA							
WS2	Peak	21.6	0.1	ND	ND	0.0	NA	NGW	0.1	0.0	No	0.00	0.00	
	Steady	21.7	0.1	ND	ND	0.0	NA							
WS4	Peak	21.7	0.1	ND	ND	0.0	NA	NGW	0.1	-0.1	No	0.00	0.00	
	Steady	21.8	0.1	ND	ND	0.0	NA							

19/05/2017

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

Key	
ND	Not Detected
NA	Not Available
NGW	No Groundwater

	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O ₂)	Carbon Dioxide (CO ₂)	Methane (CH ₄)	LEL	Hydrogen Sulphide (H ₂ S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.6	0.1	0.0	0.0	0.0	NA	1016	JB	GA 2000	Overcast	Steady
Finish	21.7	0.0	0.0	0.0	0.0	NA	1016				

[illegible]



William Smith House
173 -183 Witton Street
Northwich
Cheshire
CW9 5LP

Borehole Log

Borehole No.

WS1

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type
WS

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.40	ES	N=9 (1,1/2,2,2,3)	0.80			MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is angular fine to coarse of mixed lithologies including slate, brick, coal, clinker and ceramic.	1
		1.00 1.00 1.00	D ES		1.50			MADE GROUND: Orange brown gravelly fine to coarse sand with medium cobble content. Gravel is angular fine to coarse of mixed lithologies including brick. Cobbles are angular of brick and sandstone. Rare pockets of black ashy sand.	
		1.60	ES		1.80			MADE GROUND: Brown slightly gravelly fine to coarse sand. Gravel is angular to subrounded fine to coarse of brick and masonry.	
		2.00 2.00 2.00	D ES	N=14 (1,0/1,4,4,5)	2.00			MADE GROUND: Light brown gravelly sand. Gravel is angular to subrounded fine to coarse of brick. Slightly clayey locally.	2
								MADE GROUND: Dark brown ashy gravelly sand with low to medium cobble content. Gravel is angular fine to coarse of brick. Cobbles are angular of brick.	
		3.00 3.00	D	N=33 (2,4/9,10,9,5)	3.70				3
					3.90				
		4.00 4.00	D		4.15			Light brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and siltstone. (Possible residual bedrock).	
								Weak grey brown SANDSTONE highly weathered recovered as gravelly sand.	4
								End of borehole at 4.15 m	

Remarks

1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Standpipe installed to 3.00m bgl; 1.00m plain, 2.00m slotted.





William Smith House
173 -183 Witton Street
Northwich
Cheshire
CW9 5LP

Borehole Log

Borehole No.

WS2

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type
WS

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=1 (1,0/0,1,0,0)	0.20			MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is angular fine to coarse of mixed lithologies including slate and brick.	
								MADE GROUND: Cobbles and angular fine to coarse gravel of brick.	
		0.80	ES					<u>Black ashy sand from 0.80m.</u>	
		1.00	D	N=6 (7,6/2,2,1,1)	1.00			MADE GROUND: Orange brown sandy angular fine to coarse gravel of mixed lithologies including brick and masonry.	
		1.00							
		1.50	ES						
		1.80	ES	50 (75 for 90mm/50 for 40mm)	1.90			<u>Ashy from 1.70m to 1.80m.</u>	
		2.00	D					MADE GROUND: Brown clayey gravelly fine to coarse sand. Gravel is angular fine to coarse of mixed lithologies including brick.	
		2.00							
		2.30	ES		2.40			MADE GROUND: Brown soft to firm slightly gravelly clay with low to medium cobble content. Gravel is angular fine to coarse of slate and brick.	
		2.50	ES		2.70				
		2.60							
		2.70	D					End of borehole at 2.70 m	

Remarks

1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Standpipe installed to 2.50m bgl; 1.00m plain, 1.50m slotted.



Borehole Log

Borehole No.

WS3

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type	WS
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
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90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.10			MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is medium to coarse of mixed lithologies including coal and clinker. MADE GROUND: Brown gravelly fine to coarse sand. Gravel is angular to subrounded of mixed lithologies including coal and brick. MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is medium to coarse of mixed lithologies including coal and clinker. MADE GROUND: Brown gravelly fine to coarse sand. Gravel is angular to subrounded of mixed lithologies including coal, masonry and brick. <u>Very gravelly from 0.80m.</u>	1
		0.30	ES		0.30				
					0.50				
		1.00	D	N=7 (1,3/1,2,1,3)					
		1.00							
		2.00	D	N=4 (1,2/1,1,1,1)					
		2.00							
		3.00	D	N=8 (1,1/2,2,2,2)					
3.00									
4.00		50 (13,20/50 for 255mm)	4.00		Weak red brown SANDSTONE highly weathered recovered as gravelly sand.	4			
			4.25						
							End of borehole at 4.25 m	5	

Remarks

- | | |
|---------|--|
| Remarks | 1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Hole backfilled upon completion. |
|---------|--|





William Smith House
173 -183 Witton Street
Northwich
Cheshire
CW9 5LP

Borehole Log

Borehole No.

WS4

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type
WS

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES					MADE GROUND: Dark brown gravelly sand with low to medium cobble content. Slightly ashy locally, gravel is angular fine to coarse of brick. Cobbles are angular of brick.	
		1.00	D						
		1.00	ES	N=2 (1,0/0,1,0,1)				Coal gravel from 1.00m.	1
		1.00							
		2.00		N=5 (2,1/1,1,1,2)					2
		2.30	ES						
		3.00	D	N=10 (0,1/1,2,2,5)					3
		3.00							
		3.30	ES						
		3.30							
		4.00	D	65 (13,13/30,35,,)	4.10			Weak red brown SANDSTONE highly weathered recovered as gravelly sand.	4
		4.00			4.30				
								End of borehole at 4.30 m	5

Remarks

1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Standpipe installed to 4.00m bgl; 1.00m plain, 3.00m slotted.





William Smith House
173 -183 Witton Street
Northwich
Cheshire
CW9 5LP

Borehole Log

Borehole No.

WS5

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type
WS

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is medium to coarse of mixed lithologies including coal and clinker.	
					0.30			MADE GROUND: Light brown gravelly sand with low to medium cobble content. Gravel is angular to subrounded fine to coarse of brick. Cobbles are angular of brick.	
		0.40	ES		0.40			MADE GROUND: Dark brown slightly gravelly fine to coarse sand. Gravel is angular of mixed lithologies including brick.	
		0.65	ES		0.60			MADE GROUND: Black ashy gravelly fine to coarse sand. Gravel is medium to coarse of mixed lithologies including coal and clinker.	
		1.00	D	N=0 (1,0/0,0,0,0)	1.00			MADE GROUND: Brown slightly gravelly fine to coarse sand. Gravel is angular to subrounded of mixed lithologies including coal, brick and clinker and rare plastic.	1
		1.00						MADE GROUND: Dark brown slightly gravelly fine to coarse sand. Gravel is angular fine to coarse of mixed lithologies including brick.	
		1.50	ES						
		2.00	D	N=12 (2,1/1,4,3,4)				Clayey from 1.90m.	2
		2.00							
		2.50	ES						
		3.00	D	N=20 (2,1/1,6,6,7)	3.00			Brick cobbles form 2.90m.	3
		3.00						MADE GROUND: Light brown slightly gravelly fine to coarse sand. Gravel is angular to subrounded fine to coarse of mixed lithologies including brick.	
		3.50	ES		3.50			Light brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite. (Possible residual bedrock).	
		3.80	D	72 (15,20/72 for 275mm)	3.80			Weak red brown SANDSTONE highly weathered recovered as gravelly sand.	
		3.80			4.00			End of borehole at 4.00 m	4
									5

Remarks

1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Hole backfilled upon completion.





William Smith House
173 -183 Witton Street
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Cheshire
CW9 5LP

Borehole Log

Borehole No.

WS6

Sheet 1 of 1

Project Name: JORDAN STREET

Project No.
C3512

Co-ords: -

Hole Type
WS

Location: MANCHESTER

Level:

Scale
1:25

Client: BEECH CONSTRUCTION

Dates: 09/03/2017 -

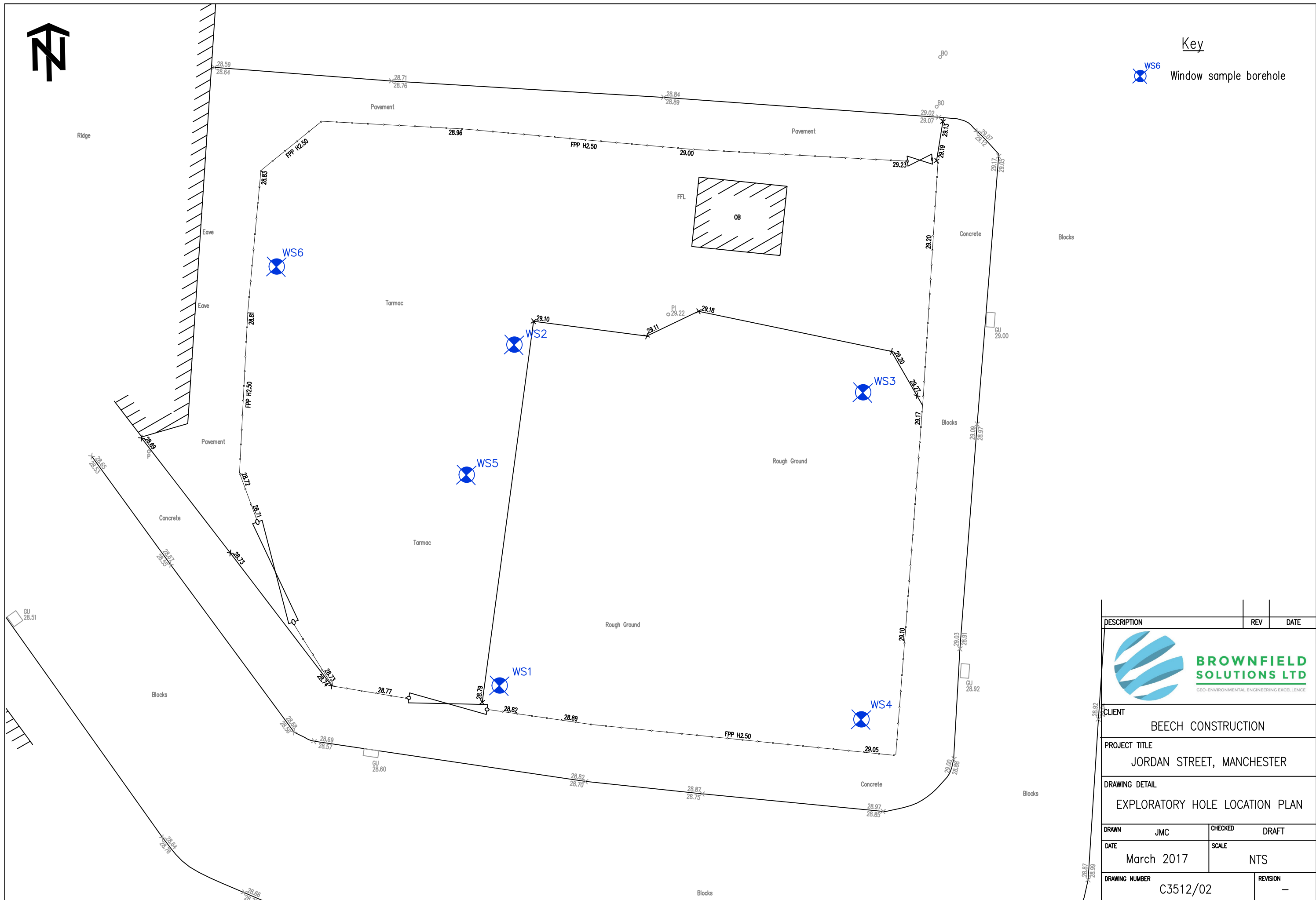
Logged By
JC

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.20			MADE GROUND: Dark brown clayey gravelly sand. Gravel is angular to subrounded fine to coarse of mixed lithologies.	1
					0.37			MADE GROUND: Black ashy sandy angular to subrounded fine to coarse gravel of mixed lithologies including clinker and brick	
					0.47			MADE GROUND: Light brown gravelly fine to coarse sand. Gravel is angular to subrounded fine to medium of mixed lithologies including masonry.	
		0.60	ES	N=4 (1,1/1,1,1,1)				MADE GROUND: Dark brown slightly clayey gravelly fine to coarse sand with low cobble content. Locally sandy clay. Gravel is angular of mixed lithologies including brick. Cobbles are angular of brick and masonry.	
		1.00	D						
		1.00							
		1.60	ES	N=2 (1,0/1,0,1,0)					
		2.00	D						
		2.00							
		2.20	ES						
		3.00	D	N=1 (1,0/0,1,0,0)					3
		3.00							
		3.20	ES						
		3.80	D	50 (16,20/50 for 230mm)	3.80				4
		4.00	D		3.90			Light brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of mixed lithologies including sandstone and quartzite. (Possible residual bedrock).	
		4.00						Weak red brown SANDSTONE highly weathered recovered as gravelly sand.	
					4.30			End of borehole at 4.30 m	5

Remarks

1. Hand dug pit to 1.20m bgl.
2. No groundwater encountered.
3. Hole backfilled upon completion.





WS6

Window sample borehole

DESCRIPTION	REV	DATE
 BROWNFIELD SOLUTIONS LTD GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE		
CLIENT		
BEECH CONSTRUCTION		
PROJECT TITLE		
JORDAN STREET, MANCHESTER		
DRAWING DETAIL		
EXPLORATORY HOLE LOCATION PLAN		
DRAWN	JMC	CHECKED
DATE		SCALE
March 2017		NTS
DRAWING NUMBER		REVISION
C3512/02		—