

Made Ground and imported fill material.

Any exposed formations should be protected from the effects of the weather, site traffic, or water in order to prevent deterioration of this surface. It is recommended that any exposed formations be protected with a minimum thickness of 200mm of suitable granular material or a thin layer of blinding concrete, which should be placed immediately after excavation and exposure.

7.3.2. Cutting and Filling

No cutting and filling works are envisaged.

7.3.3. Excavation Plant

On the basis of the observations made during the exploratory investigation it is considered that excavations within the Made Ground is likely to encounter layers of concrete and very dense materials that excavating plant may have difficulties in penetrating and it would be prudent to make allowance for the use of breaking equipment and heavy tracked 360 degree excavators.

7.3.4. Stability of Excavation Sides

The Trial Pits revealed the Made Ground to be generally stable, however due to the predominately granular nature of Made Ground, the potential for collapse of the sides of excavations exist and therefore any excavations for foundation construction may require shoring or support if left open for a sustained period of time, unless battered back to a suitable safe angle.

7.3.5. Control of Groundwater

Groundwater was typically encountered within the underlying Fluvial Glacial granular deposits >3mbgl as per Table 10, recorded as medium to fast incursions.

It is determined that due to the variable nature of the Made Ground i.e. areas of increased granular material, pockets of perched water were encountered a varying depths.

Regardless of what method of remediation works undertaken and finalised formation/ foundation depths it is likely that groundwater will be encountered, whether it be perched or full groundwater. Sump pumping should be adequate for dewatering excavations where groundwater is encountered, or where surface water ingress occurs.

7.3.6. Former Mine Workings

The Coal Authority report (Reference Number:51000896384001) as supplied by the Client suggest the site is not in the zone of past, present or future underground or open cast mining methods.

A copy of the Coal Authority report is presented in Appendix V for completeness.

7.4. Slope Stability

No major groundworks involving slopes or slope stability are anticipated or proposed for the site development.

7.5. Foundation Assessment

7.5.1. Geotechnical Discussion

For the purpose of a preliminary appraisal of potential foundation solutions, we would comment as follows.

The Made Ground contains variable granular deposits, areas of concrete slabs and coarse soil fractions such as cobbles. Due to its variable nature and the presence of concrete and cobbles that may result in 'hard spots', as well as areas of increased finer grained soils and much anthropogenic material within, shallow foundations within the Made Ground are not considered suitable for the proposed development due to the potential for significant magnitudes of differential and total settlements to occur.

The underlying Estuarine Alluvium Deposits is described to exhibit a very soft to soft consistency as demonstrated by the low shear strength readings obtained from the Undrained Shear Strength in Triaxial Compression tests, ranging from 12-22kPa, as well as the One Dimensional Consolidation tests indicating significant potential settlement under loading. This strata is also not considered suitable for founding.

The Fluvial Glacial Deposits which offered increased SPT N values and would offer allowable bearing capacities in excess of 150kN/m² may be deemed suitable founding strata. However, the depth to these would be typically >3mbgl across the site and would encounter significant groundwater. Conventional deep trench foundations may prove difficult.

The alternate option of deep piled foundations pose a significant risk in creating new source-pathway-receptor linkages and new conduits for the overlying contaminated soils and waters – this however is dependent on the Remediation strategy employed. If the overlying soils were remediated to permit the installation of pile foundations this may be an option, but may prove economically non-viable. The Remediation strategy may be to excavate and dispose the Made Ground off site and replace with clean inert engineering fill material. If this was the case then shallow foundations set upon the newly imported and laid engineering fill may prove the best option, particularly for the residential builds. The larger retail units may still need to extend to the deeper lying Fluvial Glacial Deposits for sufficient bearing capacity.

Following the proof rolling of the newly exposed formations following the Made Ground offsite disposal, the importation and laying of engineered fill (granular blanket) will be required to achieve a uniform formation upon which the foundations may be placed

Fill shall be placed and compacted in near-horizontal layers of the thicknesses required to achieve the

specified end product or in accordance with the approved method specification, and shall, as far as practicable, be brought up at a uniform rate so that all parts of the site or particular sections of the site reach finished (formation) level at the same time.

Fill placed adjacent to structures, membranes or buried surfaces shall be of a type and shall be placed and compacted in a sequence and manner which ensure stability and avoid damage and undue settlement.

Type 1 granular sub-base to the Department of Transport Specification for Highway Works should be used as the granular fill blanket to raise levels to finished formation in preparation for the slab. The material should be laid and compacted in accordance with Tables 6/1 and 6/4 Volume 1 Specification for Highways Works. Layers should not exceed 110mm thickness prior to compaction. Guidance may also be sought from Table 8/4 Volume 1 Specification for Highways Works. Compaction shall be carried out as soon as practicable after deposition of the fill materials

Determination of sufficient compactness and bearing capacity of the granular fill may be undertaken through in-situ control testing which may include load tests i.e. plate load testing or CBR testing. Typically an allowable bearing capacity of 50kN/m² is applied for such material if laid correctly unless in-situ testing is undertaken to suitably prove increased strengths.

The underlying Estuarine Alluvium deposits would dictate that reinforced ground beams be adopted.

The foundations should be designed by an experienced and competent specialist contractor who should select appropriate design parameters and guarantee safe working loads together with maximum total and differential settlements, which should be within acceptable tolerances for the proposed structures.

The contractor should satisfy themselves and confirm to the Client that the available site investigation data provides sufficient information upon which to base their design. If the contractor requires any further data, any such requirements should be identified and the information should be obtained prior to the foundation design being finalised. The contractor should monitor the foundation installations and satisfy himself that the encountered ground conditions are as good as, or better than, assumed in his design.

7.5.2. Landgas Considerations

Based on landgas emission readings of natural gases to date indicate no special precautions are required, however, elevated readings of Volatile Organic Compounds of the soils sampled and on site whilst undertaking the trial pitting exercise, would indicate that vapour membranes would be required. This once again depends on the successfulness of the Remediation works that would be employed and post-Remediation testing/ monitoring. See Section 6.3.

7.5.3. Foundation Concrete Class Designation

The Aggressive Chemical Environment for Concrete (ACEC) classification for the site has been assessed

according to the guidelines within BRE Special Digest 1 (2005). For classification purposes, based on the BRE guidance, the groundwater must be classed as 'mobile' unless proven to be 'static' over a 24hr period.

The pH values of the soil samples taken from across the site ranged from 5.8 – 9.3 indicating near neutral to slightly alkaline conditions. The levels of water-soluble sulphate (SO_4) content of the tested soil samples varied between 0.039 g/l (0.10mg/l) to 0.53 g/l (53mg/l).

Based on the above, the Design Sulphate (DS) class for the site is DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification is AC-2s, assuming mobile groundwater conditions.

7.5.4. Pavement Design

Figure 3 in Appendix I shows the location of the in-situ California Bearing Ratio (CBR) tests undertaken with the test results sheets presented within Appendix VI.

For preliminary purposes CBRs were undertaken during this phase of Ground Investigation to gauge the shallow soils. However, based on the overall findings of the investigation both chemically and geo-technically it is now likely that significant Remediation and Earthworks will be undertaken to prepared the site prior to construction of the new builds. Therefore the CBR results presented herein are unlikely to reflect the end material upon which the new roadways and car parking facilities will be constructed. Further CBR testing following site preparation works may be required. CBR values recorded typically ranged between 2.7 and 23%.

8. EXECUTIVE SUMMARY

The site has been subject to numerous desk studies and environmental investigations dating back to 2002. These studies have not targeted the site as a whole but individual areas based on historic land use with particular focus on areas relating to the former Petrol Filling Station, the former Council Yard and a Former Tar Tank area.

No geotechnical investigation has been undertaken or reported for any areas of the site previously with past studies focusing on contamination.

It has been identified that following the last such study in 2007 the site has elevated levels of contaminants with particular focus on hydrocarbons in the south. These contaminants are considered to pose a risk to both future site users (human health) and the environment particularly nearby controlled waters.

The purpose of this 2015 ground investigation by Quantum was to establish what changes have taken place since 2007 but also provide added detail and information relating to areas of the site that have not been investigated previously and also provide geotechnical input for the proposed development which will be divided into residential and commercial.

This phase of investigation has demonstrated that in relation to the contamination issues, very little has changed in the past 10 years. Strong and persistent hydrocarbon contamination remains in the southern and south-eastern area of site in the area of the former Petrol Filling Station but also in the northern-northwest area where an old Tar tank was believed to have once existed but been emptied several years prior. In addition, raised heavy metals were encountered across the proposed residential area posing a human health risk and also high leachate potential of soil-held contaminants across the site were concluded posing significant risk to groundwater and the nearby River Afan.

The site has seen some partial development, whereby two steel portal frames have been erected circa 2010 on the western boundary but for whatever reasons these were not completed.

It is therefore recommended and concluded that Remediation of the site is required to reduce the contamination concentration and sever the pollutant linkages that have been realised. The form of Remediation should be carefully considered due to the variation of the range of contaminants identified. Free phase hydrocarbons may require well pumping and in-situ bioremediation, however, the heavy metal contamination, widespread Asbestos and general buried waste which pose significant health risks must also be considered.

The form of foundations for the new residential and commercial premises will to some extent be dictated by the chosen Remediation Methodology. This may include significant earthworks and offsite disposal of the revealed Made Ground in conjunction with the well pumping and the subsequent construction of a new formation upon which new builds may be situated. It is anticipated that shallow foundations on newly imported engineered fill would best serve the development considering the geo-environmental and geotechnical findings.

Natural Landgas emissions were recorded as low, however, vapour emissions associated with the hydrocarbons in the soils were high and post-remediation landgas monitoring should be undertaken as this will define whether any residual contamination after Remediation is presenting potential harmful gases and whether gas mitigation measures would be required for new builds.

9. REFERENCES

British Geological Survey:-

- British Geological Survey (BGS) Sheet 247 Swansea' (Solid and Drift) – 1:63 360 Scale.

Environment Agency Publications:-

- Aquifer Designation Maps – 1:100,000 Scale.

Specialist Publications:-

- British Code of Practice BS 5930:1999+A2:2010 '*Code of Practice for Site Investigations*'
- British Code of Practice BS 1377:1990 '*Methods of test for soils for civil engineering purposes*'.
- British Code of Practice BS 10175:2001 '*Code of Practice for Investigation of Potentially Contaminated Sites*'
- British Code of Practice BS EN ISO 14688-1:2002+A2:2013 Geotechnical investigation and testing. Identification and classification of soil. Identification and description
- British Code of Practice BS EN ISO 14688-2:2004+A2:2013 Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.
- British Code of Practice BS EN ISO 14689-1:2003 Ground Investigation and Testing – Identification and classification of rock
- Health and Safety Executive Guidance Note EH40/90
- EA: '*Dealing with contaminated land in England and Wales*', 2009
- EA: Science Report: SC050021/SR3, 2009 '*Updated Technical Background to the CLEA Model*'
- CIRIA Report C665 '*Assessing risks posed by hazardous ground gases to buildings (revised)*', 2007
- CIRIA Report 143 '*The Standard Penetration Test (SPT): Methods and Use*, 1995.
- British Code of Practice BS 8485: (2007) '*Code of practice for the characterization and remediation from ground gas in affected developments*'
- Inter Departmental Committee for the Redevelopment of Contaminated Land (UK) (ICRCL) Guidance Note 61/84(12) Notes on the fire hazards of contaminated land. 2nd edition, July 1986.

Historic Reports:-

- BAPTIE GROUP. March 2004. Preliminary Contamination Assessment, Afan Way Service Station, Port Talbot. Ref. 0006681/AW/CR/R01.
- Earth Science Partnership, Proposed Residential And Retail Development, Afan Way, Port Talbot,
- GROUND INVESTIGATION LTD. November 2004. Afan Way, Port Talbot, Phase Two Geoenvironmental Site Assessment Report. Rpt No. 220.01.
- GROUND INVESTIGATION LTD. December 2006. Former Service Station, Afan Way, Port Talbot, Validation of Tank Removal. Letter Rpt ref. p220a.01.lt.validation.doc.

- GROUND INVESTIGATION LTD. November 2007a. Afan Way, Port Talbot, Geo-environmental Assessment of Old Tar Tank Beneath Unit D. Letter Rpt ref. p220a.05.lt3.report.doc.
- GROUND INVESTIGATION LTD. November 2007b. Afan Way, Port Talbot, Tank Excavation Validation. Letter Rpt ref. p220a.03.lt4.validation rpt.doc.
- GROUND INVESTIGATION LTD. November 2007c. Former Petrol Filling Station, Afan Way, Port Talbot. Assessment of Potential Pollution Risks to Controlled Waters. Rpt no. 220.03.
- LEE REMEDIATION LIMITED. 2008. Ground Contamination Risks and Remediation Requirements. Former Petrol Filling Station, Afan Way, Port Talbot. Doc ref. R080022 #1 QRA.

For and on behalf of **Quantum Geotechnical Ltd**,

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Date

Checked by

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Principal Engineering Geologist

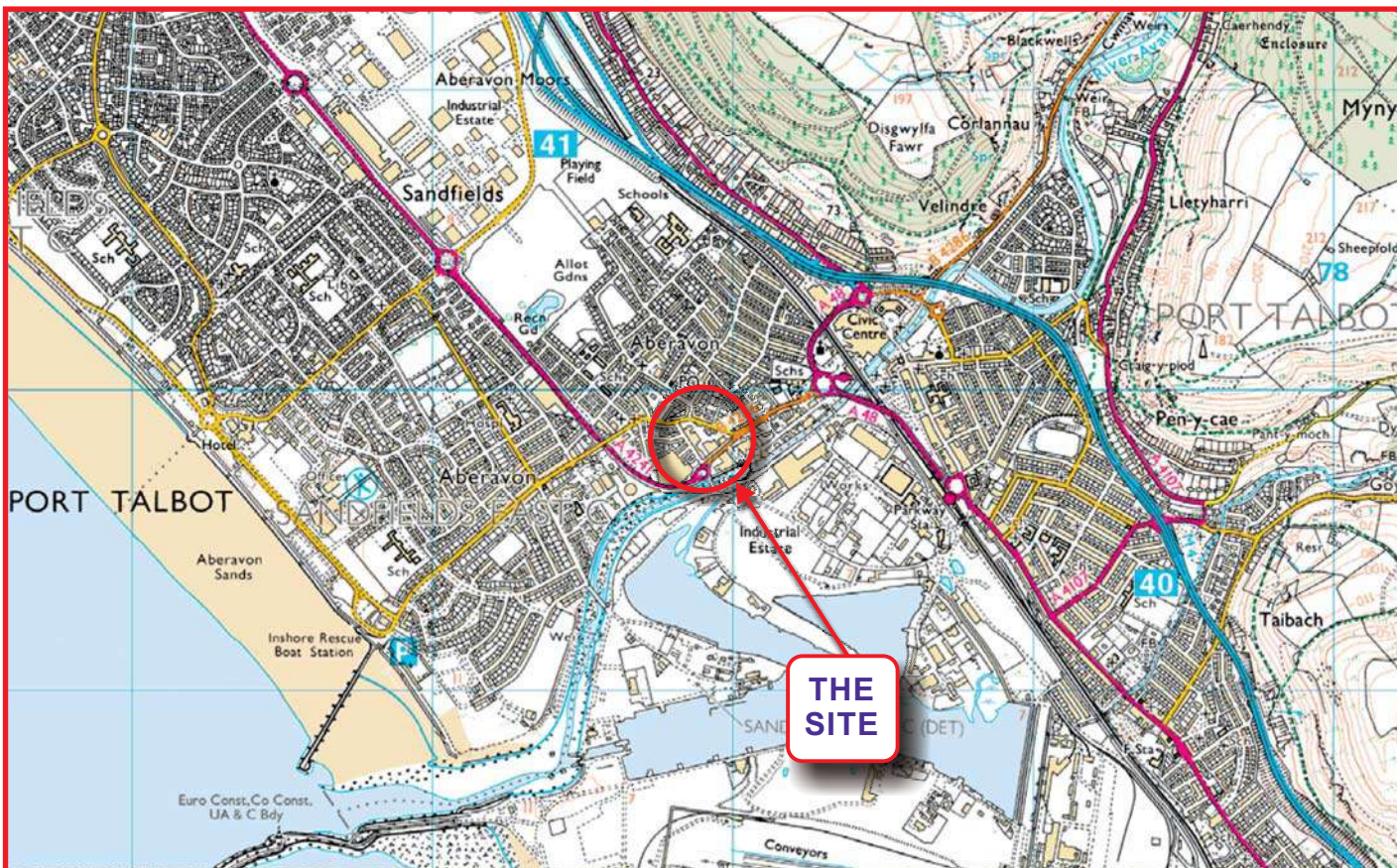
Date

Approved by:

J.E. STARK, B.Sc. (Hons), C.Geol., F.G.S.
Technical Director

Date

APPENDIX I – SITE PLANS AND FIGURES



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BURROWS YARD GROUND INVESTIGATION

SITE LOCATION PLAN

FIGURE 1

SCALE:
1 : 25000

JOB No.
G762



Figure 1a Site Photographs

Plate 1:

Burrows Yard looking southeast

(Photo taken from the
Northwest of the site)



Figure 1a Site Photographs

Plate 2: Dumped Builder's Material at Site Entrance (Looking south)



Figure 1a Site Photographs

Plate 3: Dumped Builder's Material at Site Entrance (Looking southwest)



Figure 1a Site Photographs

Plate 4: Steel Frame Building in northwest corner
(Photograph taken in the centre of site looking west)



Figure 1a Site Photographs

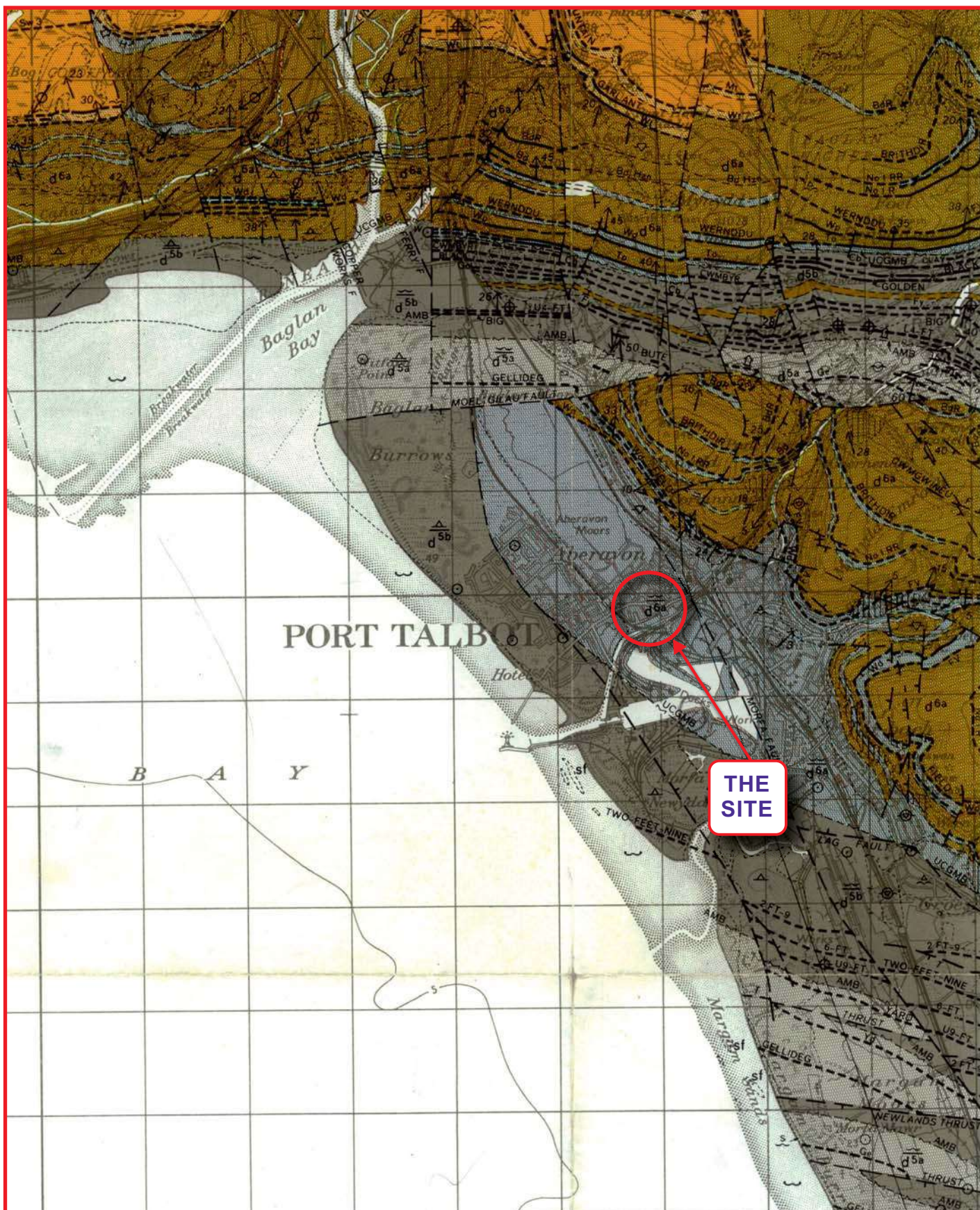
Plate 5: Fenced off area of Hypodermic Needles waste in north of site
(Photograph taken from north)



	Figure 1a Site Photographs Plate 6: Mound 2 (Looking Northwest)
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	Figure 1a Site Photographs Plate 7: South corner of site (Photograph taken from centre of site looking South)
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BURROWS YARD GROUND INVESTIGATION

**GEOLOGICAL MAP EXTRACT
SHEET 247 SOLID EDITION**

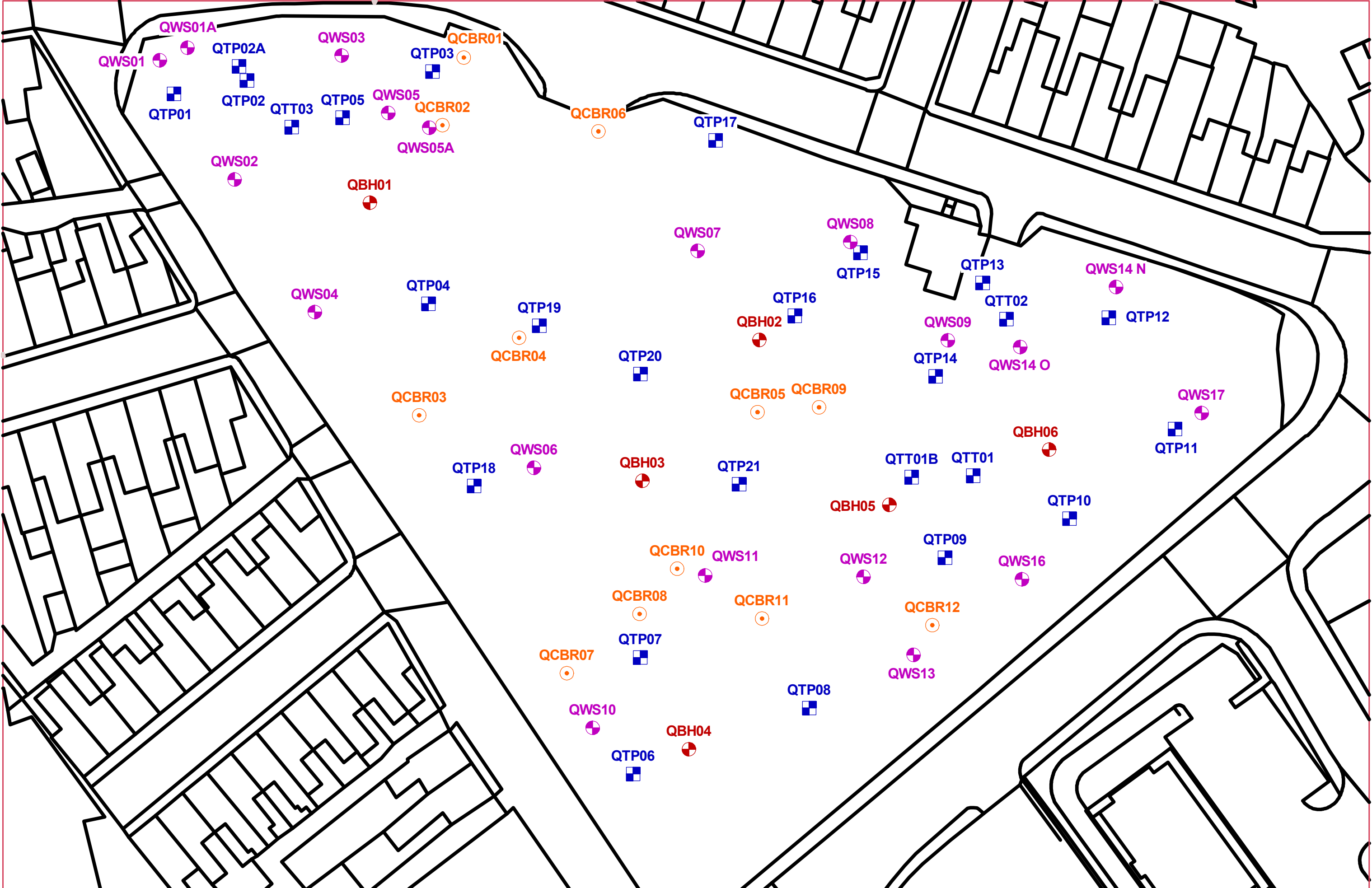
FIGURE 2

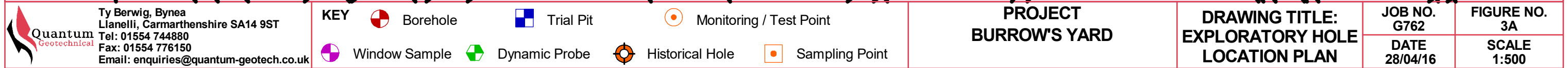
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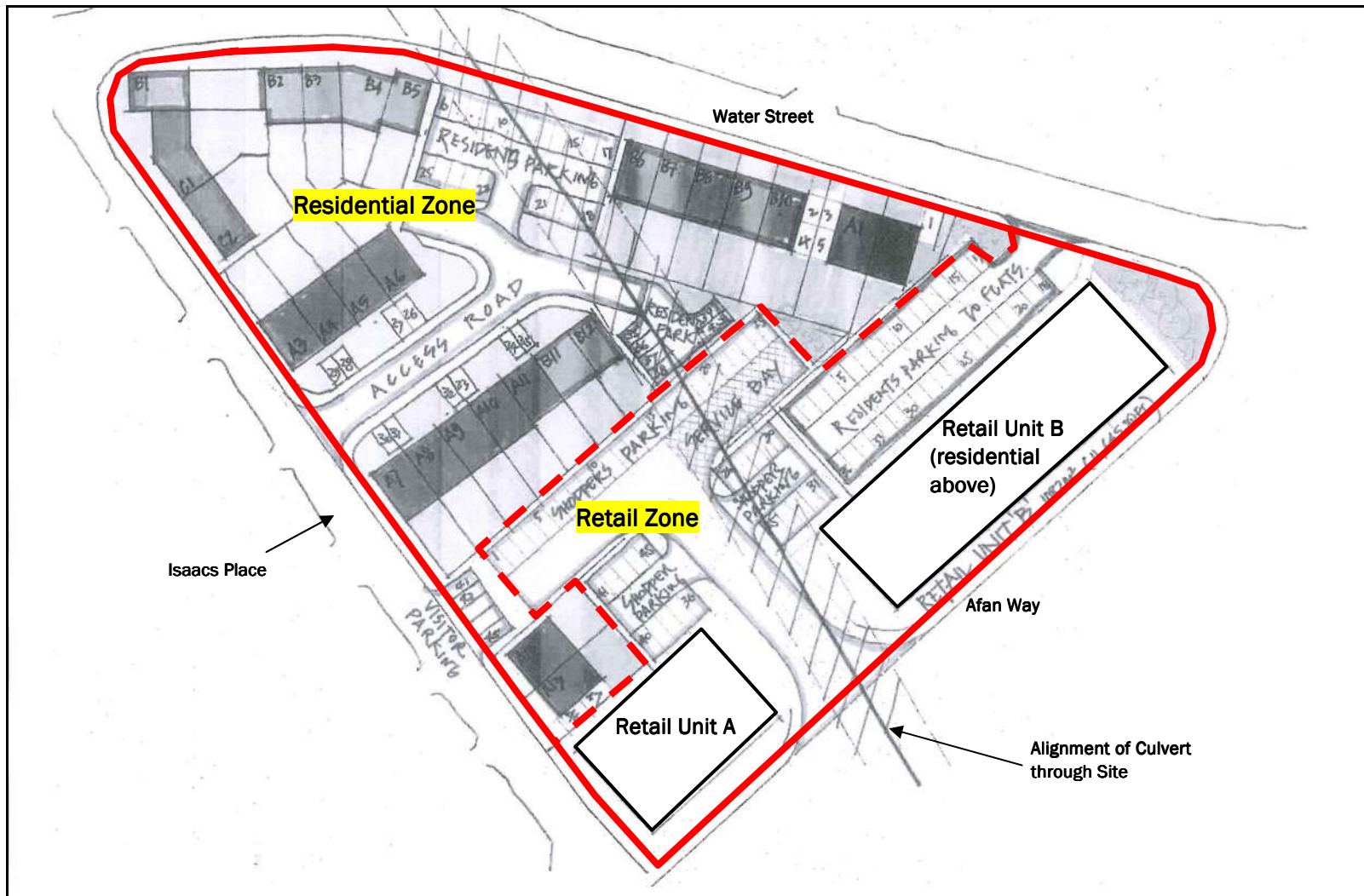
JOB No.
G762



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Proposed layout after C2J Architects, February 2015



--- Boundary between residential and retail zone

PROJECT: PROPOSED RETAIL AND RESIDENTIAL DEVELOPMENT, AFAN WAY, PORT TALBOT

SCALE: 1:1,000 (approx. at A4)

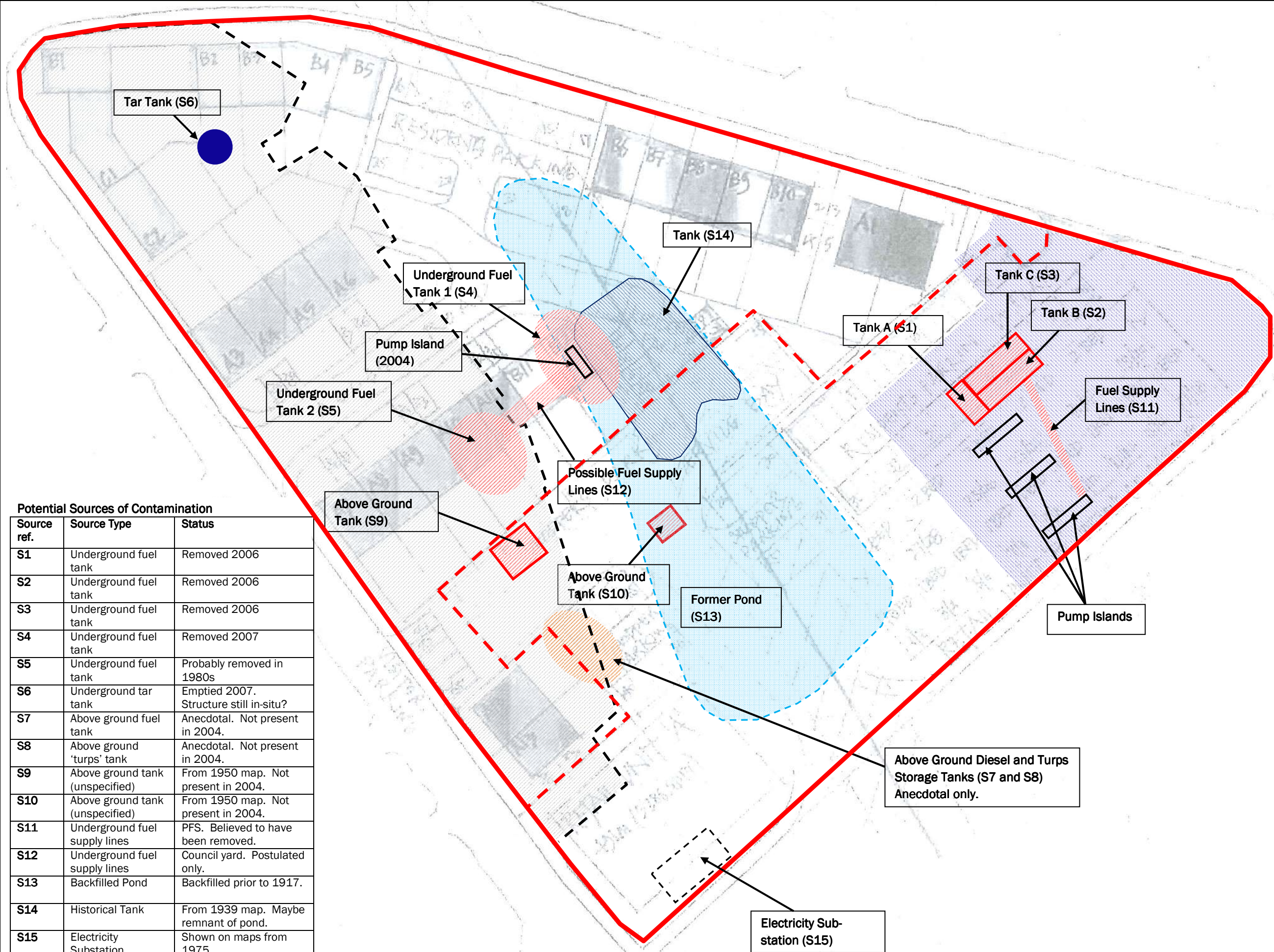
FIGURE 2: PROPOSED SITE LAYOUT



EARTH SCIENCE PARTNERSHIP

33 Cardiff Road, Taffs Well, Cardiff CF15 7RB

Tel: 029 2081 3385 enquiries@earthsciencepartnership.com



Potential Sources of Contamination

Source ref.	Source Type	Status
S1	Underground fuel tank	Removed 2006
S2	Underground fuel tank	Removed 2006
S3	Underground fuel tank	Removed 2006
S4	Underground fuel tank	Removed 2007
S5	Underground fuel tank	Probably removed in 1980s
S6	Underground tar tank	Emptied 2007. Structure still in-situ?
S7	Above ground fuel tank	Anecdotal. Not present in 2004.
S8	Above ground 'turps' tank	Anecdotal. Not present in 2004.
S9	Above ground tank (unspecified)	From 1950 map. Not present in 2004.
S10	Above ground tank (unspecified)	From 1950 map. Not present in 2004.
S11	Underground fuel supply lines	PFS. Believed to have been removed.
S12	Underground fuel supply lines	Council yard. Postulated only.
S13	Backfilled Pond	Backfilled prior to 1917.
S14	Historical Tank	From 1939 map. Maybe remnant of pond.
S15	Electricity Substation	Shown on maps from 1975.
S16	General Made Ground	



Notes:

-  Former Petrol Filling Station (1991 - 2004)
-  Backfilled former pond (1899)
-  Former Tank Positions
-  Former Tin Plate Works (Main building)
-  Boundary between proposed Residential and Retail Zones (see Figure 2)

Base Layout after C2J Architects (Feb 2015)

PROJECT:
PROPOSED RETAIL AND RESIDENTIAL DEVELOPMENT
AFAN WAY, PORT TALBOT

Scale: 1:500 (approx. at A3)

FIGURE 5:
POTENTIAL SOURCES OF CONTAMINATION

EARTH SCIENCE PARTNERSHIP
33 Cardiff Road, Taffs Well,
Cardiff CF15 7RB Tel: 029 2081 3385
enquiries@earthsciencepartnership.com

APPENDIX II – CABLE PERCUSSIVE BOREHOLE LOGS

Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH01		
Dates : 2/12/15 - 3/12/15 Location : Residential Zone				Job Number : G762 Engineer : Quantum				Ground Level : 6,47 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275853,72 E 189870,46 N <i>Co-ordinates to National Grid</i>				

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Medium dense to dense blackish grey slightly clayey slightly silty sandy Gravel with low to medium cobble content. Sand is fine to coarse.				
	0,60	ES2								
1	1,00	ES3				Gravel is strong fine to coarse subrounded of siltstone with slag and brick fragments.				
	1,20 1,20 - 1,70	SPT4 B5	1.2	SPT (C) 50/35mm (25/40mm-50/35mm---)	(2,40)	Cobbles are subangular of sandstone and concrete.		(2,40)		
2	2,00 2,00 - 2,40	ES6 SPT7 B8	2	SPT (C) 19 (7-8-6-5-4-4)						
					2,40	MADE GROUND Medium dense to dense brownish grey speckled red clayey silty sandy Gravel with low to medium cobble content. Sand is fine to coarse.		4,07 (0,70)		
3	3,00 3,00 - 3,50	ES9 SPT10 B11	3	SPT (C) 9 (6-4-3-2-2-2)						
					3,10	Gravel is strong fine to coarse subrounded of siltstone with slag and weak brick fragments. Cobbles are subangular of sandstone and concrete.		3,37 (1,60)		
4	4,00 - 4,45	U12 - 9/100%			(1,60)	Very soft to soft light greyish brown silty CLAY				
	4,45 - 4,45	D13								
5	5,00	SPT14	5	SPT (C) 38 (7-7-8-10-10-10)						
	5,50 - 6,00	B15			4,70 (1,30)	Very dense to dense reddish brown sandy GRAVEL and COBBLES. Sand is fine to coarse. Gravel is fine to coarse angular some tabular and some subangular of sandstone. Cobbles are subangular to rounded sandstone. Sandstone is coarse.		1,77 (1,30)		
6	6,00	SPT16	6	SPT (C) 45 (8-8-10-10-12-13)	6,00	Borehole refused at 6.00m depth.			0,47	
	6,50 - 7,00	B17								
7										
	7,50	SPT18	7.5	SPT (C) 47 (6-7-9-11-12-15)						

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
02/12/2015 07:30	0,00 1,20			4,70	203,00	4,70	4,70			1,20 5,70	1,50 6,00	1:15 1:30
02/12/2015 17:30	1,20 6,00	4,70	4,70							6,70 7,80	6,90 8,00	1:00 1:15
03/12/2015 07:30	6,00 8,00											
03/12/2015 17:30												
04/12/2015 07:30												

Remarks: Dando 150
 12:00

	Ty Berwig, Llanelli, Carmarthenshire SA14 9ST Tel: 01544 744 880 Fax: 01554 776 150 email: enquiries@quantum-geotech.co.uk	Operator: W.P. Osborn / Sam Whitty	Logged By: L Weaver	Sheet No. 1 Of 2	m Per Page 8	All measurements in metres unless otherwise stated	
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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group											Borehole No. QBH01		
Dates : 2/12/15 - 3/12/15 Location : Residential Zone				Job Number : G762 Engineer : Quantum				Ground Level : 6.47 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275853,72 E 189870,46 N <i>Co-ordinates to National Grid</i>					

m B.G.L.	Samples		Insitu Test Results		Strata				Legend	Red. Level A.O.D.	Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description						
8	8.00	SPT19	8	SPT (C) 53 (7-8-9-12-14-18)								
9												
10												
11												
12												
13												
14												
15												

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Remarks: Dando 150

	Ty Berwig, Llanelli, Carmarthenshire SA14 9ST Tel: 01544 744 880 Fax: 01554 776 150 email: enquiries@quantum-geotech.co.uk	Operator: W.P. Osborn / Sam Whitty	Logged By: L Weaver	Sheet No. 2 Of 2	m Per Page 8	All measurements in metres unless otherwise stated	
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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH02			
Dates : 10/12/15 - 11/12/15 Location : Residential Zone					Job Number : G762 Engineer : Quantum					Ground Level : 6,01 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275910,74 E 189850,38 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Black sandy Gravel. Gravel is coarse strong angular of sandstone and fine brick and strong slag fragments. Sandstone is coarse.		(2,10)		
	0,60	ES2								
1	1,00	ES3								
	1,20 1,20 - 1,20	SPT4 B5	1.2	SPT (C) 31 (5-6-7-7-8-9)	(2,10)					
2	2,00	ES6 SPT7			2,10	Soft to firm dark brown mottled orangish brown slightly sandy silty CLAY. Sand is fine. Below 3.45m depth: Very soft to softdark brown.		3,91 (1,40)		
	2,30 - 2,80	B8			(1,40)					
3	3,00 - 3,45	U9 - /%	3	SPT (C) 9 (8-7-3-2-2-2)		Very dense to dense medium brown sandy GRAVEL. Sand is fine to coarse. Gravel is subrounded to subangular fine sandstone.		2,51		
	3,45 - 3,50	D10			3,50					
4	4,00	SPT11 B12	4	SPT (C) 30 (6-7-9-9-1-11)		Borehole refused at 6.50m depth.		(3,00)		
5	5,00	SPT13	5	SPT (C) 44 (6-9-9-10-12-13)	(3,00)					
	5,50	B14								
6										
	6,50	SPT15			6,50			-0,49		
7										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
11/12/2015 07:30	0,00			3,50	203,00	3,50	3,50	Medium groundwater flow at 3.50m depth.				
11/12/2015 17:30	6,50	3,50	3,50									

Remarks:

	Ty Berwig, Llanelli, Carmarthenshire SA14 9ST Tel: 01544 744 880 Fax: 01554 776 150 email: enquiries@quantum-geotech.co.uk	Operator:	Logged By:	Sheet No. 1 Of 1	m Per Page 8	All measurements in metres unless otherwise stated	
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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH03		
Dates : 3/12/15 - 7/12/15 Location : Retail Zone				Job Number : G762 Engineer : Quantum				Ground Level : 6,28 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275893,61 E 189829,75 N <i>Co-ordinates to National Grid</i>				

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Stone, ash, brick granular fill (Driller's description)				
	0,60	ES2								
1	1,00	ES3			(2,00)			(2,00)		
	1,20 1,20 - 1,70	SPT4 B5	1.2	SPT (C) 34 (4-5-7-9-9-9)						
2	2,00 2,00 - 2,50	ES6 SPT7 B8	2	SPT (C) 31 (4-5-7-7-8-9)	2,00 (1,00)	Very soft to soft grey silty CLAY interbedded orangish brown slightly silty very sandy CLAY with recognisable wood fragments. Sand is fine to coarse.		4,28 (1,00)		
3	3,00 3,00 - 3,50	ES9 SPT10 B11	3	SPT (S) 15 (3-3-4-4-3-4)	3,00 (1,30)	Very soft to firm light grey to grey silty CLAY interbedded orangish brown slightly silty very sandy CLAY Sand is fine to coarse.		3,28 (1,30)		
4	4,00 - 4,30	U12 - 30/100%								
	4,50	D13			4,30	Dense to very dense sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse medium strong sandstone. Cobbles are subrounded medium strong sandstone. Sandstone is coarse.		1,98		
5	5,00	SPT14	5	SPT (C) 54 (7-9-12-12-14-16)	(2,20)	Below 6.00m depth: medium to high cobble content.		(2,20)		
6	6,00 - 6,50	B15								
	6,50	SPT16	6.5	SPT (C) 20 (45/mm-20-)	6,50	Borehole refused at 6.50m depth.		-0,22		
7										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
04/12/2015 12:00	0,00 1,20			4,50	203,00	4,50	4,50	Groundwater encountered at 4.50m depth.		4,50 5,80 6,30	4,80 6,00 6,50	1:00 0:00 1:00
04/12/2015 17:30	0,00 6,50	4,50	4,50									
07/12/2015 07:30												
07/12/2015 17:30												

Remarks: Dando 150

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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH04		
Dates : 7/12/15 - 8/12/15 Location : Retail Zone				Job Number : G762 Engineer : Quantum				Ground Level : 6,10 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275900,42 E 189790,46 N <i>Co-ordinates to National Grid</i>				

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Black sandy Gravel. Gravel is coarse strong angular of sandstone and fine brick and strong slag fragments. Sandstone is coarse.		(2,25)		
	0,60	ES2								
1	1,00	ES3								
	1,20	SPT4	1.2	SPT (C) 20 (3-4-4-5-6-5)	(2,25)					
	1,50 - 2,00	B4								
2	2,00	ES5 SPT6	2	SPT (C) 15 (4-6-5-4-3-3)		Medium grey silty CLAY interbedded orangish brown sandy CLAY. Sand is fine to medium.		3,85 (1,25)		
	2,50 - 3,00	B7			2,25					
3	3,00	U8 - 19%			(1,25)					
	3,45 - 3,50	D9				Medium brown very gravelly SAND with medium cobble content. Sand is coarse. Gravel is medium subrounded to subangular strong sandstone. Cobbles are sandstone.		2,60 (4,20)		
4	4,00 4,00 - 4,50	SPT10 B11	4	SPT (S) 13 (2-3-3-4-3-3)	3,50					
5	5,00 5,00 - 5,50	SPT12 B13	5	SPT (C) 46 (7-8-9-11-12-14)	(4,20)					
6	6,50	SPT14	6.5	SPT (C) 58 (8-9-12-14-15-17)						
7	7,70	SPT15	7.7	SPT (C) 45 (30/mm-45-)	7,70	Borehole refused at 7.70m depth;		-1,60		

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
08/12/2015 07:30	0,00 7,70	4,50	4,50	4,50	203,00	4,50	4,50	Groundwater encountered at 4.50m depth		1,80 5,60 7,50	2,00 5,80 7,70	0:45 0:45 1:15
08/12/2015 17:00												

Remarks: Dando 150

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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH05		
Dates : 9/12/15 - 10/12/15 Location : Retail Zone				Job Number : G762 Engineer : Quantum				Ground Level : 5.94 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275929,76 E 189826,24 N <i>Co-ordinates to National Grid</i>				

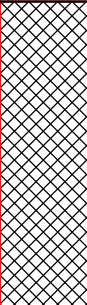
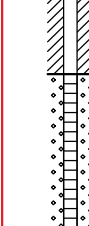
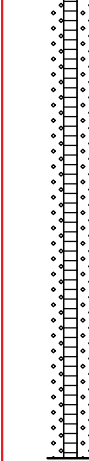
m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Loose black sandy GRAVEL. Sand is fine to coarse. Gravel is weak to strong angular some subrounded of siltstone with coal, slag and brick fragments.		(2,30)		
	0,60	ES2								
1	1,00	ES3								
	1,20 1,20 - 1,70	SPT4 B5	1.2	SPT (C) 50/10mm (25-50/10mm---)	(2,30)					
2	2,00	ES6 SPT7	2	SPT (C) 21 (6-6-7-8-4-2)		Very soft to soft grey silty CLAY interbedded orangish brown slightly silty very sandy CLAY with recognisable wood fragments. Sand is fine to coarse.		3,64 (1,20)		
	2,30 - 2,80	B8			2,30					
3	2,90 3,00 - 3,45	ES9 U10 - 18/100%			(1,20)					
	3,45 - 3,50	D11				Very dense to dense medium brown sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is subrounded to subangular fine sandstone. Cobbles are subrounded strong of sandstone. Sandstone is coarse.		2,44 (3,10)		
4	4,00 4,00 - 4,50	SPT12 B13	4	SPT (C) 40 (7-7-9-9-10-12)						
5	5,00 5,00 - 5,50	SPT14 B15	5	SPT (C) 57 (9-10-12-13-15-17)	(3,10)					
6	6,60	SPT16	6.6	SPT (C) 50/20mm (25/40mm-50/20mm---)	6,60	Borehole refused at 6.60m depth.		-0,66		
7										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
10/12/2015 07:30	0,00 6,60			3,50	203,00	3,50	3,50	Medium groundwater flow at 3.50m depth.		1,20 3,80 6,40	1,50 4,00 6,60	1:15 0:30 1:00
10/12/2015 17:30		3,50	3,50									

Remarks: Dando 150

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Contract : Burrow's Yard Client : NPTCBC / Coastal Housing Group										Borehole No. QBH06		
Dates : 8/12/15 - 9/12/15 Location : Retail Zone				Job Number : G762 Engineer : Quantum				Ground Level : 6,06 m A.O.D. <i>Level to Local Datum</i> Coordinates: 275953,16 E 189834,32 N <i>Co-ordinates to National Grid</i>				

m B.G.L.	Samples		Insitu Test Results		Strata				Water	Install/ Backfill
	Depth	Type No. Blows	Depth	Test Results	Depth (Thick- ness)	Description	Legend	Red. Level A.O.D.		
0	0,30	ES1				MADE GROUND Black sandy Gravel with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded strong slag and brick fragments. Cobbles are tabular of sandstone. Sand stone is coarse.		(2,00)		
	0,60	ES2								
1	1,00	ES3			(2,00)					
	1,20	SPT4 B5	1.2	SPT (C) 24 (3-4-5-6-6-7)						
2	2,00	ES6 SPT7 B8	2	SPT (C) 9 (4-5-2-2-3-2)	2,00	Soft dark brown silty slightly sandy CLAY. Sand is fine.		4,06		
	2,20 - 2,60				(1,50)			(1,50)		
3	3,00	ES9 U10 - 19/100%								
	3,45 - 3,50	D11			3,50	Medium brown very gravelly SAND with medium cobble content. Sand is coarse. Gravel is medium subrounded to subangular strong sandstone. Cobbles are sandstone. Below 5.00m depth: Low cobble content.		2,56		
4	4,00	SPT12 B13	4	SPT (C) 34 (5-7-7-8-9-10)						
	4,00 - 4,50									
5	5,00	SPT14 B15	5	SPT (C) 54 (8-9-11-12-15-16)	(3,00)			(3,00)		
	5,00 - 5,50									
6										
	6,50	SPT16	6.5	SPT (C) 50/110mm (19-6/30mm-31-19/35mm-)	6,50	Borehole terminated at 6.50m depth.		-0,44		
7										

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
09/12/2015 07:30	0,00 6,50			3,70	203,00	3,70	3,70	Medium groundwater flow encountered at 3.70m depth.		1,60 5,30 6,30	1,80 5,60 6,50	0:45 1:00 1:00
09/12/2015 17:30												

Remarks: Dando 150

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