



JB/C3664/7430

28 June 2018

Lidl UK GmbH
Eastgate Way
Manor Park
Runcorn
Cheshire
WA7 1NT

For the attention of Ms Faye Heeley

Dear Faye,

Re: Wrexham Police Station

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 30th November 2017 and 07th February 2018.

The Geo-Environmental Assessment report (Ref: JB/C3664/7273) issued in January 2018 identified a potential off site source of ground gas relating to three landfill sites located at least 500m to the southeast and southwest of the site. The risk from off site ground gas was considered moderate to low due to the distances involved. There were no on-site sources of ground gas identified with the exception of localised made ground.

Three ground gas monitoring wells were installed at the site during the site investigation of 11th to 12th November 2017. These wells consist of 35mm internal diameter polyvinyl chloride (PVC) pipe. Plain pipe was used from ground level to between 1.00m and 2.00m bgl and sealed with a bentonite surround. Slotted pipe with a clean gravel surround was used from the start of the slotted pipe down to the base of the wells. The top of the pipe is sealed with a rubber bung with a gas valve and the installations 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

Methane gas was not detected from any of the wells throughout the monitoring period.

The peak carbon dioxide concentrations ranged from 0.6%v/v to 3.5%v/v. Steady state values also ranged from 0.2%v/v to 3.3%v/v, and were generally similar to the peak concentrations. CO₂ concentrations were highest in WS03.

Peak oxygen concentrations ranged from 17.9%v/v to 20.4%v/v. Steady state concentrations also ranged from 18.1%v/v to 20.5%v/v and were generally similar to peak.
We did not monitor for the presence of carbon monoxide.

A maximum positive flow of 0.2l/hr was recorded, however flows were generally 0.1l/hr.

The atmospheric pressure ranged between 985mb and 1014mb over the monitoring period, although monitoring has only been undertaken during steady or rising pressure conditions.

No groundwater has been encountered from any of the standpipes throughout the monitoring period.

Full records of the ground gas monitoring results are enclosed.

Discussion

The highest concentration of CO₂ was encountered within WS03. The installation was entirely within granular natural strata. The recorded concentrations of carbon dioxide are what is expected from natural alluvium. As the three installations are all producing similar levels of gas, it is considered that the source is the naturally deposited alluvium, and not associated with the offsite landfills.

The site does however lie in a Radon affected area where 5-10% of homes are affected.

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 commercial end use 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. As no positive flow values were recorded it is not possible to calculate a GSV and the typical concentration thresholds were used instead.

The ground gas levels recorded place the site within Situation 1.

The guidance document above as well as BS8485:2015 states that for Situation 1 no precautions are necessary in respect of carbon dioxide or methane.

As the site lies in an area where 5-10% of properties are affected by Radon, UK Radon dictate that Basic Radon precautions are required.

Recommendations

On the basis of the monitoring undertaken, the assessment and guidance, ground gas precautions are required with respect to Radon. This should comprise of Basic Radon precautions, and guidance should be sought from UKRadon and BRE report 211 'Guidance on protective measures for new buildings'.

If the installation of a membrane is a planning requirement, the Local Authority is likely to require validation of the placement of protective measures. We recommend the requirements of the validation should be discussed with the local authority prior to installation.

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

Yours sincerely

On behalf of Brownfield Solutions Limited



A handwritten signature in black ink, appearing to read 'Dan Gates', written over a large, stylized 'D'.

Dan Gates
Senior Project Engineer

Enc Gas Monitoring Results
 Exploratory Hole Location Plan
 Borehole Logs

30/11/2017

**BROWNFIELD
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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	20.9	0.1	ND	ND	ND	NA	1005	JB	GA5000	Clear	Rising
Finish	21.1	0.1	ND	ND	ND	NA	1005				

		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	
WS03	Peak	18.9	2.5	ND	ND	ND	NA	NGW	0.1	-0.2	No	0.00	0.00		
	Steady	19.2	2.5	ND	ND	ND	NA								
WS10	Peak	20.4	0.6	ND	ND	ND	NA	NGW	0.1	-0.3	No	0.00	0.00		
	Steady	20.8	0.2	ND	ND	ND	NA								
WS12	Peak	19.4	2.2	ND	ND	ND	NA	NGW	0.1	-0.3	No	0.00	0.00		
	Steady	20.9	0.2	ND	ND	ND	NA								

03/01/2018

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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	20.8	0.1	ND	ND	ND	NA	985	JB	GA5000	Mostly cloudy	Rising
Finish	20.9	0.1	ND	ND	ND	NA	985				

		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 _{avg} CO ₂	Q _{avg} CH ₄	Notes	
WS03	Peak	17.9	3.5	ND	ND	ND	NA	NGW	0.2	0.0	No	0.01	0.00		
	Steady	18.1	3.3	ND	ND	ND	NA								
WS10	Peak	20.1	1.2	ND	ND	ND	NA	NGW	0.1	-0.5	No	0.00	0.00		
	Steady	20.2	1.2	ND	ND	ND	NA								
WS12	Peak	20.1	1.8	ND	ND	ND	NA	NGW	0.1	0.1	No	0.00	0.00		
	Steady	20.2	1.6	ND	ND	ND	NA								

19/01/2018

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GEO-ENVIRONMENTAL ENGINEERING EXCELLENCE

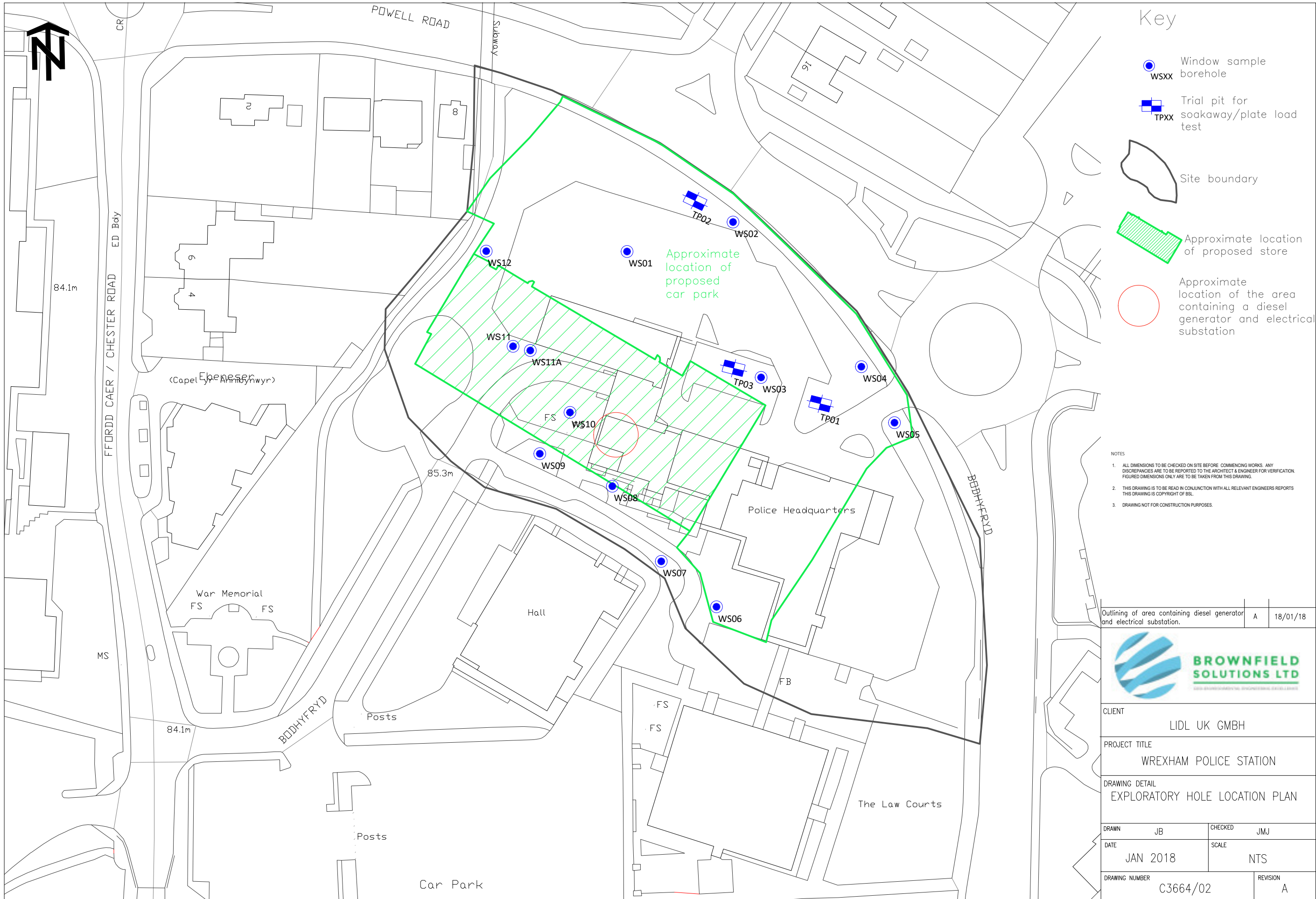
	Percentage Concentrations				Parts per Million		mb				
Ambient	Oxygen (O₂)	Carbon Dioxide (CO₂)	Methane (CH₄)	LEL	Hydrogen Sulphide (H₂S)	Carbon Monoxide (CO)	Atm Pressure	Monitored by	Equipment	Weather	Pressure Trend
Start	21.0	0.1	ND	ND	ND	NA	997	JB	GA5000	Partly cloudy	Steady
Finish	21.4	0.1	ND	ND	ND	NA	997				

		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	
WS03	Peak	18.7	3.3	ND	ND	ND	NA	NGW	0.1	0.2	No	0.00	0.00		
	Steady	18.7	3.3	ND	ND	ND	NA								
WS10	Peak	20.3	1.6	ND	ND	ND	NA	NGW	0.2	0.1	No	0.00	0.00		
	Steady	20.5	1.6	ND	ND	ND	NA								
WS12	Peak	19.9	1.8	ND	ND	ND	NA	NGW	0.2	0.0	No	0.00	0.00		
	Steady	20.0	1.9	ND	ND	ND	NA								

07/02/2018

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		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
WS03	Peak	18.8	3.0	ND	ND	ND	NA	NGW	0.0	0.1	No	0.00	0.00	
	Steady	18.9	2.9	ND	ND	ND	NA							
WS10	Peak	20.1	1.7	ND	ND	ND	NA	NGW	0.0	0.0	No	0.00	0.00	
	Steady	20.3	1.7	ND	ND	ND	NA							
WS12	Peak	20.0	1.7	ND	ND	ND	NA	NGW	0.0	0.0	No	0.00	0.00	
	Steady	20.2	1.5	ND	ND	ND	NA							





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Trial Pit Log

Trialpit No

TP01

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -
Level:

Date
11/11/2017

Location: WREXHAM

Dimensions
(m):

Depth
1.35

Scale
1:25

Logged
FINAL

Client: LIDL UK GMBH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20	ES		0.30			MADE GROUND: Grass over clayey silty sand with roots. Rare gravel of rounded fine to coarse siltstone (TOPSOIL).	
				0.80			MADE GROUND: Light brown slightly clayey slightly silty fine sand. Occasional cobbles of sub-rounded concrete.	
	1.00	D		1.30			MADE GROUND: Brown sandy gravel of angular fine to coarse siltstone. High cobble content of angular siltstone.	1
				1.35			MADE GROUND: Grey sub-angular concrete cobbles. End of pit at 1.35 m	
								2
								3
								4
								5

Remarks: 1. No groundwater encountered. 2. Hole terminated at 1.35m bgl due to presence of concrete cobbles and potential service.

Stability:





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Trial Pit Log

Trialpit No

TP02

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -
Level:

Date
11/11/2017

Location: WREXHAM

Dimensions
(m):

Depth
1.10

Scale
1:25

Logged
FINAL

Client: LIDL UK GMBH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	ES					MADE GROUND: Grass over dark brown silty sand with roots. Rare gravel of rounded fine to coarse siltstone. Low cobble content of rounded siltstone and brick (TOPSOIL).	
	1.00	D		0.75 1.10 1.10			MADE GROUND: Light brown clayey slightly silty sand with occasional sub-angular brick cobbles.	1
							MADE GROUND: Concrete. End of pit at 1.10 m	
								2
								3
								4
								5

Remarks: 1. No groundwater encountered. 2. Hole terminated at 1.10m bgl due to presence of concrete.

Stability:





173-183 Witton Street,
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Cheshire,
CW9 5LP

Trial Pit Log

Trialpit No

TP03

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -
Level:

Date
11/11/2017

Location: WREXHAM

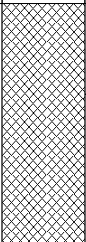
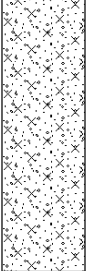
Dimensions
(m):

Depth
2.00

Scale
1:25

Logged
FINAL

Client: LIDL UK GMBH

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	ES					MADE GROUND: Grass over dark brown silty sand with roots. Low cobble content of angular brick and concrete, and sub-rounded siltstone. <i>Cobbles are occasional from 0.30m bgl.</i>	
				0.80			MADE GROUND: Brown gravelly sand Gravel is fine to coarse of angular brick.	1
	1.40	D		1.10			Orange brown slightly silty gravelly SAND. Gravel of fine to coarse rounded siltstone. Medium cobble content of rounded siltstone.	
	1.50	ES						
				2.00			End of pit at 2.00 m	2
								3
								4
								5

Remarks: 1. No groundwater encountered.

Stability:





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS01

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 12/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
					0.15			MADE GROUND: Macadam.	1	
					0.30			MADE GROUND: Light brown gravel of sub-rounded limestone. High cobble content of sub-rounded limestone.		
		0.55	ES		0.60			MADE GROUND: Red gravel of sub-angular brick, charcoal and siltstone. Low cobble content of sub-angular brick and siltstone.		
									<i>Made ground is predominantly gravel of siltstone beyond 0.4m bgl.</i>	2
		0.90	ES					Medium dense brown slightly silty gravelly SAND. Sand is medium grained. Gravel is rounded fine to coarse of siltstone.		
		1.00	D							
		1.20		N=14 (4,4/4,4,3,3)						3
2.00	D						<i>Bands of coal present between 1.80m and 2.40m bgl.</i>			
2.00		N=10 (2,2/3,2,3,2)								
									5	
									6	
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173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS02

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 12/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES					MADE GROUND: Grass over silty sand with roots. Low gravel content of sub-angular fine to coarse brick. Low cobble content of sub-rounded siltstone (TOPSOIL).	
					1.00			<i>Rare sub-rounded brick cobbles from 0.80m bgl.</i>	
		1.20		N=6 (1,1/1,1,2,2)				Light brown clayey slightly silty SAND. Sand is fine to medium grained.	1
		1.30	ES					<i>Bands of coal present between 1.30 and 1.40m bgl.</i>	
		1.50	D		1.75				
		2.00		N=6 (1,1/1,2,1,2)				Loose orange brown slightly silty gravelly SAND. Sand is medium grained. Gravel is sub-rounded fine to coarse of siltstone.	2
		2.50	D					<i>Rare sub-rounded limestone cobbles from 2.4m to 2.5m bgl.</i>	
		3.00		N=5 (1,1/1,2,1,1)	3.20				
								Loose orange brown SAND. Sand is medium grained. Gravel is sub-rounded fine to coarse of siltstone.	
								<i>Sand is medium to coarse from 3.60m bgl.</i>	
		4.00		N=8 (2,2/2,2,2,2)	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.





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 12/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES					MADE GROUND: Grass over silty gravelly sand with roots. Gravel is sub-rounded fine to coarse of siltstone and brick. Low cobble content of sub-rounded siltstone and brick (TOPSOIL).	
								<u>Very gravelly from 0.50m bgl.</u>	
								<u>Angular limestone cobble at 0.85m bgl.</u>	1
		1.20		N=23 (7,7/7,6,5,5)	1.40				
		1.50	D					Medium dense orange brown fine to medium slightly silty gravelly SAND. Gravel is sub-rounded fine to coarse siltstone. Rare fragments of coal. Occasional cobbles of sub-rounded siltstone.	
		2.00		N=25 (5,7/7,7,6,5)					2
		2.60	D					<u>Sand is slightly gravelly from 2.60m bgl.</u>	
		3.00		N=15 (3,3/3,4,4,4)	3.00			End of borehole at 3.00 m	3
									4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole collapsing to 2.60m bgl. 3. No groundwater encountered. 4. Standpipe installed to 2.50m bgl; 1.50m plain, 1.00m slotted





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 12/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.70	ES		0.70			MADE GROUND: Grass over sand with roots. Rare gravel of sub-rounded to rounded fine to coarse siltstone and brick. Low cobble content of rounded siltstone (TOPSOIL).	
		1.20		N=9 (1,2/3,2,2,2)				MADE GROUND: Dark brown very gravelly sand. Gravel is rounded fine to coarse of brick, concrete and siltstone. Medium cobble content of rounded siltstone and limestone.	1
		1.70	ES						
		2.00		N=6 (1,1/1,1,2,2)				Less gravelly and low cobble content from 2.00m to 2.30m bgl.	2
		2.30	D		2.40			Rare sub-angular concrete cobbles from 2.30 to 2.40m bgl.	
								End of borehole at 2.40 m	3
									4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole terminated due to casing bouncing off suspected concrete. 3. No groundwater encountered. 4. Hole backfilled upon completion.





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 12/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.60	ES		0.60			MADE GROUND: Grass over dark brown gravelly sand with roots. Gravel is sub-angular fine to coarse of siltstone. Medium cobble content of sub-rounded siltstone and brick (TOPSOIL).	1
		1.20 1.20	D	N=5 (1,1/1,1,1,2)				MADE GROUND: Dark brown slightly clayey sand and gravel. Gravel is sub-rounded fine to coarse of brick. Rare fragments of pottery. <i>Rare glass fragment at 0.80m bgl.</i>	
		2.00		N=12 (3,5/4,3,2,3)				<i>Frequent coal fragments from 2.10m to 2.30m bgl.</i>	2
		2.40	D		2.30			Medium dense orange brown fine to medium slightly silty gravelly SAND. Gravel is of sub-rounded fine to coarse of siltstone. Medium cobble content of sub-rounded siltstone.	
		3.00		N=10 (2,2/2,2,3,3)				<i>Bands of coal from 2.80m to 2.90m bgl.</i>	3
		3.60	D					<i>Bands of coal from 3.70m to 3.90m bgl.</i>	
		4.00		N=13 (3,3/3,3,3,4)	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.





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.40			MADE GROUND: Dark brown slightly gravelly organic silty fine sand with rootlets and roots. Gravel is subrounded to rounded fine to coarse of mixed lithologies. Pieces of plastic sheeting. (TOPSOIL)	1
		0.50	D					Dark brown slightly gravelly organic silty fine sand with rootlets and roots. Gravel is subrounded to rounded fine to coarse of mixed lithologies. (TOPSOIL)	
		1.20 1.20	D	N=17 (5,5/4,4,5)	0.90			Medium dense brown orange silty SAND and GRAVEL. Sand is fine grained. Gravel is subangular to rounded fine to coarse of mixed lithologies including siltstone and limestone.	
		2.00		N=30 (3,7/7,8,8,7)				Bands of coal present between 2.30m bgl and 2.60m bgl.	2
		2.70	D						
		3.00		50 (7,10/50 for 240mm)	3.00			End of borehole at 3.00 m	3
									4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole terminated due to SPT refusal. 3. No groundwater encountered. 4. Hole backfilled upon completion.





173-183 Witton Street,
Northwich,
Cheshire,
CW9 5LP

Borehole Log

Borehole No.

WS07

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES	N=10 (4,3/3,2,2,3)	1.30			MADE GROUND: Grass over dark brown organic clayey sand. Sand is fine grained. Low cobble content of concrete and pottery. (TOPSOIL). <i>Becoming gravelly from 0.10m bgl. Gravel is subangular fine to coarse of mixed lithologies.</i>	1
		1.00	ES						
		1.20							
		1.50	D	N=50 (8,10/10,12,15,13)	2.00			Medium dense brown orange SAND. Sand is medium grained.	2
		2.00							
								End of borehole at 2.00 m	3
									4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole terminated due to SPT refusal. 3. No groundwater encountered. 4. Hole backfilled upon completion.





173-183 Witton Street,
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CW9 5LP

Borehole Log

Borehole No.

WS08

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.50			Grass over light brown slightly organic slightly gravelly silty fine sand with rootlets. Gravel is subrounded fine to medium of mixed lithologies. (TOPSOIL).	1
		0.60	D					Orangish brown slightly organic slightly gravelly silty fine SAND. Gravel is subrounded fine to medium of mixed lithologies.	
		1.20 1.30	D	N=16 (3,6/3,4,4,5)				Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subangular to rounded fine to medium of limestone and siltstone. Low cobble content of limestone.	
		2.00		N=24 (6,8/6,6,6,6)	3.00				2
		2.50	D					Bands of coal present between 2.40m bgl and 2.60m bgl.	
		3.00		N=23 (5,5/5,6,6,6)					
								End of borehole at 3.00 m	3
									4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole collapsing to 2.00m bgl. 3. No groundwater encountered. 4. Hole backfilled upon completion.





173-183 Witton Street,
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CW9 5LP

Borehole Log

Borehole No.

WS09

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30			Grass over dark brown silty organic SAND with roots and rootlets. (TOPOSOIL)	
		1.20 1.20	D	N=18 (3,3/3,7,4,4)	1.50			Medium dense dark brown orange slightly clayey SAND and GRAVEL. Sand is fine to medium grained. Gravel is rounded to subangular fine to coarse of mixed lithologies.	1
		1.70	D					Medium dense ight brown silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to rounded fine to coarse of mixed lithologies including limestone. Low cobble content of limestone.	2
		2.00		N=16 (4,5/4,4,4,4)					
		2.50	D					<u>Bands of coal present from 2.40m bgl.</u>	
		3.00		N=22 (4,5/5,5,6,6)					3
		3.50	D						
					4.00			End of borehole at 4.00 m	4
									5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole collapsing to 3.00m bgl. 3. No groundwater encountered. 4. Hole backfilled upon completion.





173-183 Witton Street,
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CW9 5LP

Borehole Log

Borehole No.

WS10

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30			MADE GROUND: Grass over dark brown slightly clayey organic silty sand with rootlets. Sand is fine grained. (TOPSOIL).	
		0.40 0.40	D ES					MADE GROUND: Brown orange silty sand and gravel. Sand is fine to coarse grained. Gravel is subangular to rounded fine to coarse of mixed lithologies with rare gravels of concrete, glass and wood. Low cobble content of mixed lithologies.	
					0.90			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	1
		1.20		N=20 (5,6/4,5,5,6)					
		1.40	D						
					2.00			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	2
		2.00		N=15 (5,4/4,3,4,4)					
					2.40			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	
		2.40	D						
					3.00			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	3
		3.00		N=17 (4,4/4,5,4,4)					
					3.40			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	
		3.40	D						
					4.00			Medium dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to angular fine to coarse of limestone and siltstone. Low cobble content of limestone.	4
		4.00		N=24 (4,5/4,6,7,7)					
					4.00			End of borehole at 4.00 m	5

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole collapsing to 2.50m bgl. 3. No groundwater encountered. 4. Standpipe installed to 2.50m bgl; 0.50m plain, 2.00m slotted.





173-183 Witton Street,
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CW9 5LP

Borehole Log

Borehole No.

WS11

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20	ES		0.30			MADE GROUND: Grass over brown slightly gravelly sandy clay with roots. Sand is coarse grained. Gravel is rounded fine to coarse of mixed lithologies. (TOPSOIL)	
					0.35			MADE GROUND: Concrete. End of borehole at 0.30 m	
									1
									2
									3
									4
									5

Remarks

1. Hand dug pit to 0.30m bgl. 2. Hole terminated due to concrete slab. 3. Hole moved 1m east.





173-183 Witton Street,
Northwich,
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CW9 5LP

Borehole Log

Borehole No.

WS11A

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			MADE GROUND: Grass over brown slightly gravelly sandy clay with roots. Sand is coarse grained. Gravel is rounded fine to coarse of mixed lithologies. (TOPSOIL)	
					0.35			MADE GROUND: Concrete. End of borehole at 0.30 m	
									1
									2
									3
									4
									5

Remarks

1. Hand dug pit to 0.30m bgl. 2. Hole terminated due to concrete slab.





173-183 Witton Street,
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CW9 5LP

Borehole Log

Borehole No.

WS12

Sheet 1 of 1

Project Name: WREXHAM POLICE STATION

Project No.
C3664

Co-ords: -

Hole Type
WS

Location: WREXHAM

Level:

Scale
1:25

Client: LIDL UK GMBH

Dates: 11/11/2017 -

Logged By
FINAL

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.30	ES		0.50			MADE GROUND: Grass over light brown gravelly SAND. Sand is fine to medium grained. Gravel is subangular fine to coarse of mixed lithologies including brick, concrete and pottery. Low cobble content of mixed lithologies.	1
		0.60	D					Medium dense light brown orange silty gravelly SAND with rare rootlets. Sand is fine grained. Gravel is subangular to rounded fine to medium of mixed lithologies.	
		1.20		N=12 (2,1/1,3,3,5)	1.80			Meidum dense brown orange silty SAND and GRAVEL. Sand is fine to medium grained. Gravel is subrounded to rounded fine to coarse of mixed lithologies.	2
		1.40	D						
		1.90	D						
		2.00	N=16 (4,4/4,4,4,4)						
		2.80	D	N=9 (3,3/2,2,2,3)			<u>Sand becoming fine to coarse from 2.70m bgl.</u>	3	
		3.00	<u>Becoming very clayey between 2.90m and 3.00m bgl.</u>						
		3.70	D	3.60		Loose damp brown orange slightly clayey SAND and GRAVEL. Sand is medium grained. Gravel is rounded fine to coarse of mixed lithologies.	4		
				4.00	End of borehole at 4.00 m				
								5	

Remarks

1. Hand dug pit to 1.20m bgl. 2. Hole collapsing to 3.00m bgl. 3. No groundwater encountered. 4. Standpipe installed to 3.00m bgl; 1.00m plain, 2.00m slotted.

