



GROUNDTECH
CONSULTING

AFAN WAY, PORT TALBOT

*PERMENANT GROUND GAS RISK
ASSESSMENT*

ALDI STORES LIMITED

APRIL 2022

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PROJECT	AFAN WAY, PORT TALBOT
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CLIENT	ALDI STORES LIMITED
CLIENT CONTACT	-
For and Behalf of Groundtech Consulting	
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Introduction

We are pleased to present our findings following the completion of the gas monitoring programme undertaken at the Afan Way in Port Talbot for the proposed commercial development.

A Geo-Environmental Appraisal was carried out by Groundtech Consulting referenced GRO-21252-3003, dated 08 December 2021.

Preliminary Risk Assessment Information

The site is currently vacant and predominantly covered in scrub and light vegetation. Some areas of hardsurfacing comprising concrete and tarmac are present at the site entrance and to the east. The proposed development is commercial end use comprising the erection of an Aldi store.

Deep Made Ground is likely to be present beneath the property due to the historic site use as a Tin Plate Works from 1881. The site has since been redeveloped for various industries through time including a railway terminus in 1900 and Bakery Engineering works in 1950. Residential dwellings and a well were constructed in the northern area. Between 1957 and 1962 a mortuary was developed east of the residential homes. In 1964 the bakery engineering works was redeveloped into sign post works. Between 1971 and 1993 all the buildings on site were assumed to be demolished as they were no longer shown on historical maps. Through the various land uses, features such as chimneys, well, tanks and electricity substation have been present on site.

In addition to the onsite sources, several potential contaminative sources of ground gas have been identified within influencing distance offsite including marshland immediately south and south east, and a garage 50m south west.

Through carrying out the PRA, a *Moderate to High* risk from permanent ground gases has been identified.

The site is not within an area requiring radon precautions within foundations.

Ground Model

Made Ground

Made Ground was encountered beneath the entire site to depths between 1.0m and 2.9m bgl.

Four main populations were encountered during the investigation and are described below:

- *Brown sandy gravelly topsoil with occasional cobbles of brick and concrete was present from ground level to 0.25m bgl.*
- *Brown sandy cobbly gravel of mixed lithologies including brick, coal and concrete was encountered from depths of between ground level and 0.5m bgl to a maximum depth of 2.2m bgl.*
- *Black sandy gravel and variably gravelly sand was recorded from depths of 0.2m to a maximum depth of 2.2m bgl. Gravel is of mixed lithologies including ash, clinker, coal, shale and slag.*
- *Red brown locally silty, clayey variably gravelly sand was encountered from a minimum depth of 0.75m to a depth of 2.0m bgl. Gravel is of mixed lithologies including concrete, ash and clinker.*

Natural Ground

The natural strata generally comprised three main populations including;

- Soft to firm slightly sandy Clay from a minimum depth of 1.35m to a maximum observed depth of 4.0m bgl within WS02, WS04, TP01 to TP07, TP09, TP10, TP12, TP14 and TP15.
- Soft silty organic Clay was encountered from depths of between 1.2m and 2.9m bgl to a maximum depth of 5.3m bgl within CP01 to CP04, WS03 to WS05, WS06, TP02, TP05, TP12, and TP13.
- Dense to very dense sand and gravel has been encountered in CP01 to CP03, WS02, WS03, TP08 and TP12 from depths between 1.9m and 5.3m bgl to a maximum observed depth of 7.5m bgl.

Bedrock

Bedrock was not encountered during the site investigation.

Groundwater

Groundwater strikes were encountered at depths of between 1.0m and 5.3m bgl and were observed in the natural Sand and Gravel and sandy silty Clay deposits.

Location	Depth to Groundwater Strike (m bgl)	Depth to Groundwater after 20 minutes (m bgl)	Strike/Perched	Strata
CP01	5.3	3.5	Strike	Sand and Gravel
CP02	5.0	4.3	Strike	Sand and Gravel
CP03	2.0	1.3	Perched	Made Ground
	5.0	3.5	Strike	Sand and Gravel
CP04	5.0	3.0	Strike	Sand and Gravel
TP05	4.2	-	Strike	Tidal Flat Deposits
TP06	1.0	-	Perched	Made Ground
TP07	1.3	-	Perched	Made Ground
TP08	2.8	-	Strike	Sand and Gravel
TP12	2.4	-	Seepage	Tidal Flat Deposits

The borehole and trial pit positions are shown on the Exploratory Hole Location Plan GRO-21252-P04 and the exploratory logs are appended.

Gas Monitoring

During the Ground Investigation works, monitoring standpipes were installed in the following holes and a summary of the installations is provided in the table below.

Location	Depth (m bgl)	Response Zone (m bgl)	Targeted Strata	Reason
CP01	6.0	5.0 - 6.0	Natural	Ground Gas/Groundwater
CP02	7.0	6.0 - 7.0	Natural	Ground Gas/Groundwater
CP03	6.0	5.0 - 6.0	Natural	Ground Gas/Groundwater
CP04	6.0	4.0 - 6.0	Natural	Ground Gas/Groundwater
WS02	4.0	1.0 - 4.0	Made Ground and Natural	Ground Gas
WS03	2.0	1.0 - 2.0	Made Ground	Ground Gas
WS05	4.0	1.0 - 4.0	Made Ground and Natural	Ground Gas
WS06	4.0	1.0 - 4.0	Made Ground	Ground Gas

The standpipes consisted of HDPE and PVC pipe - a bentonite seal was placed around the plain pipe and a clean gravel pack was placed around the slotted pipe.

Four ground gas monitoring visits have been completed between 18 November 2021 and the 26 January 2022. Monitoring of the weather conditions and predicted atmospheric pressures (Met Office Surface Pressure Charts) was carried out up to 72 hours in advance of proposed monitoring visits in order that a reasonable period of data was obtained to determine atmospheric trends, and also to target the 'worst case' scenario.

Permanent gas and flow rate monitoring was carried out using a GFM436 infrared gas monitor with integral electronic flow analyser. The measurements taken are listed below:

- *Oxygen (O₂), carbon dioxide (CO₂) and methane (CH₄) as the percentage volume in air (%v/v).*
- *Hydrogen sulphide (H₂S) and carbon monoxide (CO) as the percentage volume in air (%v/v).*
- *Lower Explosive Limit (% LEL) of methane.*
- *Atmospheric and borehole pressure, including pressure trend.*
- *Flow measurements (l/hr).*
- *Weather conditions.*

Both peak and steady state conditions were monitored to understand the behaviour of the permanent ground gas, the steady state conditions were recorded by allowing the gas monitor to run for a minimum of 3 minutes.

Permanent gas and groundwater monitoring results are appended.

Gas Monitoring Results

During the monitoring period, detectable concentrations of methane (CH₄) have been recorded up to a maximum level of 4.0% v/v in WS06. No methane was recorded in any of the other standpipes that were installed across the site.

Detectable levels of carbon dioxide (CO₂) were recorded up to a maximum level of 4.2% v/v together with associated depleted oxygen (O₂) concentrations (minimum 3.2% v/v).

No positive gas flow rates were recorded during the gas monitoring period.

Groundwater was encountered at depths of between 1.55m and 3.05m bgl and was generally present within the response zone of the installations of the shallow wells. Groundwater was encountered above the response zone on the deeper monitoring wells due to a high groundwater table. On two occasions within WS03, no groundwater was present within the standpipe.

The atmospheric pressure ranged between 1003mb and 1032mb during the monitoring period and was carried out during periods of steady, falling and rising barometric pressure.

Characterisation of the Gas Screening Value (GSV)

In accordance with CIRIA Report C665, November 2007 it is felt that an adequate risk assessment can be undertaken based on the following limiting factors:

- *The proposed development has been considered as **low sensitivity** based on the site being developed with a commercial outlet (Table 5.5 – Typical/Idealised frequency and period of monitoring, after Wilson et al, 2005).*

- The risk associated with the generation potential of a source is considered as **Moderate**, (assessment based on the environmental setting as well as observations noted during the fieldworks).
- Negligible flow rates have been recorded over the monitoring period (Table 8.5 – Modified Wilson & Card classification). For this site, two of the monitoring visits were targeted to correlate with a falling atmospheric pressure trend. As a comparison, monitoring has also been undertaken during steady and rising atmospheric pressure trends.

Based upon the results recorded, in accordance with CIRIA Report C665, the risk to the site from ground gases has been assessed by converting the results to gas screening values (GSVs), calculated by multiplying the typical maximum gas concentrations with the recorded maximum positive flow rates. In addition, individual “hazardous gas flow rates” (Q_{hg}) have been derived for each monitoring point.

$$GSV \text{ (l/hr)} = \text{max borehole flow rate (l/hr)} \times \text{max gas concentration (\%)}$$

For this assessment, the maximum recorded concentrations of carbon dioxide of 4.2% v/v and methane of 4.0% v/v has been used. As no positive gas flow rates have been recorded, the limit of detection of the gas analyser of 0.1 l/hr has been used to calculate the GSV.

$$\text{Carbon Dioxide GSV} = 0.042 \text{ (4.2\%)} \times 0.1 = 0.0042 \text{ l/hr}$$

$$\text{Methane GSV} = 0.040 \text{ (4.0\%)} \times 0.1 = 0.0040 \text{ l/hr}$$

Assessment

Made Ground was encountered beneath the entire site to depths between 1.0m and 2.9m bgl.

The maximum concentration of methane recorded was 4.0% v/v in WS06 only, which is located within the former PFS area. The elevated concentration of methane is considered to be associated with localised hydrocarbon contamination in the PFS area. The methane recorded in WS06 initially was at a concentration of 4.0% v/v which gradually reduced over the monitoring period, with a peak concentration of 0.0% v/v being recorded during the final visit.

No other concentrations of methane have been recorded in the remaining standpipes.

A maximum concentration of carbon dioxide of 4.2% v/v has been detected over the monitoring period and the concentrations recorded are likely due to the Made Ground associated with the previous land uses that have been identified onsite.

In order to assess the ground gas regime beneath the site and the need to incorporate ground gas precautions, guidance was taken from CIRIA C665 ‘Assessing risks posed by hazardous ground gases to buildings’. Based on the site being developed with a commercial end use, the Wilson and Card method has been used to carry out the assessment.

When considering the results, in accordance with CIRIA C665 (Section A Development and Table 8.5 – Modified Wilson and Card Classification) it can be seen that the GSV values for methane and carbon dioxide correspond with CS1 criteria (GSV of less than 0.07 l/hr).

Aldi Store in the West

The proposed Aldi store is to be constructed in the western part of the site away from the former PFS in the east where the methane was recorded in WS06. The methane is considered to be a result of the hydrocarbons present in the soils and perched groundwater underlying the PFS. The perched groundwater encountered within the Made Ground in the PFS was highly localised and therefore the residual hydrocarbon contamination is also likely to be localised to the PFS. Additionally, the site is underlain by a clay layer which will mitigate the downwards migration of contamination to the underlying aquifer. The lack of methane recorded in any of the other monitoring wells support that the hydrocarbon contamination is localised.

The GSVs for carbon dioxide and methane place the western section of site in CS1 and in accordance with CIRIA C665, no special gas protection measures are required.

Characteristic Situation 1 in the western site area

Commercial Buildings in the Eastern Area (Former PFS)

The GSVs for methane and carbon dioxide placed this area of the site in CS1. However, methane exceeded the typical maximum concentrations of 1% v/v for CS1 conditions on three of four monitoring visits and a maximum concentration of methane of 4.0%v/v was recorded in the first visit. The exceedances were isolated to a single monitoring well (WS06) which was situated in the eastern part of the site where the historic PFS was located. Given the proximity of WS06 to the PFS, the methane concentrations are likely to be associated with localised hydrocarbons in this area from spills/leakages of the former USTs.

It is recommended that the former PFS area of the site is increased to CS2 based on methane concentrations. In addition, vapour protection measures are required in the form of a vapour resistant membrane to mitigate the vapour risk from underlying, localised hydrocarbon contamination.

The areas requiring CS2 and vapour protection measures are shown on Groundtech Plan GRO-21252-P11.

Characteristic Situation 2 in the eastern site area (former PFS)

An extract of the table is presented below.

Characteristic Situation (Wilson and Card)	Traffic Light Classification (NHBC)	Methane				Carbon Dioxide			
		NHBC		Wilson and Card		NHBC		Wilson and Card	
		Gas Screening Value (l/hr)	Typical Maximum Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Maximum Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Maximum Concentration (%v/v)	Gas Screening Value (l/hr)	Typical Maximum Concentration (%v/v)
1	Green	0.16	1	<0.07	<1	0.78	5	<0.07	<5
2	Amber 1			<0.7	Borehole flow rate not greater than 70l/hr			<0.7	Borehole flow rate not greater than 70l/hr
3		0.63	5	<3.5		1.56	10	<3.5	
4	<15			Quantitative Risk Assessment Required	<15			Quantitative Risk Assessment Required	
5	Amber 2	1.56	20	<70		3.10	30	<70	
6	Red			>70				>70	

In accordance with CIRIA C665 and CS2, the typical scope of protective measures required for a commercial property is as follows:

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 gauge DPM.*
- Beam and block or pre cast concrete slab and minimum 2000 gauge DPM/reinforced gas membrane.*
- Possibly underfloor venting or pressurisation in combination with a) and b) depending on use.*

All joints and penetrations sealed.

The proposed commercial development is classified as a Building Type C in accordance with BS8485:2015 and the eastern site area (former PFS) falls in CS2 in accordance with Table 2 of the above guidance. Therefore, 2.5 points of protection are required for the proposed commercial development and gas protection measures are necessary.

Gas precautionary measures outlined in BS8485:2015 should include two of the following to reach the required number of protection points:

Structural Barrier / Floor Slab

- Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations – 1.5 points.*

Ventilation Protection Measures

- *Passive sub floor dispersal layer of good performance – 1.5 points.*

Gas Resistant Membrane

- *Gas resistant membrane (including methane and vapours) meeting the criteria outlined in Table 7 of BS 8485:2015 – 2 points.*

A vapour resistant membrane may be used to mitigate against methane due to the vapour membrane generally comprising a higher specification compared to other gas resistant membranes.

Radon Gas

The site lies in an area where radon protective measures are not required within new structures.

Conclusions

No gas protection measures are required within the western part of the site in the area of the proposed Aldi store.

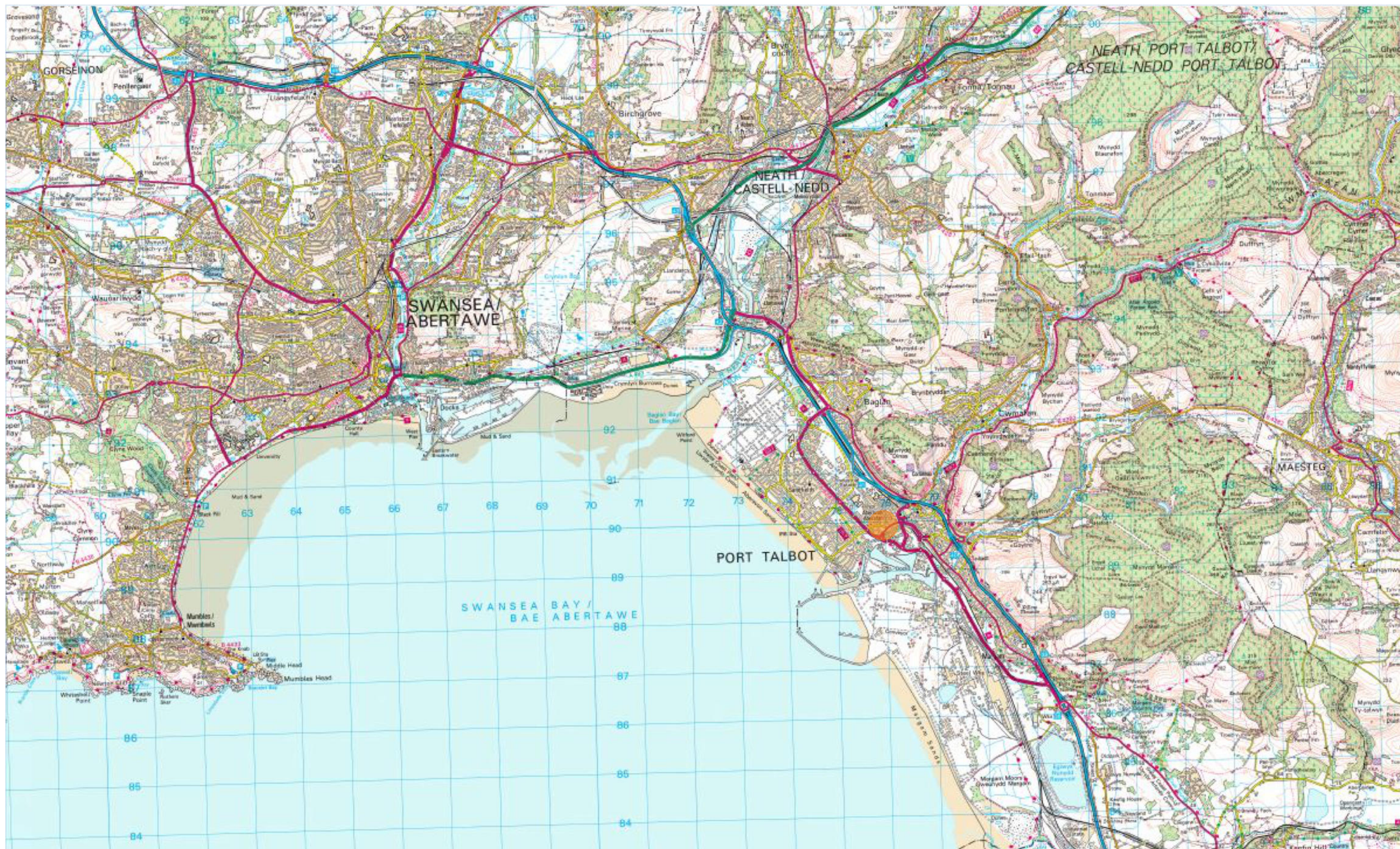
Gas protection measures, including a vapour resistant membrane, required in the area of the former PFS in the eastern site area.

No radon precautions are necessary.

The installation and verification of the gas protection measures should be carried out in accordance with CIRIA C735.

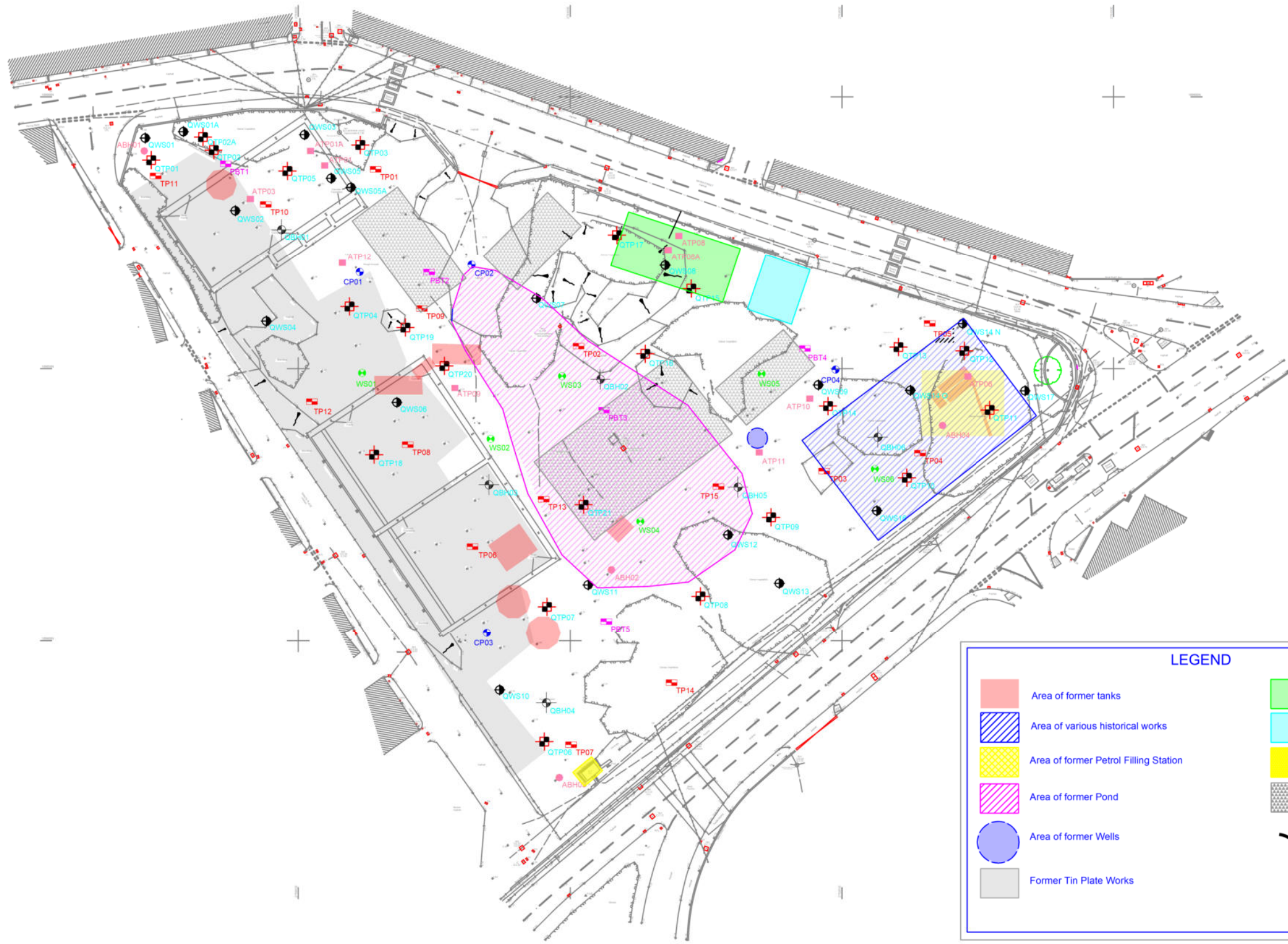
It is recommended that confirmation of these findings is made with the Local Authority prior to any irrevocable action being taken.

PLANS

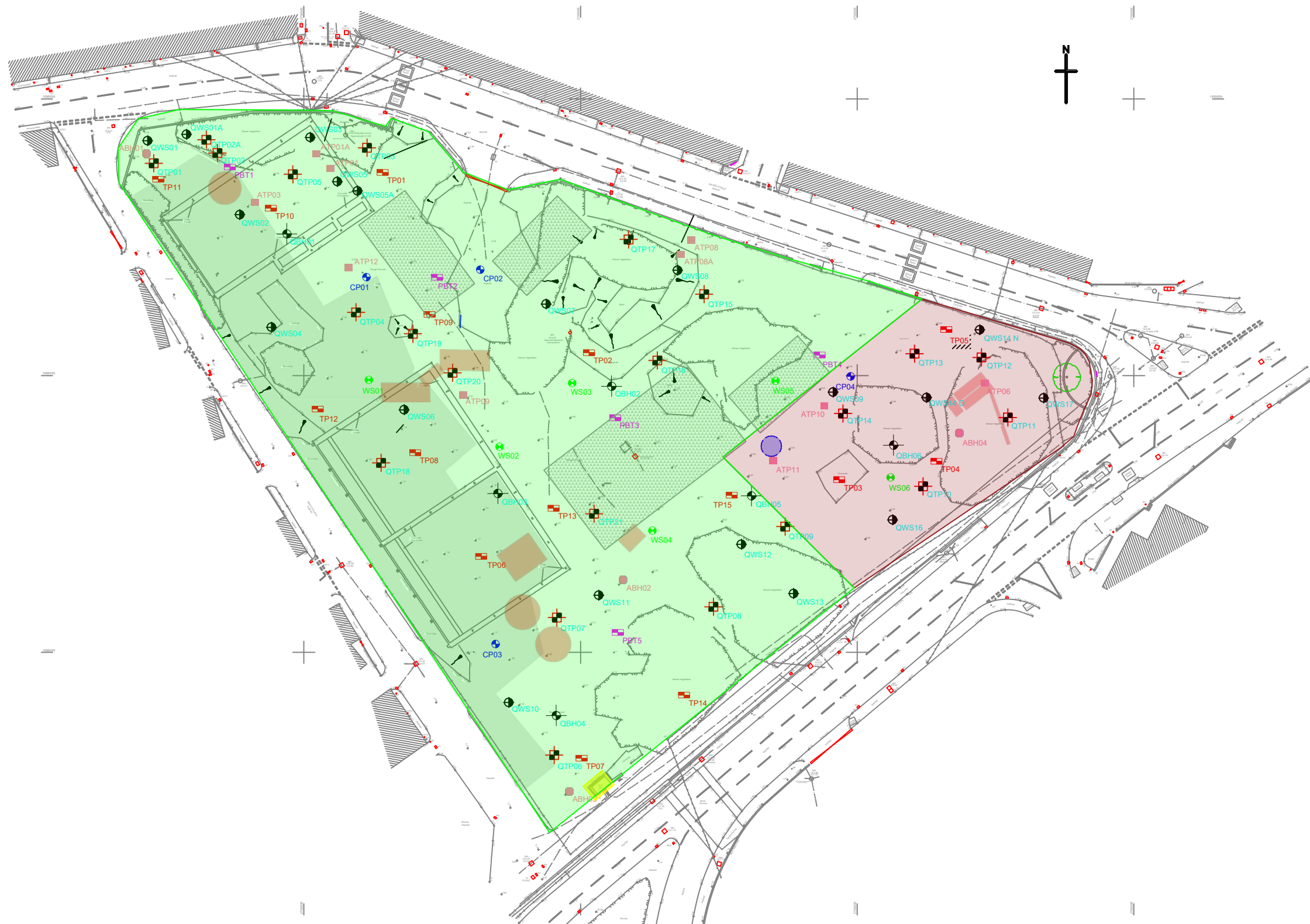


	CLIENT	DATE				Status	Notes  SITE LOCATION
	ALDI STORES LTD	NOVEMBER 2021				Preliminary	
	PROJECT TITLE	SCALE				Draft	
	AFAN WAY, PORT TALBOT	NTS				Issued	
	PLAN TITLE	PLAN NUMBER				For Comment	
	PROJECT LOCATION PLAN	GRO-21252-P01	Rev.	Details	Date	Approved	





GROUNDTECH CONSULTING	CLIENT	DATE				Status		Notes APPROXIMATE CABLE PERCUSSIVE BOREHOLE LOCATION APPROXIMATE WINDOWLESS SAMPLE BOREHOLE LOCATION APPROXIMATE PIT LOCATION APPROXIMATE PLATE LOAD TEST LOCATION ARCADIS TRIAL PIT LOCATION ARCADIS BOREHOLE LOCATION QUANTUM TRIAL PIT LOCATION QUANTUM WINDOWLESS SAMPLE LOCATION QUANTUM CABLE PERCUSSIVE BOREHOLE LOCATION
	ALDI STORES LIMITED	DECEMBER 2021				Preliminary		
	PROJECT TITLE	SCALE				Draft		
	AFAN WAY, PORT TALBOT	NTS				Issued		
	PLAN TITLE	PLAN NUMBER				For Comment		
EXPLORATORY HOLE LOCATION PLAN	GRO-21252-P04	Rev.	Details		Date	Approved		



GROUNDTECH CONSULTING	CLIENT	DATE			Status		Notes APPROXIMATE CABLE PERCUSSIVE BOREHOLE LOCATION APPROXIMATE WINDOWLESS SAMPLE BOREHOLE LOCATION APPROXIMATE TRIAL PIT LOCATION APPROXIMATE PLATE LOAD TEST LOCATION AREA OF CS1 GAS CONDITIONS AREA OF CS2 GAS CONDITIONS AND VAPOUR MEMBRANE
	ALDI STORES LIMITED	APRIL 2022			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	AFAN WAY, PORT TALBOT	NTS			Issued		
	PLAN TITLE	PLAN NUMBER			For Comment		
	GAS MEMBRANE PLAN	GRO-21252-P11	Rev.	Details	Date	Approved	



EXPLORATORY HOLE LOGS



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Borehole Log

Borehole No.

CP01

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
CP

Location: PORT TALBOT

Level:

Scale
1:50

Client: ALDI STORES LIMITED

Dates: 29/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
		Depth (m)	Type	Results							
		0.50	ES	PID=0	2.80			MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse.	1		
		1.00	ES	PID=0							
		1.20		50 (25,20/50 for 20mm)							
		1.25 - 1.65	D								
		2.00	ES	50 (6, 10/50 for 85mm)			2.80				2
		2.00		PID=0							
		2.00 - 2.45	D								
		2.90	D								
		3.00	ES	PID=0			5.30			Soft very low strength grey silty CLAY.	3
		3.00 - 3.45	U								
		3.50	D								
		4.00		N=10 (1,1/2,2,3,3)							
		4.00 - 4.45	D								
		5.00		50 (25,40/50 for 10mm)			5.30			Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	4
		5.00 - 5.45	U								
		5.50	D								
5.50	D										
6.00	D	50 (25,20/50 for 25mm)	6.00				5				
6.00											
End of borehole at 6.00 m								6			
								7			
								8			
								9			
								10			

Remarks

1. Hand dug pit to 1.20m bgl 2. Groundwater encountered at 3.0m bgl 3. Installation to 6.00m bgl 5.00m plain 1.00m slotted. 4. 2.50 hours chiselling undertaken between 1.20m and 2.8m bgl, 2 hours chiseling between 5.50m and 6.00m bgl.



Borehole Log

Borehole No.

CP02

Sheet 1 of 1

Project Name: AFAN WAY

 Project No.
GRO-21252

Co-ords: -

 Hole Type
CP

Location: PORT TALBOT

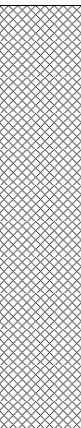
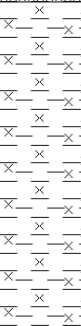
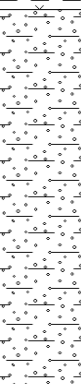
Level:

 Scale
1:50

Client: ALDI STORES LIMITED

Dates: 01/10/2021 -

 Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES	PID=0	2.80			MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse.	1
		1.00	ES	PID=0					
		1.20		N=50 (4,5/50 for 265mm)					
		1.20 - 1.65	D						
		2.00	ES	50 (25,20/50 for 20mm)	2.80			Soft to firm low strength firm grey silty CLAY.	2
		2.00		PID=0					
		2.00 - 2.45	D						
		3.00	ES	N=6 (1,1/1,1,1,3)					
		3.00		PID=0					
		3.00 - 3.45	D						
		4.00 - 4.45	U						
		4.50	D						
		5.00		50 (10,15/50 for 85mm)	5.00			Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	5
		5.00 - 5.45	D						
		6.00		50 (10,14/50 for 220mm)					
		6.00 - 6.45	D						
		7.00		100 (25,25/100 for 40mm)	7.50			End of borehole at 7.50 m	7
		7.00 - 7.45	D						

Remarks

1. Hand dug pit to 1.20m bgl 2. Groundwater encountered at 3.00m bgl 3. Installation to 7.0m bgl: 5.00m plain, 2.00m slotted. 4. 2.00 hours chiselling undertaken between 1.20m and 2.2m bgl, 3 hours chiseling between 5.00m and 7.00m bgl.



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Borehole Log

Borehole No.

CP03

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
CP

Location: PORT TALBOT

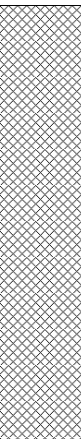
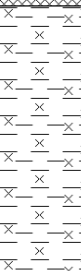
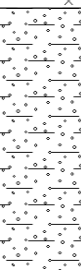
Level:

Scale
1:50

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	ES	PID=0				MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse.	1
		1.00	ES	PID=0					
		1.20		N=20 (2,2/4,5,4,7)					
		2.00	ES	N=12 (1,1/2,5,3,2)				Firm medium strength soft brown silty CLAY.	2
		2.00		PID=0					
		3.00	D		2.90				
		3.00	ES	N=8 (1,1/1,2,2,3)				Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	3
		3.00		PID=0					
		4.00	D		4.70				4
		4.00 - 4.45	U					End of borehole at 6.45 m	5
		5.00	D	N=50 (3,4/7,3,20,20)					
		5.00							
		6.00	D	50 (25,7/50 for 20mm)	6.45				6
		6.00							7
									8
									9
									10

Remarks

1. Hand dug pit to 1.20m bgl 2. Groundwater encountered at 3.5m bgl 3. Installation to 6.00m: 5.00m plain 1.00m slotted.
4. 2.50 hours chiselling undertaken between 5.30m and 6.00m bgl.



Borehole Log

Borehole No.

CP04

Sheet 1 of 1

Project Name: AFAN WAY

 Project No.
GRO-21252

Co-ords: -

 Hole Type
CP

Location: PORT TALBOT

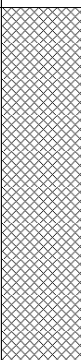
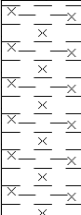
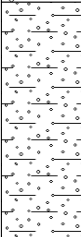
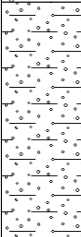
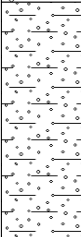
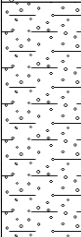
Level:

 Scale
1:50

Client: ALDI STORES LIMITED

Dates: 05/10/2021 -

 Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.50	ES	PID=0	2.40			MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse.	1	
		1.00	ES	PID=0						
		1.20	D	N=15 (1,3/5,2,3,5)						
		1.20								
		2.00	D	N=8 (1,2/2,2,2,2) PID=0			2.40		Firm low strength firm brown silty CLAY.	2
		2.00	ES							
		2.00								
		3.00	D	N=10 (1,2/3,2,2,3)			3.90		Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	3
		3.00	U							
		3.00 - 3.45								
		4.00	D	N=30 (3,6/6,7,7,10)			5.50		Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	4
		4.00								
		5.00	D	50 (25,25/50 for 20mm)			5.50		Dense brown slightly cobbly sandy subrounded fine to coarse GRAVEL of mixed lithologies.	5
		5.00								
		5.50		50 (10,10/50 for 10mm)			5.50		End of borehole at 5.50 m	6
										7
										8
										9
										10

Remarks

1. Hand dug pit to 1.20m bgl 2. Groundwater encountered at 3.50m bgl 3. Installation to 6.00m bgl; 4.00m plain, 2.00m slotted.



GROUNDTECH
CONSULTING

Borehole Log

Borehole No.

WS02

Sheet 1 of 2

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
WS

Location: PORT TALBOT

Level:

Scale
1:25

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES					MADE GROUND: Brown sandy cobbly angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse. Cobbles are angular to sub angular of brick.	
		0.90	ES		0.80				
		1.00		N=32 (4,7/7,8,7,10)				MADE GROUND: Black sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mixed lithologies including brick concrete and ceramic.	1
		2.00		N=2 (0,1/0,1,0,1)					2
		2.30	D		2.20			Soft to firm grey sandy CLAY.	
		2.30	ES						
		3.00		N=4 (2,1/1,1,1,1)					3
		3.60	D		3.50			Soft grey sandy CLAY.	
		3.60	ES						
		4.00		N=40 (10,10/10,10,10,10)	4.00			Dense brown fine to medium SAND and subrounded to rounded fine to coarse GRAVEL of mixed lithologies.	4
					5.00			Continued on next sheet	5

Remarks

1. Hand dug pit to 1.20m bgl 2. No groundwater encountered 3. Installation to 4.0m bgl: 1.00m plain, 3.00m slotted.





GROUNDTECH
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Borehole Log

Borehole No.

WS03

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
WS

Location: PORT TALBOT

Level:

Scale
1:25

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.20			MADE GROUND: Brown sandy gravelly topsoil. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including brick and concrete.	1
					0.50			MADE GROUND: Brown sandy cobbly angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse. Cobbles are angular to subangular of concrete.	
		0.60	ES					MADE GROUND: Black sandy angular to subangular fine to coarse gravel of mixed lithologies including coal, ash and clinker. Sand is fine to coarse.	
		1.00		N=2 (1,0/1,1,0,0)	1.00			Very loose black silty clayey fine to medium SAND.	
		1.10	ES						2
		2.00			1.90			Loose black sandy angular to subangular fine to coarse GRAVEL of mixed lithologies. Sand is fine to medium.	
		2.00	D						
		2.00	ES	N=5 (1,1/2,1,1,1)					
		3.00		N=8 (1,0/1,1,1,5)					
		4.00		N=2 (1,0/0,1,0,1)	4.00			End of borehole at 4.00 m	4

Remarks

1. Hand dug pit to 1.20m bgl 2. No groundwater encountered 3. Installation to 2.00m bgl due to borehole collapse 1.00m plain, 1.00m slotted.



Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
WS

Location: PORT TALBOT

Level:

Scale
1:25

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES		0.20			MADE GROUND: Brown sandy gravelly topsoil. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mixed lithologies including brick and concrete.	
		1.00 1.00	ES	N=4 (1,1/1,1,1,1)				MADE GROUND: Black sandy angular to subangular fine to coarse gravel of mixed lithologies including brick, concrete, ash and clinker. Sand is fine to coarse.	1
		1.90 2.00	ES	N=2 (1,0/0,1,0,1)	1.80			MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including brick and concrete. Sand is fine to coarse.	2
		2.60 2.60	D ES		2.50			Soft grey sandy CLAY.	
		3.00		N=4 (1,1/1,1,1,1)					3
		4.00		N=21 (10,5/5,6,5,5)	4.00			Becoming firm to stiff at 4.00m bgl. End of borehole at 4.00 m	4
									5

Remarks

1. Hand dug pit to 1.20m bgl 2. No groundwater encountered 3. Borehole backfilled.





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Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
WS

Location: PORT TALBOT

Level:

Scale
1:25

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10	ES	N=4 (1,3/1,1,1,1)	0.25			MADE GROUND: Brown sandy gravelly topsoil. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mixed lithologies including brick and concrete.	1
		0.30	ES					MADE GROUND: Black sandy gravel. Sand is fine to coarse. Gravel is fine to coarse angular to subangular of mixed lithologies including concrete, coal, ceramic and brick.	
		0.80	ES					MADE GROUND: Dark brown silty clayey sand. Sand is fine to coarse.	
		1.00							
		1.20		N=2 (1,0/1,0,1,0)	2.20			Firm grey organic CLAY. Contains plant material.	2
		1.50	D						
		1.50	ES						
		2.00	D						
		2.00		N=4 (1,1/1,1,1,1)	4.00			Soft dark grey CLAY.	3
		3.00	D						
		3.00	ES						
		3.00							
		4.00	D	N=20 (7,6/5,5,5,5)	4.00			End of borehole at 4.00 m	4
		4.00							

Remarks

1. Hand dug pit to 1.20m bgl 2. No groundwater encountered 3. Installation to 4.0m bgl 1.00m plain, 3.00m slotted.





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Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: AFAN WAY

Project No.
GRO-21252

Co-ords: -

Hole Type
WS

Location: PORT TALBOT

Level:

Scale
1:25

Client: ALDI STORES LIMITED

Dates: 04/10/2021 -

Logged By
MB

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND: Concrete.	
		0.30	ES		0.40			MADE GROUND: Black sandy angular to subangular fine to coarse gravel of mixed lithologies including brick, concrete, ash and clinker. Sand is fine to coarse.	
		0.50	ES		0.60			MADE GROUND: Brown sandy angular to subangular fine to coarse gravel of mixed lithologies including ash and clinker. Sand is fine to coarse.	
		0.70	ES					MADE GROUND: Black sandy angular to subangular fine to coarse gravel of mixed lithologies including coal, ash and clinker. Sand is fine to coarse.	
		1.00		N=2 (1,1/0,1,0,1)	1.00			Soft to firm grey CLAY.	1
		1.50	ES						
		2.00		N=4 (1,1/1,1,1,1)	2.00				2
								NO RECOVERY.	
		3.00		N=4 (1,1/1,1,1,1)	3.00			Soft to firm grey CLAY.	3
		3.50	D						
		4.00		N=23 (8,7/8,5,5,5)	4.00			Becoming firm to stiff at 4.00m bgl. End of borehole at 4.00 m	4
									5

Remarks

1. Hand dug pit to 1.20m bgl 2. No groundwater encountered 3. installation to 4.0m bgl 1.00m plain, 3.00m slotted.





GROUND GAS MONITORING RESULTS

PERMANENT GROUND GAS MONITORING FORM



SITE NAME:	AFAN WAY, PORT TALBOT	ENGINEER:	Jack Perkins
CLIENT:	ALDI STORES LIMITED	DATE:	18/11/2021
JOB NO:	GRO-21252		

Pressure Trend:	Rising	Weather:	Overcast			Equipment:	GFM 436
Ambient:	O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)	
Start	20.3	0.0	0.0	0.0	0.0	0.0	
Finish	20.3	0.0	0.0	0.0	0.0	0.0	

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady						
CP01	0.0	0.0	0.00	0.0	0.0	0.0	1.1	0.5	17.8	19.2	0.0	0.0	0.0	0.0	0.0011	0.0000	1027	-	N	3.02
CP02	0.0	0.0	0.00	0.0	0.0	0.0	3.1	1.6	14.4	17.3	0.0	0.0	0.0	0.0	0.0031	0.0000	1027	-	N	2.80
CP03	0.0	0.0	0.00	0.0	0.0	0.0	2.0	0.8	12.5	16.9	0.0	0.0	0.0	0.0	0.0020	0.0000	1027	-	N	2.95
CP04	0.0	0.0	0.00	0.0	0.0	0.0	1.4	0.4	18.2	19.8	0.0	0.0	0.0	0.0	0.0014	0.0000	1027	-	N	2.58
WS02	0.0	0.0	0.00	0.0	0.0	0.0	4.2	0.4	4.3	18.9	0.0	0.0	0.0	0.0	0.0042	0.0000	1027	-	N	1.88
WS03	0.0	0.0	0.00	0.0	0.0	0.0	3.9	3.9	14.9	15.0	0.0	0.0	0.0	0.0	0.0039	0.0000	1027	-	N	NGW
WS05	0.0	0.0	0.00	0.0	0.0	0.0	2.4	2.4	16.3	16.3	0.0	0.0	0.0	0.0	0.0024	0.0000	1027	-	N	1.84
WS06	0.0	0.0	0.00	4.0	1.8	80.0	2.6	1.5	15.7	17.8	0.0	0.0	0.0	0.0	0.0026	0.0040	1027	-	N	2.22

Notes:

PERMANENT GROUND GAS MONITORING FORM



SITE NAME:	AFAN WAY, PORT TALBOT	ENGINEER:	Josh Turton
CLIENT:	ALDI STORES LIMITED	DATE:	07/01/2022
JOB NO:	GRO-21252		

Pressure Trend:	Falling	Weather:	Rain			Equipment:	GFM 436
Ambient:	O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)	
Start	20.7	0.0	0.0	0.0	0.0	0.0	
Finish	20.6	0.0	0.0	0.0	0.0	0.0	

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady						
CP01	0.0	0.0	0.00	0.0	0.0	0.0	1.1	0.4	17.6	19.1	0.0	0.0	0.0	0.0	0.0011	0.0000	1011	-	N	2.74
CP02	0.0	0.0	0.00	0.0	0.0	0.0	2.2	1.0	16.4	18.4	0.0	0.0	0.0	0.0	0.0022	0.0000	1011	-	N	2.50
CP03	0.0	0.0	0.00	0.0	0.0	0.0	1.9	0.9	15.2	17.4	0.0	0.0	0.0	0.0	0.0019	0.0000	1011	-	N	2.63
CP04	0.0	0.0	0.00	0.0	0.0	0.0	1.4	0.8	19.1	19.3	0.0	0.0	0.0	0.0	0.0014	0.0000	1011	-	N	2.58
WS02	0.0	0.0	0.00	0.0	0.0	0.0	2.6	1.8	6.4	11.1	0.0	0.0	0.0	0.0	0.0026	0.0000	1011	-	N	2.32
WS03	0.0	0.0	0.00	0.0	0.0	0.0	3.1	2.8	3.2	9.8	0.0	0.0	0.0	0.0	0.0031	0.0000	1011	-	N	2.02
WS05	0.0	0.0	0.00	0.0	0.0	0.0	1.4	0.4	18.1	19.4	0.0	0.0	0.0	0.0	0.0014	0.0000	1011	-	N	2.27
WS06	0.0	0.0	0.00	2.4	1.0	48.0	2.4	1.1	16.8	18.4	0.0	0.0	0.0	0.0	0.0024	0.0024	1011	-	N	2.31

Notes:

PERMANENT GROUND GAS MONITORING FORM



SITE NAME:	AFAN WAY, PORT TALBOT	ENGINEER:	Josh Turton
CLIENT:	ALDI STORES LIMITED	DATE:	09/12/2021
JOB NO:	GRO-21252		

Pressure Trend:	Falling	Weather:	Overcast			Equipment:	GFM 436
Ambient:	O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)	
Start	20.5	0.0	0.0	0.0	0.0	0.0	
Finish	20.4	0.0	0.0	0.0	0.0	0.0	

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady						
CP01	0.0	0.0	0.00	0.0	0.0	0.0	1.0	0.4	18.0	19.2	0.0	0.0	0.0	0.0	0.0010	0.0000	1003	-	N	2.89
CP02	0.0	0.0	0.00	0.0	0.0	0.0	3.5	1.9	13.5	18.2	0.0	0.0	0.0	0.0	0.0035	0.0000	1003	-	N	2.75
CP03	0.0	0.0	0.00	0.0	0.0	0.0	1.8	0.8	13.0	16.9	0.0	0.0	0.0	0.0	0.0018	0.0000	1003	-	N	2.74
CP04	0.0	0.0	0.00	0.0	0.0	0.0	0.8	0.0	19.1	19.8	0.0	0.0	0.0	0.0	0.0008	0.0000	1003	-	N	2.79
WS02	0.0	0.0	0.00	0.0	0.0	0.0	3.7	0.0	15.3	20.1	0.0	0.0	0.0	0.0	0.0037	0.0000	1003	-	N	1.55
WS03	0.0	0.0	0.00	0.0	0.0	0.0	3.7	3.5	16.2	16.8	0.0	0.0	0.0	0.0	0.0037	0.0000	1003	-	N	NGW
WS05	0.0	0.0	0.00	0.0	0.0	0.0	1.5	1.4	17.3	17.8	0.0	0.0	0.0	0.0	0.0015	0.0000	1003	-	N	1.67
WS06	0.0	0.0	0.00	2.0	0.6	40.0	1.3	0.9	17.8	19.2	0.0	0.0	0.0	0.0	0.0013	0.0020	1003	-	N	2.10

Notes:

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Pressure Trend:	Steady	Weather:	Overcast			Equipment:	GFM 436
Ambient:	O ₂ (%v/v)	CH ₄ (%v/v)	CO ₂ (%v/v)	LEL	H ₂ S (ppm)	CO (ppm)	
Start	0.0	0.0	0.0	0.0	0.0	0.0	
Finish	0.0	0.0	0.0	0.0	0.0	0.0	

BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (mb)	Methane (%v/v)			Carbon Dioxide (%v/v)		Oxygen (%v/v)		Hydrogen Sulphide (ppm)		Carbon Monoxide (ppm)		Q _{hg} CO ₂ (l/hr)	Q _{hg} CH ₄ (l/hr)	Atmos Press (mb)	PID (ppm)	Sheen (Y/N)	Depth to Water (m bgl)
	Peak	Steady		Peak	Steady	LEL	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady						
CP01	0.0	0.0	0.00	0.0	0.0	0.0	1.5	0.6	17.1	18.5	0.0	0.0	0.0	0.0	0.0015	0.0000	1032	-	N	3.05
CP02	0.0	0.0	0.00	0.0	0.0	0.0	2.1	0.7	16.8	19.0	0.0	0.0	0.0	0.0	0.0021	0.0000	1032	-	N	2.81
CP03	0.0	0.0	0.00	0.0	0.0	0.0	1.7	0.7	16.6	18.6	0.0	0.0	0.0	0.0	0.0017	0.0000	1032	-	N	2.76
CP04	0.0	0.0	0.00	0.0	0.0	0.0	0.7	0.7	19.6	19.6	0.0	0.0	0.0	0.0	0.0007	0.0000	1032	-	N	2.55
WS02	0.0	0.0	0.00	0.0	0.0	0.0	3.4	0.6	7.0	18.5	0.0	0.0	0.0	0.0	0.0034	0.0000	1032	-	N	1.83
WS03	0.0	0.0	0.00	0.0	0.0	0.0	2.8	1.7	16.4	17.8	0.0	0.0	0.0	0.0	0.0028	0.0000	1032	-	N	2.34
WS05	0.0	0.0	0.00	0.0	0.0	0.0	2.0	1.1	19.0	19.4	0.0	0.0	0.0	0.0	0.0020	0.0000	1032	-	N	2.79
WS06	0.0	0.0	0.00	0.0	0.0	0.0	2.0	0.6	17.0	19.2	0.0	0.0	0.0	0.0	0.0020	0.0000	1032	-	N	2.10
Notes:																				

LIMITATIONS

Limitations

This report (Report) forms part of the Services and if applicable Additional Services undertaken by Groundtech Consulting Ltd pursuant to a written contract (Agreement) which contains detailed provisions including express limitations of the liability of Groundtech Consulting Ltd.

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The observations and conclusions outlined in this Report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting Ltd.

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Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions may also vary due to the ground's heterogeneous properties and because investigation exploratory locations only allow examination of the ground at discrete

locations. The potential exists for ground conditions to be encountered which are different to those considered in this Report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. If so stipulated in the Agreement, geo-environmental testing was carried out for a limited number of parameters based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

Any groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore, groundwater levels are subject to seasonal variation or changes in local drainage conditions and groundwater levels may occur at other times of the year which are higher than were recorded during this investigation.

Any site drawings provided in this Report are preliminary and used to present the general relative locations of features on, and surrounding, the Site.

