

STRATA SURVEYS LIMITED

GROUND INVESTIGATION REPORT

Report No. 15076

Land Off Meredith Close

Acrefair

Issue : Final Report

Issue Date : 18th March 2011

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REPORT NO. 15076

**Land off Meredith Close
Acrefair**

for

Ventura Developments Limited

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1. INTRODUCTION

This report sets out the results of the field work and laboratory testing for a ground investigation carried out by Strata Surveys Limited for Ventura Developments Limited.

The investigation was required in connection with the development of the vacant former garden site for two blocks of semi detached and one detached house.

This report must be read in conjunction with the Desk Study Phase 1 Risk Assessment Report issued as a separate volume and dated 2nd February 2011.

The object of the investigation was to obtain information on the ground conditions and soil properties for use in the design and construction of foundations on the site and for the initial assessment of the potentially contaminated soil risk.

The ground investigation has been carried out in accordance with the relevant standards for ground investigation. Details of the relevant standards are given in the references to this report.

2. SITE DESCRIPTION

The site lies to the rear of Roberts terrace (that front onto Llangollen Road) and to the north of Lygad yr Haul. The site formed the extended garden to the house Lygad yr Haul. The site gently slopes from the south to the north.



The aerial photograph below shows the general site arrangement.

The site is now roughly vegetated and some general site preparation works have been undertaken locally clearing vegetation.



View of the north west corner, note trial pit excavated for infiltration assessment.



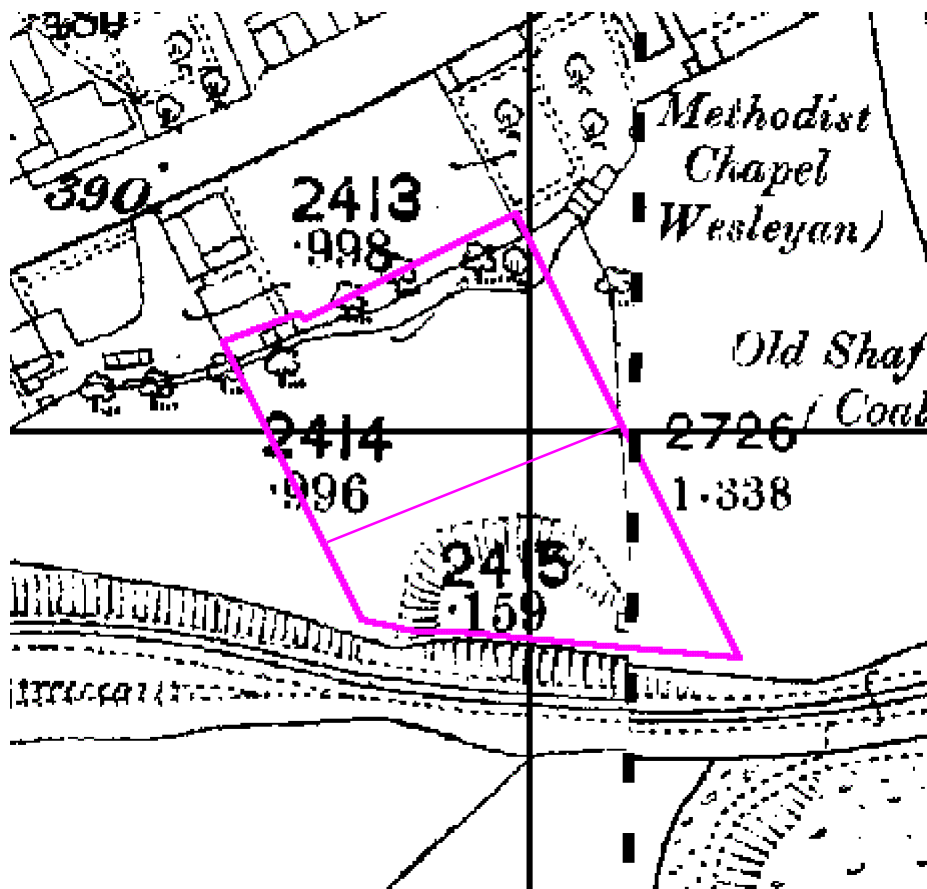
View to the north east showing the proposed access on to site from Meredith Close.



3. HISTORICAL SETTING & ENVIRONMENTAL ISSUES.

The detailed discussion of the history of the site is discussed in the Phase 1 Risk Assessment Report, presented in a separate volume.

The site has been shown as open land since the 1874 Ordnance Survey maps. The oldest mapping shows that there was an open stream course on the northern boundary of the site. The mapping also shows that there is a raised area, above the railway cutting that is shown on the Coal Authority Shaft plan as a coal shaft. See Section 4.



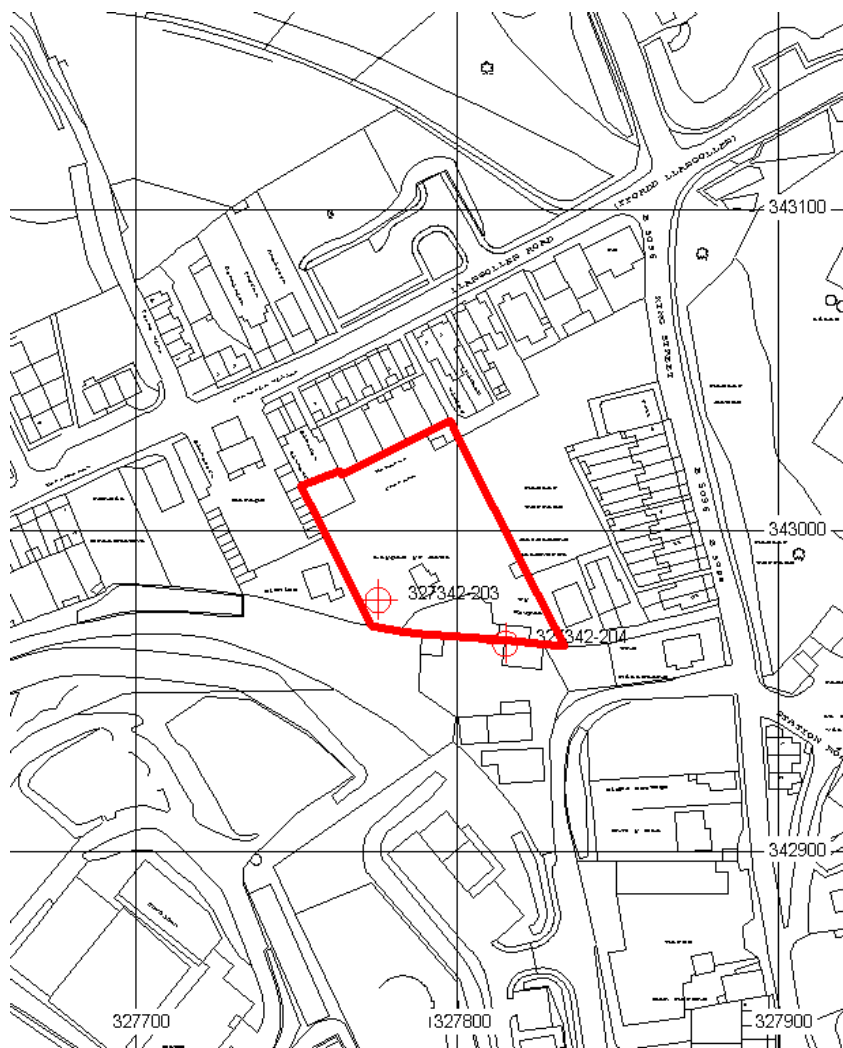
4. SITE GEOLOGY

The published British Geological Survey (BGS) map Sheet 121 Wrexham (1inch to 1mile) shows the site underlain by Drift comprising Glacial Till which overlies bedrock consisting Pennine Lower Coal Measures Formation And Pennine Middle Coal Measures Formation.

The 1:10000 sheet shows that there are three coal seams in the area of the plot. These are Yard Coal, Stone Coal and the Brassy Coal, sub-outcropping from west to east. There is a gentle dip of the seams towards the east. Thus the site will be underlain by the Stone and Yard Coal.

The productive strata of the Acrefair, Aber Nant and Ruabon area include coal, ironstone and fireclay. The CA report states "The property is in the likely zone of influence from workings in 6 seams of coal at shallow to 170m depth, and last worked in 1912.

The GroundSolve Limited Report (prepared for the developers adjacent site), "Ref Shaft Report Issue February 10" included extracts from the Coal Authority Abandonments Plans for records that are present in the area. The extracts of the abandonment plans show a seam dip of 1 v 6h towards the west south-south west.



The coal authority report (see appendix) shows that there are two shafts in the plot area but not in the development zone. It is possible that shaft entry 327342-203 may be in influencing distance of Plot 1 if the depth to rock head is deep.

The Coal Authority Report No 00004680-05 shows where there was a shaft that impacted on the adjacent Meredith Close development.

JANET JENKINS,
PROPERTY SEARCH GROUP,
1 LIVERPOOL ROAD NORTH,
LIVERPOOL,
MERSEYSIDE,
L31 2HB

This matter is being dealt with by Simon Leeming

Our Ref: 00004680-05

Your Ref: BW SMD JSB 0057142 BROADHURST

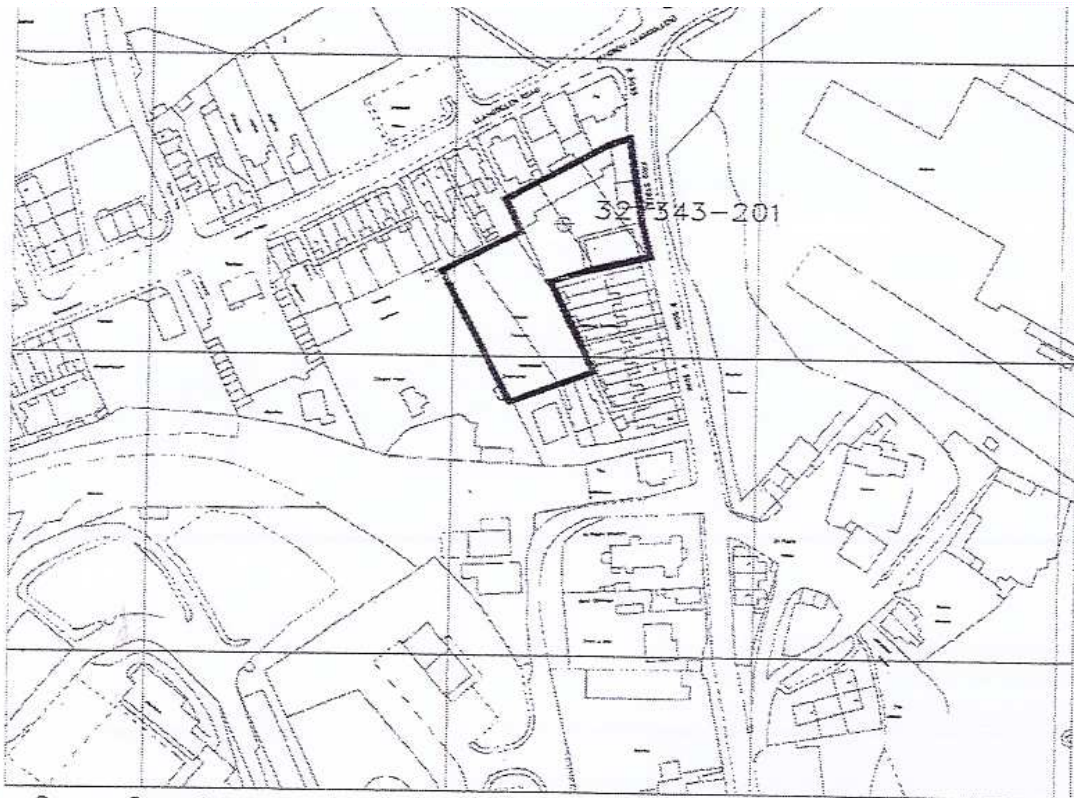
Electronic Ref: EME_00002415040003_005

RRUID: 005.00002415040003

Date: 25 February 2005

Dear Sir,

Coal Mining Report
MAELOR HOUSE, KING STREET, ACREFAIR, WREXHAM, CLWYD, LL14 3RH



Crown Copyright.

5. FIELDWORK

The fieldwork was carried out during the period from 16th February 2011 to 22nd February 2011 and consisted of seven dynamically driven, continuously sampled boreholes ranging from 1.0m (for contamination test sampling only) to 4.0m below the existing ground surface level using an AEC 150 self propelled, tracked dynamic sounding and sampling machine. Samples were recovered in (OS-TW(100mm with liner) eighty-four mm diameter, 1.00m long plastic liners, which were returned to the laboratory for description, sub-sampling and testing.

A standard penetration test (SPT) type test was undertaken at the end of each sample run in accordance with BS EN ISO 22476-3:2005 (formerly BS 1377 Part 9:1990), as described in Appendix 1.

Rotary boreholes were drilled using ODEX drilling techniques with compressed air flush in the drift soils then rotary Cone Roller Bit with water flush in the bedrock. Two rotary boreholes were undertaken completed to a depth of 30m below surface.

Detailed results of the strata met, depths and levels of changes, thickness of strata, samples taken, groundwater observations and standard penetration test (SPT) (Continuous Dynamic Sampling (CDSa) N₃₀₀) values from the dynamic penetration tests are given on the borehole record sheets in Appendix 2.1. The detailed results of the Standard Penetration Test (SPT) are presented in the table in Appendix 2.2

The positions of the boreholes are given on the Borehole Location Plan in Appendix 4.

A Site Location Plan is given in Appendix 5.

Ground levels at the borehole were estimated from the survey drawing provided.

Appendix 1 contains statements of the Terminology used in

Soil Descriptions

Standard Penetration Tests

Dynamic Probing (Continuous Dynamic Sounding)

Concrete in Aggressive Conditions

6. LABORATORY TESTING

A testing programme was agreed with the project engineer and the tests were carried out as specified by B.S. 1377:1990 Methods of Test for Soils for Civil Engineering Purposes.

The following tests were undertaken:-

Moisture Content	9	Undrained Unconsolidated Triaxial Test 84mm Multi Stage	4	Soluble Sulphate Content of Soil	4
Plasticity Index	2			pH Value	4

(The Sulphate Contents are reported as SO₄ for ease of use with BRE Digest 363 and BRE Special Digest 1.

Scientific Analysis Laboratories (SAL) carried out chemical contamination tests on seven selected samples.

Comprehensive – Suite 1 – 5 Tests	SOIL LOD mg/kg	WATER LOD mg/l
Total Metals : As, Cd, Cr, Pb,Hg,Se,Cu,Ni,Zn	1	0.05
Water Soluble Boron (1)	1	0.05
Hexavalent Chromium	0.1	0.03
Total Cyanide	2.5	0.05
Free Cyanide	2.5	0.05
Thiocyanate	1	0.2
Total Sulphate ²	50	3
Sulphide	5	0.01
Total Sulphur	0.01%	0.1
pH	2dp	2dp
PAHs - 16 USEPA Priority Pollutants by GC	0.05	0.01 ug/l
Phenols	0.01	0.01
Leachate test on Soil – Suite 5 – 2 Tests	As above	
Asbestos – Suite 6 – 2 tests	Visual	

The results of all the geotechnical and the chemical contamination tests are presented in Appendix 3.

7. SUMMARY OF GROUND CONDITIONS

The CDSa (continuous dynamic sampling), show the following sequence of strata.

Topsoil	Absent in BH1 and BH7. Present as a dark brown sandy clayey topsoil with some to abundant roots.
Made Ground	In BH1 present from surface to 0.45m general household rubbish including carpet and plastic sheet. In BH3 from 0.4-1.4m clayey gravelly mudstone Fill. BH6 from 0.5-1.45m clayey mudstone gravel Fill BH7 from surface ash and clinker in clayey mudstone gravel Fill.
Glacial Clay	Present in all boreholes to the completion depth (4.45m) comprising a fine sandy gravelly Clay with subordinate bands of clayey gravel (mostly mudstone). Generally stiff, locally very stiff with the Undrained Shear Strength (C_u) in the range 84-171kN/m ² . In BH3 the triaxial test at 3.5m had a large pocket of slightly clayey gravelly sand that would account for the $C_u = 25\text{kN/m}^2$ in the laboratory result. The N_{300} result is in the range 15-31. In BH4 at 4.0m the N_{300} was 96 in the clayey weathered Mudstone (See BHA)
Bedrock	The bedrock comprises Mudstone with interbedded coal. The location of the coal seams are given in the following table. No voids were encountered during the boring. During boring the air from the borehole was monitored for gases (methane oxygen, carbon dioxide and hydrogen sulphide) No harmful gases (CH_4 or H_2S) were recorded

Borehole	Depth to Top	Thickness m	Reduced Level to Top mAD	Reduced Level to Top mAD	Borehole	Depth to Top	Thickness m	Reduced Level to Top mAD	Reduced Level to Top mAD
BHA	13.75	0.55	83.25	82.70	BHB	8.30	0.70	88.40	87.70
BHA	18.90	0.60	78.10	77.50	BHB	15.45	0.80	81.25	80.45
BHA	20.60	0.65	76.40	75.75	BHB	20.60	0.65	76.10	75.45
					BHB	22.80	0.40	73.90	73.50

Note depths and thickness from drillers records.

No groundwater was identified in the shallow Continuously Dynamic Sampler boreholes and any groundwater in the bedrock would be masked by the water flush used to advance the borehole.

8. GEOTECHNICAL ASSESSMENT

Foundation Assessment – Mining Related Issues

The two deep rotary openhole boreholes did not encounter any voids indicating that although coal seams are present in the upper 30m none had been exploited. Thus any mining related ground movement would have emanated from the deeper seams. The last workings under the site is given in the CA report as 1912.

The CA report shows a mine shaft in the area of land to the south of the development plot in the garden of Lygad yr Haul. A second shaft is shown on the boundary of Lygad yr Haul and the abandoned railway line.

Shaft reference 327342-203 is outside of the development plot and has not been investigated in this study. Both BH1 and BHA located on the southern boundary of the site did not encounter materials that would be associated with the excavation of a mineshaft and the disposal of mudstone spoil. The depth to bedrock is 5.8m and we would conclude that the house at plot 1 would not be in the influencing distance of the shaft should there be any collapse of the shaft cover infill materials.

It should be remembered that the location of the old shaft will appear on the legal searches for the conveyance of most of the houses on the development. The CA use a 20m search radius in showing abandoned mine entries.

We would conclude that although the house at plot 1 is outside of the zone of influence of the potential collapse zone of the mine shaft basic protection measures should be included in the structural foundations of the house.

Foundation Assessment

Plot 1-2

This plot lies on the southern boundary and lies closest to the location of the recorded mine shaft. The mineshaft lies on the adjacent property and has not been investigated as part of this report. However, we conclude that the proposed house location should be outside of the area of influence if the shaft surface infill should collapse. The bedrock is 5.8m below the current ground level.

The following comments were provided by the design engineer. Provided the ground is consistent at the base of the excavations, then a 2m trench fill can be provided to PLOT 1 only before constructing reinforcement strips. The trench fill will step up along the length of garage to plot 1 to a normal foundation depth (900mm) at PLOT 2.

For Plot 1, the strips are designed for a 5m crown hole to allow for possible shaft collapse, the remainder of the properties will be designed for a 3m void.

Plot 3

The detached house at this location will lie in the area where there the deepest Made Ground is present. The deepest Made Ground is associated with the culverting of the open stream course identified on the historical maps. The borehole had identified Made Ground to 1.4m composed of mudstone gravel in a sandy clay matrix. The adjacent hand excavated contamination sampling pit identified some ash cinder pottery and metal fragments in the upper 1m. There is firm brown fine sandy fine gravelly Clay from 1.4-2.0m where we feel that the sediment of the old water course was met. From 2.0-2.2m is a soft very sandy gravelly Clay. From 2.2m is stiff and firm-stiff fine sandy gravelly Clay.

Use a reinforced strip foundation on mass trenchfill concrete to pass through the Made Ground and weaker sediments to found on the Stiff Clay at 2.5m. At this depth the allowable bearing capacity should be limited to 125kN/m^2 to take account of the weaker horizon from 3.0-3.5m.

Plots 4 and 5

In this area there is stiff Clay at shallow depth. The Undrained Shear Strength (C_u) results are 171kN/m^2 (BH5 @1.5m) and the N_{300} values are 16/16/31 for BH4 and 19/15/21 for BH5. There is a 200mm band of f-c sandy gravelly Clay at 2.6-2.8m. We would suggest that a reinforced strip foundation at 1.0m with a bearing pressure of 100kN/m^2 . There is a thin soft band of clay at 1.6m below footing level. The dispersed bearing pressure will not overload this band leading to any loss of structural integrity.

Concrete in Aggressive Ground

With reference to BRE Special Digest 1 the site should be considered as brownfield with mobile groundwater.

The testing for sulphates shows low concentration of soluble sulfate in the Made Ground. The pH of the soil (Made Ground) is acid with the minimum pH of 4.5.

The natural Glacial Till has a low sulfate and a slightly acidic to neutral pH

For Plots 1/2 and Plots 4/5 the Site Design Sulphate Class is DS1 and the Aggressive Chemical Environment for Concrete (ACEC) is AC1.

For Plot 3 the Site Design Sulphate Class is DS1 and the Aggressive Chemical Environment for Concrete (ACEC) is AC3Z to account for acidic groundwater protection.

9. CONTAMINATION ASSESSMENT

CONTAMINATED SOIL

The current legislation for the assessment of Contaminated Land is Part IIA of the Environmental Protection Act (1990) Contaminated Land Regime and the development controls of the relevant Town and Country Planning acts. EA/DEFRA has produced four reports and assessment software to assist in the assessment of the potential harmful effects of contaminated land to the users of the land and the risk to the general environment. The EA/DEFRA has withdrawn all published SGV (Soil Guidance Values) for certain target compounds and contaminants and these are used for a Generic Risk Assessment. Updated TOX reports have been issued.

For assessment of the results of contamination tests we make reference to the Atrisk^{Soil}© commercial database for Generic Assessment Criteria (GAC). Atkins have derived ATRISK^{soil} SSVs based on the 2009 SC050021/SR3 "Updated background to the CLEA model and SC050021/SR2 (the TOX report) for commercial/industrial, residential without plant uptake and residential with plant uptake. We have based these on the default assumptions provided in the CLEA report which we understand will be used in development of the Soil Guideline Values by Defra and the Environment Agency.

In the assessment of the results of testing comparisons to publish Generic Assessment Criteria from EA published SGV (Soil Guidance Value) for certain target compounds and the Atkins AtriskSoil© database of Generic Assessment Criteria's (GAC).

The disposal of construction spoil that is considered waste will need to be assessed in line with current Land Fill regulations. The Landfill (England and Wales) (Amendment) Regulations 2004 have introduced a set of analysis requirements for the classification of waste into

- Inert Waste
- Non-reactive hazardous Waste
- Hazardous Waste.

If excavation spoil is to be taken off site for disposal additional testing for the Waste Acceptance Criteria will be required.

This investigation of contaminated soil must only be considered as the preliminary phase of works where there is an identified contamination hazard. The results of the analyses of a sample can only be relied on as evidence as to what is in the sample and not what may be in the surrounding or adjacent area. Additional works may be necessary to assess the hazard of any contamination on site and the local environmental impact. Additional investigation may be necessary to evaluate the extent and hence volume of any contaminated soil. The assessment of the contaminated soil must take account of the limited access as part of the of the contamination investigation.

The site has not been identified as having an historical contaminative land use. The historical mapping has shown that along the northern boundary of the site there was the course of an open stream that has since been culverted. The culverting appears to have made use of general fill of mine spoil mudstone/shale from the general area mixed with ash and cinders with some brick. Therefore HD3 and BH6 and BH7 were targeted in the area of the identified deeper filled ground. The site as a whole was the rear garden to the Lygad yr Haul to the south of the development site.

Summary of results

Contaminants	Results (mg/kg) Five samples	CLEA Residential (Plant uptake) Soil Guidelines Values (SGV) and Atkins Soil Screening Values (SSV) 6% Soil Organic Matter
Arsenic	22-61	32mg/kg (SGV)
Beryllium	<2 - 7	61mg/kg (SSV)
Cadmium	1-3	10mg/kg (SSV)
Chromium	26-46	Based on CrVI
Chromium VI	<1	14.7mg/kg (SSV)
Copper	58-190	4020mg/kg (SSV)
Lead	160-320	322mg/kg (SSV)
Mercury	<1	170Inorganic mg/kg (SGV)
Nickel	31-90	130mg/kg(SSV)
Selenium	<3	350mg/kg (SGV)
Vanadium	41-96	115 mg/kg (SSV)
Zinc	140-680	172000 mg/kg (SSV)
pH	6.8-7.3	5-9 *
Total PAH (16)	0.6-31	-
Benzo(a)Pyrene	<0.1 – 2.1	1mg/kg (SSV)
Naphthalene	<0.1-0.5	8.7mg/kg s (SSV)
Asbestos Visual Assessment	No fibres were identified.	

SGVs represent 'intervention values'; and provide indication that soil concentrations above this level might represent an unacceptable potential risk to the health of site-users, depending on land-use and that further investigation and possibly remediation is required (copper and zinc are known to be phytotoxic in nature and not covered under CLEA).

Atkins has developed Soil Screening Values (SSVs) applicable to the UK for common contaminants not currently covered by SGVs issued by Defra and the Environment Agency. Full justification is provided to support their use.

In general, the results show that the site has a low risk of Significant Potential of Serious Harm for the proposed residential end use.

The arsenic result for HD3 at 0.5m(61mg/kg) exceeds the Soil Screening Values (SSVs) of 32mg/kg. The sample is taken from firm brown clay fill with carbonaceous mudstone gravel. The gravel is the likely origin of the elevated levels of arsenic. This is known to have been filled during the culvert construction.

No suspicious fibres were noted during the fieldwork. Two samples from HD3 (Plot3) and BH7 (northern boundary) were screened for Asbestos fibres. No fibres were detected.

Two samples from BH3 and BH7 were selected for leachate testing. A summary of the results can be found below. As noted above the site has a culverted stream along the northern boundary.

Substance	BH3 - ES1 - 1.0m (ug/l)	BH7 - ES1 - 0.25m (ug/l)	EQS - All Freshwater - Hardness band 100-150mg/l	EQS - All Freshwater - Hardness band >150 - 200mg/l	EQS - All Freshwater - Hardness band >200-250mg/l
Arsenic	0.4	4.6	50µg/l	50µg/l	50µg/l
Cadmium	0.17	0.05	5µg/l	5µg/l	5µg/l
Chromium	<1	3	20µg/l	200µg/l	250µg/l
Copper	4.3	11	10µg/l	10µg/l	10µg/l
Lead	<0.3	2.2	10µg/l	20µg/l	20µg/l
Mercury	<0.05	<0.05	1µg/l	1µg/l	1µg/l
Nickel	10	4	150µg/l	150µg/l	200µg/l
Selenium	0.6	0.5	-	-	-
Vanadium	<2	4	20	20	60
Zinc	21	13	75µg/l	75µg/l	75µg/l
PAH – Naphthalene	0.05	0.07	10µg/l for Naphthalene	10µg/l for Naphthalene	10µg/l for Naphthalene

The leachate analysis has been compared to Environmental Quality Standards (EQS) data from the Environmental Agency. Groundwater toxicity is related to hardness with higher toxicity in softer water. We have no hardness data for the area so the site has been compared to a range of hardness bands.

In summary the results from the leachate analysis show very low concentrations. BH7 has recorded Copper at 11ug/l, which slightly exceeds the EQS value of 10ug/l. The remainder of the results do not exceed the relevant EQS values.

10. CONCLUSIONS and RECOMMENDATIONS

The development site lies with the plot of Llygad yr Haul and occupied the extended garden of the house. The general area can be seen to have had major industrial activity of coal/ironstone/fireclay mining and extensive iron foundries.

During the walkover inspection it was apparent that the northerly portion of the plot has been covered or uplifted with imported mudstone shale and cinder and ash.

The risk to human health is assessment using 'source' – 'pathway' – 'receptor' - 'models'.

Plots 1, 2, 4 and 5

This area generally consists of topsoil 0.4-0.5m thick over natural glacial clay. The contamination testing was carried out in all of the proposed gardens / soft landscaped areas. Testing carried out in the southern 2/3 of the site (Plots 1, 2, 4, 5) has shown toxic metal/Polycyclic Aromatic Hydrocarbon (PAH) levels below the relevant Soil Screening Values (SSVs).

As part of the construction phase, there will stripping of the surface material. It is advised that the topsoil encountered in the southern 2/3 of the site is stockpiled. The topsoil should have validation testing undertaken to determine if the soil has a potential for re-use in gardens and soft landscaping on site.

If the validation testing of the existing topsoil does not show it to be suitable then a validated topsoil from an off site source should be used. The number of tests should be one sample for every 200m³ from proven 'greenfield' sources and one sample every 50m³ from 'unknown', 'mixed' or 'brownfield' sources.

The topsoil layer within the new garden areas (except plot 3) will be placed directly onto natural glacial clay, the thickness should be 300mm. A thinner topsoil layer may create waterlogging.

Any Made Ground encountered should be stockpiled separately, tested and assessed whether it can remain on site.

Northern Boundary (Plot 3)

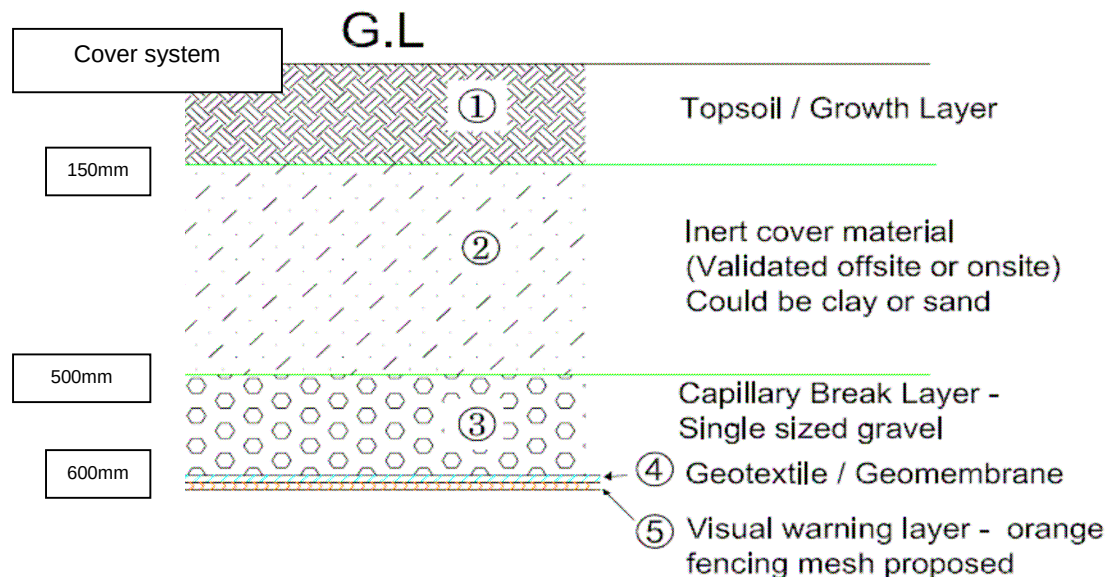
The contamination testing carried out along the northern boundary has shown the underlying material to be containing metal concentrations (Arsenic) that may pose a risk to the end users of the site i.e. high risk (young children) if left at surface.

Underlying the footprint of the proposed properties and under hard landscaped areas (footpaths, driveways) the pathway between the underlying soils and the end-users of the site is broken and therefore there is no risk. However, within the gardens and soft landscaped areas, the soils will be exposed and the pathway remains.

A cover system is proposed for Plot3 and the soft landscaped areas along the northern boundary, which will separate the receptor from the source. The cover system should consist of a growth layer (topsoil) typically 150mm thick, over inert material (sand or clay) overlying capillary break layer – a compacted single sized granular layer (~100mm).

In addition to the cover system, it is proposed that a geotextile layer should be installed at the intersection between the made ground and cover system. This will further limit the risk of future users encountering the underlying contaminated soils.

The growth layer and inert layer must have validation testing carried out to verify that the material is suitable to be used on site. It is best practice to carry out this testing prior to being installed as part of the cover system. However, generic test certificates issued by the supplier would not be suitable, as these are not material specific. If the existing topsoil material on site is validated to be clean then this material can used within the cover system.



Due to the nature of the Made Ground material in Plot 3 in the NW corner of the site, the minimum thickness of cover system should be 600mm. It is understood that ground levels are going to be raised as part of the construction phase and the northern areas may be raised in excess of 600mm. The communal soft landscaped areas along the northern boundary will have a cover thickness of 450mm.

Validation testing of the existing topsoil and the cover system within the northern areas will comprise of a toxic metal and Polycyclic Aromatic Hydrocarbon (PAH) suite.

Leachate Analysis

The testing was carried out on the Made Ground material in the northern part of the site. One sample was carried out from BH3 at 1.0m and one from BH7 at 0.25m. BH3 consists of firm brown clay with mudstone gravel. BH7 consists of dark brown clay Fill with ash and cinder fragments.

The leachate testing has shown generally low levels of toxic metals and Polycyclic Aromatic Hydrocarbon (PAH) however there is a slight exceedance of copper from BH7 when compared to the Environment Agency EQS values.

STANDARD REFERENCES

British Standards Institute (1999) BS 5930:1999, Code of practice for site investigations. Incorporating Amendment No. 2:2010 as partially replaced by:

BS EN 1997-2:2007: Eurocode 7. Geotechnical design. Ground investigation and testing

BS EN ISO 22475-1:2006: Geotechnical investigation and testing. Sampling methods and groundwater measurements. Technical principles for execution

BS EN ISO 14688-1:2002: Geotechnical investigation and testing. Identification and classification of soil. Identification and description

BS EN ISO 14688-2:2004: Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification

BS EN ISO 14689-1:2003: Geotechnical investigation and testing. Identification and classification of rock. Identification and description

BS EN ISO 22476-2:2005: Geotechnical investigation and testing. Field testing. Dynamic probing

BS EN ISO 22476-3:2005: Geotechnical investigation and testing. Field testing. Standard penetration test

APPENDICIES

APPENDIX 1

STANDARD STATEMENTS

Terminology used in Soil Descriptions

Standard Penetration Tests

Concrete in Aggressive Conditions

APPENDIX 2 RECORDS OF FIELDWORK

APPENDIX 2.1 Boreholes



RECORD SHEET SYMBOL KEY

SAMPLES/TESTS

U	Undisturbed 100mm open tube driven sample (depth records recovered length from start of test). OS-T/W(100mm with liner) * Indicates a sample with Nil Recovery {x.xx} indicates the water at the sample depth.
D	Small disturbed sample (depth records the interval of sample).
ES EW	Environmental samples (SOIL/WATER). Small disturbed samples for contamination analysis comprising glass and plastic tubs.
B	Large disturbed sample (Bulk) depth records recorded interval.
S	Standard penetration test (SPT; BS EN ISO 22476-3) recovered as a small disturbed sample. * Indicates a sample with Nil Recovery. {x.xx} indicates the water at the sample depth.
C	Solid Cone Penetration test, in rock and coarse granular soils.
W	Water sample.
L	Continuous Dynamic Sample 84mm 1.0m long

FIELD RECORD COLUMN

This column is used to present depth related information of site activity. The column will always show progress, details of water strikes and rises, field records of the SPT test and the Undisturbed sample blows. Other data may be present in this column and details of codes will be given in the remarks box at the bottom of the record sheet page.

Water Level Codes

M1 2.00	Water strike (with sequential number of the strike) recorded depth.
T1 1.90	Temporary rest level after 20 minutes with recorded depth.

Progress Codes

-{07/08/2002}	Records the date at the depth of the borehole when the borehole takes more than one day to complete. Also indicated on completion. Recorded for start of second day and subsequent shifts.
(TSL 3.00m)	Represents the water rest level at the start of the shift (AM) or the end of the borehole shown with the date of observation.

Field Records

1,2-3,4,5,6	Detailed SPT records for each 75mm test interval (incomplete penetration tests will be recorded showing blows for measured penetration).
[U60]	U100 open tube sampler blows to drive the sampler the full length

ROTARY CORE DRILLING RECORDS

Details of the rock fracture state are given in the Mechanical Log portion of the sheet SCR TCR and RQD are described in BS EN ISO 22475-1 (and BS 5930 Section 44.4.4) If is average fracture spacing over a particular lithology, Where the core is fully broken 0 indicates Non-Intact

MONITORING INSTALLATIONS

Standpipe piezometer or groundwater monitoring wells and water level information may be shown on the standard record sheet or a separate installation sheet. Bentonite seals, filter zones and installation depths are indicated. Details of installation are given in the report.

Legend symbols are those given BS5930:1999 (ISO 710-1-7) but for clarity may only the show major constituent.

Strata descriptions are compiled by visual examination of samples obtained during boring, after BS EN 14689-1:2003 and BS EN ISO 14689-1:2003: Geotechnical investigation and testing. Identification and classification of rock. Identification and description. Laboratory test results where applicable.

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BH3

Equipment and methods

Continuous Dynamic SamplingJob No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

22/02/2011**22/02/2011****4.45m****115mm****2.00m**

FIELD RECORDS	Samples / Tests					Description	Depth & Thickness m	Strata Reduced Level (m)	Legend
	Casing (Water) Depth (m)	Depth (m) from	to	SAMPLE Type & No	SPT (N) {Cu}				
1, 2- 1 ,0 ,2 ,0 									

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BH4

Equipment and methods

Continuous Dynamic SamplingJob No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

21/02/2011**21/02/2011****4.45m****115mm****2.00m**

FIELD RECORDS	Samples / Tests					Description	Strata		
	Casing (Water) Depth (m)	Depth (m) from to		SAMPLE Type & No	SPT (N) {Cu}		Depth & Thickness m	Reduced Level (m)	Legend
2, 4- 4 ,3 ,4 ,5 <									

Remarks

- 1) CAT services screen no inspection pit
 - 2) Borehole dry
 - 3) Casing refused at 2.00m
-) Hand jack out sampler at 4.00m

Logged by
ATDrilled by
JF

Ground level

96.80mAD

Co-ordinates:

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BH5

Equipment and methods

Continuous Dynamic SamplingJob No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter
115mm

Casing

Depth
2.00m**21/02/2011****21/02/2011****4.45m**

FIELD RECORDS	Samples / Tests					Description	Depth & Thickness m	Strata Reduced Level (m)	Legend
	Casing (Water) Depth (m)	Depth (m) from	to	SAMPLE Type & No	SPT (N) {Cu}				
3, 3- 4 ,4 ,5 ,6	1.00	1.00	1.45	S 1	(19)	Grass over brown clayey TOPSOIL with root material	(0.35)	96.45	
						Stiff yellow brown fine sandy slightly fine gravelly CLAY. Gravel is subangular to angular	0.35		
						Very stiff brown fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular and of sandstone mudstone	0.80		
3, 3- 3 ,4 ,4 ,4	2.00	2.00	2.45	S 2	(15)		(1.35)	96.00	
2, 3- 3 ,5 ,7 ,6	2.00	3.00	3.45	S 3	(21)	Stiff yellow brown and grey banding fine sandy fine to coarse gravelly CLAY. Gravel is subrounded to subangular and of mudstone	(0.45)	94.65	
						Soft grey fine to coarse sandy fine gravelly CLAY. Gravel is subangular	2.60		
						Stiff grey brown fine sandy fine to coarse gravelly CLAY. Gravel is subangular to angular and of mudstone	(0.20)		
						Firm grey fine to coarse sandy fine gravelly CLAY. Gravel is subangular	2.80		
2, 4- 5 ,4 ,5 ,5	2.00	4.00	4.45	S 4	(19)		(0.20)	94.00	
--{21/02/2011}--						Very stiff fine sandy fine to coarse gravelly CLAY. Gravel is subangular to subrounded and of mudstone to sandstone	(0.30)	93.80	
							3.30	93.50	
							(1.15)	92.35	
						Borehole Complete	4.45	92.35	

Remarks

- 1) CAT services screen no inspection pit
- 2) Borehole dry

Logged by
ATDrilled by
JF

Ground level

96.80mAD

Co-ordinates:

07/03/2011 08:13:15

SS- cable per -06/06 Rev a1

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BH6

Equipment and methods

Continuous Dynamic SamplingJob No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

22/02/2011**22/02/2011****1.45m**

FIELD RECORDS	Samples / Tests				Description	Depth & Thickness m	Strata Reduced Level (m)	Legend
	Casing (Water) Depth (m)	Depth (m) from to	SAMPLE Type & No	SPT (N) {Cu}				
1, 1- 2 ,2 ,2 ,3 --{22/02/2011}--		1.00 1.45	S 1	(12)	Grass over dark brown clayey TOPSOIL with thick root material	(0.50)		
					MADE GROUND of light brown fine sandy fine angular flat mudstone gravel FILL MADE GROUND of dark grey fine sandy fine to medium angular flat mudstone gravel FILL	0.50 (0.10) 0.60		
					Borehole Abandoned	1.45		

Remarks

1. Borehole dry
2. Borehole abandoned at 1.45m in mudstone

Logged by

AT

Drilled by

JF

Ground level

Co-ordinates:



Location **Meredith Close Acrefair, Wrexham**

Client: **Ventura Developments**

Project Ref.:

Borehole No.

BH7

Equipment and methods

Continuous Dynamic Sampling

Job No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

22/02/2011

22/02/2011

1.45m

FIELD RECORDS	Samples / Tests				Description	Depth & Thickness m	Strata Reduced Level (m)	Legend
	Casing (Water) Depth (m)	Depth (m) from to	SAMPLE Type & No	SPT (N) {Cu}				
1, 1- 2 ,1 ,2 ,1 <								

Remarks

- Borehole dry
- Borehole abandoned at 1.45m in mudstone

Logged by

AT

Drilled by

JF

Ground level

Co-ordinates:

APPENDIX 2.2 Rotary Open Hole Borehole record sheets

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BHAEquipment and methods **ODEX Open Hole**Job No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

16/02/2011**16/02/2011****30.00m**

Field Records	Drilling Records		In situ Tests		Description	Depth & Thickness m	Strata		Legend
	{Casing} Core Dia. mm	Depth (m)					Reduced Level (m)		
- {16/02/2011} -		0.45	D	1	No Returns CLAY with gravel	(0.45) 0.45	96.55		
						(3.95)			
		3.00	D	2					
		4.40	D	3		4.40	92.60		
					Gas Test at 4.40m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(1.40)			
		5.80	D	4	Weathered MUDSTONE	5.80	91.20		
					Grey weathered MUDSTONE				
					Gas Test at 7.40m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(2.90)			
		8.70	D	5		8.70	88.30		
					Light brown MUDSTONE				
					Gas Test at 10.40m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(5.05)			
		11.20	D	6					
					Gas Test at 13.75m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	13.75	83.25		
		14.30	D	8	Coal with mudstone traces	(0.55) 14.30	82.70		
		15.60	D	9	MUDSTONE				
					Gas Test at 17.75m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(4.60)			
		18.90	D	10		18.90	78.10		
		19.50	D	11	COAL	(0.60) 19.50	77.50		
					MUDSTONE	(1.10)			
		20.60	D	12		20.60	76.40		
					Gas Test at 20.60m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(0.65) 21.25	75.75		
		22.10	D	13	COAL	(0.85) 22.10	74.90		
					MUDSTONE				
					MUDSTONE with coal traces				
					Gas Test at 23.60m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(2.30)			
		24.40	D	14		24.40	72.60		
					MUDSTONE				
		26.20	D	15					
					Gas Test at 26.60m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(5.60)			
		29.20	D	16					
					Borehole Completed	Gas Test at 30.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	30.00	67.00	

Remarks 1) CAT services screen no inspection pit
2) ODEX drilled in drift Air flush
3) Bedrock drilled with CRB tap water flush

Logged by **AT** Drilled by **ID**
Ground level
97.00mAD
Co-ordinates:

Location **Meredith Close Acrefair, Wrexham**Client: **Ventura Developments**

Project Ref.:

Borehole No.

BHBEquipment and methods **ODEX Open Hole**Job No.: **15067**

Start Date:

End Date:

Final Depth:

Diameter

Casing

Depth

17/02/2011**18/02/2011****30.00m**

Field Records	Drilling Records		In situ Tests		Description	Depth & Thickness m	Strata		Legend
	{Casing} Core Dia. mm	Depth (m)					Reduced Level (m)		
- {18/02/2011} -		0.40	D	1	MADE GROUND of Hardcore FILL	(0.40)	96.30		
					MADE GROUND of soil stone FILL	0.40			
		1.50	D	2		(1.10)	95.20		
					MADE GROUND of clay and mst FILL	1.50			
		2.25	D	3		(0.75)	94.45		
					CLAY with gravel	2.25			
						(3.95)			
		4.70	D	5					
		6.20	D	6	SAND CLAY and GRAVEL	6.20	90.50		
		6.70	D	7		(0.50)	90.00		
					CLAY and gravel	6.70			
						(1.00)			
		7.70	D	8	CLAY and GRAVEL with sand	7.70	89.00		
		8.10	D	9		(0.40)	88.60		
					Grey MUDSTONE	8.10	88.40		
		9.00	D	10		(0.20)	87.70		
					COAL	8.30			
					Gas Test at 9.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(0.70)	86.60		
		10.10	D	11	Light grey MUDSTONE	9.00	86.10		
		10.60	D	12		(1.10)			
					Dark grey MUDSTONE	10.60			
					Light grey MUDSTONE	(0.50)			
					Gas Test at 12.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(4.85)			
		13.60	D	13					
					Gas Test at 15.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	15.45	81.25		
		15.45	D	14	COAL	(0.80)	80.45		
		16.25	D	15					
					Light grey MUDSTONE	16.25			
					Gas Test at 18.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(4.35)			
		19.30	D	16					
		20.60	D	17	COAL	20.60	76.10		
		21.25	D	18		(0.65)	75.45		
					MUDSTONE	21.25			
						(1.55)			
		22.80	D	19	COAL	22.80	73.90		
		23.20	D	20		(0.40)	73.50		
					Light brown MUDSTONE	23.20			
					Gas Test at 24.00m - O2 - 20.9, LEL - 0.0, H2S - 0.0, CO - 0.0	(1.10)	72.40		
		24.30	D	21	Light grey MUDSTONE	24.30			

APPENDIX 2.3 Detailed Results of Standard Penetration Tests

Client: Ventura Development Limited



Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Detailed SPT Summary

Borehole Number	Depth m	Test Type	Sample Ref	Sample Description	SPT N Value	Depth to water	Depth of casing at test depth	Increment 1		Increment 2		Increment 3		Increment 4		Increment 5		Increment 6		Extrapolated SPT N Value
								Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		
BH1	1.00	S	1	MADE GROUND of very stiff light brown mottled grey silty fine sandy Clay FILL with angular sandstone fragments	23		1.00	7		7		6		5		5		7		
BH1	2.00	S	2	Very stiff light brown fine sandy fine to coarse gravelly CLAY. Gravel is subangular to angular	21		2.00	2		3		4		4		5		8		
BH1	3.00	S	3	Very stiff brown silty fine sandy slightly fine-coarse gravelly Clay. Gravel is subangular	19		2.00	5		4		5		4		4		6		
BH1	4.00	S	4	Very stiff brown grey fine sandy fine to coarse gravelly CLAY with a band of orange brown fine to coarse grained sand band. Gravel is subangular to angular and of mudstone	96		2.00	4		5		5		44		28		19		
BH2	1.00	S	1	Stiff brown silty fine-coarse sandy fine-coarse gravelly Clay. Gravel is subrounded	15		1.00	3		3		3		4		4		4		
BH2	2.00	S	2	Stiff brown silty slightly fine-medium gravelly Clay. Gravel is subrounded and flat	19		2.00	3		3		5		5		4		5		
BH2	3.00	S	3	Very stiff brown fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular	28		2.00	9		7		7		6		7		8		
BH2	4.00	S	4	Very stiff brown fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular	22		2.00	3		4		5		5		7		5		
BH3	1.00	S	1	Made Ground (black brown and grey highly weathered mudstone as Gravel)	3		1.00	1		2		1		0		2		0		
BH3	2.00	S	2	Made Ground (black and brown silty clayey sandy Fill of angular and subangular mudstone gravel and coal fragments)	4		2.00	1		0		1		1		1		2		

Note: See Appendix sheet in the main report for the explanation of the Extrapolated SPT N Value.

Client: Ventura Development Limited



Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Detailed SPT Summary

Borehole Number	Depth m	Test Type	Sample Ref	Sample Description	SPT N Value	Depth to water	Depth of casing at test depth	Increment 1		Increment 2		Increment 3		Increment 4		Increment 5		Increment 6		Extrapolated SPT N Value
								Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		
BH3	3.00	S	3	Stiff grey brown fine sandy fine to medium gravelly CLAY with a band of fine to medium sandy fine to coarse gravel. Gravel is subangular to angular and of mudstone	20	2.40	2.00	4		3		4		5		5		6		
BH3	4.00	S	4	Stiff grey and yellow brown fine sandy fine to medium gravelly CLAY with a band of fine to medium sandy fine to coarse gravel. Gravel is subangular to angular and of mudstone	30	1.80	2.00	5		5		6		8		8		8		
BH4	1.00	S	1	Brown mottled silty grey fine-medium sandy fine-coarse gravelly Clay. Gravel is subangular	16		1.00	2		4		4		3		4		5		
BH4	2.00	S	2	Brown mottled grey silty fine sandy Clay with some mudstone gravel	16		2.00	4		3		3		3		4		6		
BH4	3.00	S	3	Very stiff yellow brown fine sandy fine to coarse gravelly CLAY. Gravel is subangular to angular and of mudstone	31		2.00	5		5		8		8		7		8		
BH4	4.00	S	4	Very stiff brown grey fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular flat and of mudstone	22		2.00	4		4		5		6		5		6		
BH5	1.00	S	1	Stiff brown fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular and of sandstone mudstone	19		1.00	3		3		4		4		5		6		
BH5	2.00	S	2	Stiff brown fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular and of sandstone mudstone	15		2.00	3		3		3		4		4		4		
BH5	3.00	S	3	Stiff grey fine to coarse sandy fine gravelly CLAY. Gravel is subangular	21		2.00	2		3		3		5		7		6		

Note: See Appendix sheet in the main report for the explanation of the Extrapolated SPT N Value.

Client: Ventura Development Limited



Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Detailed SPT Summary

Borehole Number	Depth m	Test Type	Sample Ref	Sample Description	SPT N Value	Depth to water	Depth of casing at test depth	Increment 1		Increment 2		Increment 3		Increment 4		Increment 5		Increment 6		Extrapolated SPT N Value
								Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		Blows (mm)		
BH5	4.00	S	4	Very stiff fine sandy silty fine to coarse gravelly CLAY. Gravel is subangular to subrounded and of mudstone to sandstone	19		2.00	2		4		5		4		5		5		
BH6	1.00	S	1	Made Ground (dark grey black angular flat mudstone gravel Fill)	12			1		1		2		2		2		3		
BH7	1.00	S	1	Made Ground (dark grey and black angular mudstone gravel with coal fragments)	6			1		1		2		1		2		1		

Note: See Appendix sheet in the main report for the explanation of the Extrapolated SPT N Value.

APPENDIX 2.4 Trial Pits

Client: JAB Design

Job No.: 15086

Site Name. : Egremont Substation, Cumbria

Trial Pit Logs

HD1

Date Drilled – 18/02/2011

Samples;- ES1- 0.20m, ES2- 0.50m, ES3- 1.00m

Depth	Description
Ground Level to 0.25m	Brown clayey TOPSOIL with much root material
0.25m to 1.00m	Yellow brown and brown orange brown mottled fine sandy CLAY

HD2

Date Drilled – 22/02/2011

Samples;- ES1- 0.20m, ES2- 0.50m, ES3- 1.00m

Depth	Description
Ground Level to 0.65m	MADE GROUND of light grey fine to medium sandy clayey subangular to angular limestone gravel FILL
0.65m to 1.00m	Firm yellow brown and brown fine sandy fine to coarse gravelly CLAY. Gravel is subangular flat and of mudstone

HD3

Date Drilled – 22/02/2011

Samples;- ES1- 0.20m, ES2- 0.50m, ES3- 1.00m

Depth	Description
Ground Level to 0.20m	Dark brown ashy fine to medium sandy TOPSOIL
0.20m to 1.00m	MADE GROUND of dark brown fine to medium sandy ash and fine to medium cinder FILL with fine to medium ceramic and metal fragments

Client: JAB Design
Job No.: 15086
Site Name. : Egremont Substation, Cumbria
Trial Pit Logs

HD4

Date Drilled – 15/02/2011

Samples;- ES1- 0.20m, ES2- 0.50m, ES3- 1.00m

Depth	Description
Ground Level to 0.30m	Brown clayey TOPSOIL with thick root material
0.30m to 1.00m	Soft light brown orange brown mottled fine sandy fine to medium gravelly CLAY. Gravel is subangular to angular

HD5

Date Drilled – 15/02/2011

Samples;- ES1- 0.20m, ES2- 0.50m, ES3- 1.00m

Depth	Description
Ground Level to 0.30m	Brown clayey TOPSOIL with thick root material
0.30m to 1.00m	Soft light brown orange brown mottled fine to medium sandy fine to medium gravelly CLAY. Gravel is subangular to angular

APPENDIX 3 LABORATORY TEST RESULTS

APPENDIX 3.1 Summary of Test Results

Client: Ventura Development Limited



Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Laboratory Test Result Summary

					Classification					Triaxial Compression								Chemical					
Location Number	Sample Type No.	Sample Depth Top m	Sample Depth Bottom m	Description	LL	PL	PI	% Retained 425µm	Moisture Content %	Bulk Density Mg/m³	Dry Density Mg/m³	Test Type	Specimen Diameter mm	Specimen Length mm	Lateral Pressure {Deviator Stress} kPa	Cohesion Intercept kPa	Friction Angle	Cu kPa	pH	SO ₄ % Total	SO ₄ mg/l 2:1 Extract	SO ₄ mg/l in Water	Cl ₂ %
BH1	D 1	0.90		light brown mottled grey silty fine sandy Clay	36	19	17	9	17														
BH1	S 1	1.00	1.45	light brown mottled grey silty fine sandy Clay with angular sandstone fragments					18														
BH1	U 1	1.55	1.75	Stiff light brown mottled grey fine sandy slightly fine-coarse gravelly Clay. Gravel is angular and rounded includes coal and mudstone fragments. Mudstone piece 80x50x32mm					11	2.289	2.065	UUM	84	168	25 50 100 {148 169 174}	48	16	84					
BH1	S 3	3.00	3.45	brown silty fine sndy slighlty fine-coarse gravelly Cla. Gravel is subangular					13														
BH2	S 1	1.00	1.45	brown silty fine-coarse sandy fine-coarse gravelly Clay. Gravel is subrounded					14														
BH2	S 2	2.00	2.45	brown silty slightly fine-medium gravelly Clay. Gravel is subrounded and flat					14														
BH3	S 1	1.00	1.45	Made Ground (black brown and grey highly weatehred mudstone as Gravel)					21														
BH3	S 2	2.00	2.45	Made Ground (black and brown silty clayey sandy Fill of angular and subangular mudstone gravel and coal fragments)															4.5		49.38		
BH3	S 2	2.00	2.45	Made Ground (black and brown silty clayey sandy Fill of angular and subangular mudstone gravel and coal fragments)					40														

Client: Ventura Development Limited



Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Laboratory Test Result Summary

					Classification					Triaxial Compression								Chemical					
Location Number	Sample Type No.	Sample Depth Top m	Sample Depth Bottom m	Description	LL	PL	PI	% Retained 425µm	Moisture Content %	Bulk Density Mg/m³	Dry Density Mg/m³	Test Type	Specimen Diameter mm	Specimen Length mm	Lateral Pressure {Deviator Stress} kPa	Cohesion Intercept kPa	Friction Angle	Cu kPa	pH	SO ₄ % Total	SO ₄ mg/l 2:1 Extract	SO ₄ mg/l in Water	Cl ₂ %
BH3	U 1	2.50	2.70	Stiff light brown mottled grey fine sandy slightly fine-coarse gravelly Clay. Gravel is angular and rounded includes coal and mudstone fragments. Mudstone piece 76x55x42mm					12	2.250	2.004	UU M	84	168	25 50 100 {218 241 241}	72	18	120					
BH3	U 1	2.50	2.70	Stiff light brown mottled grey fine sandy slightly fine-coarse gravelly Clay. Gravel is angular and rounded includes coal and mudstone fragments. Mudstone piece 76x55x42mm	34	18	16	22															
BH3	U 2	3.50	3.70	Stiff greyish yellow motteld reddish brown fine sandy fine-medium gravelly Clay with large pocket of wet dark grey slightly clayey f/c gravelly f/c Sand					15	2.160	1.875	UU M	84	168	35 70 140 {37 50 61}	10	9	25					
BH4	S 1	1.00	1.45	brown mottled silty grey fine-medium sandy fine-coarse gravelly Clay. Gravel is subangular															5.5		28.80		
BH4	S 1	1.00	1.45	brown mottled silty grey fine-medium sandy fine-coarse gravelly Clay. Gravel is subangular					12														
BH4	S 2	2.00	2.45	Brown mottled grey silty fine sandy Clay with some mudstone gravel					19														
BH5	U 1	1.50	1.70	Very stiff light brown mottled grey slightly fine sandy slighly fine-medium gravelly Clay. Gravel is angular and subangular mudstone					19	2.078	1.745	UU M	84	168	25 {342}			171					
BH6	S 1	1.00	1.45	Made Ground (dark grey black anfular flat mudstone gravel Fill)															5.5		41.15		

Client: Ventura Development Limited



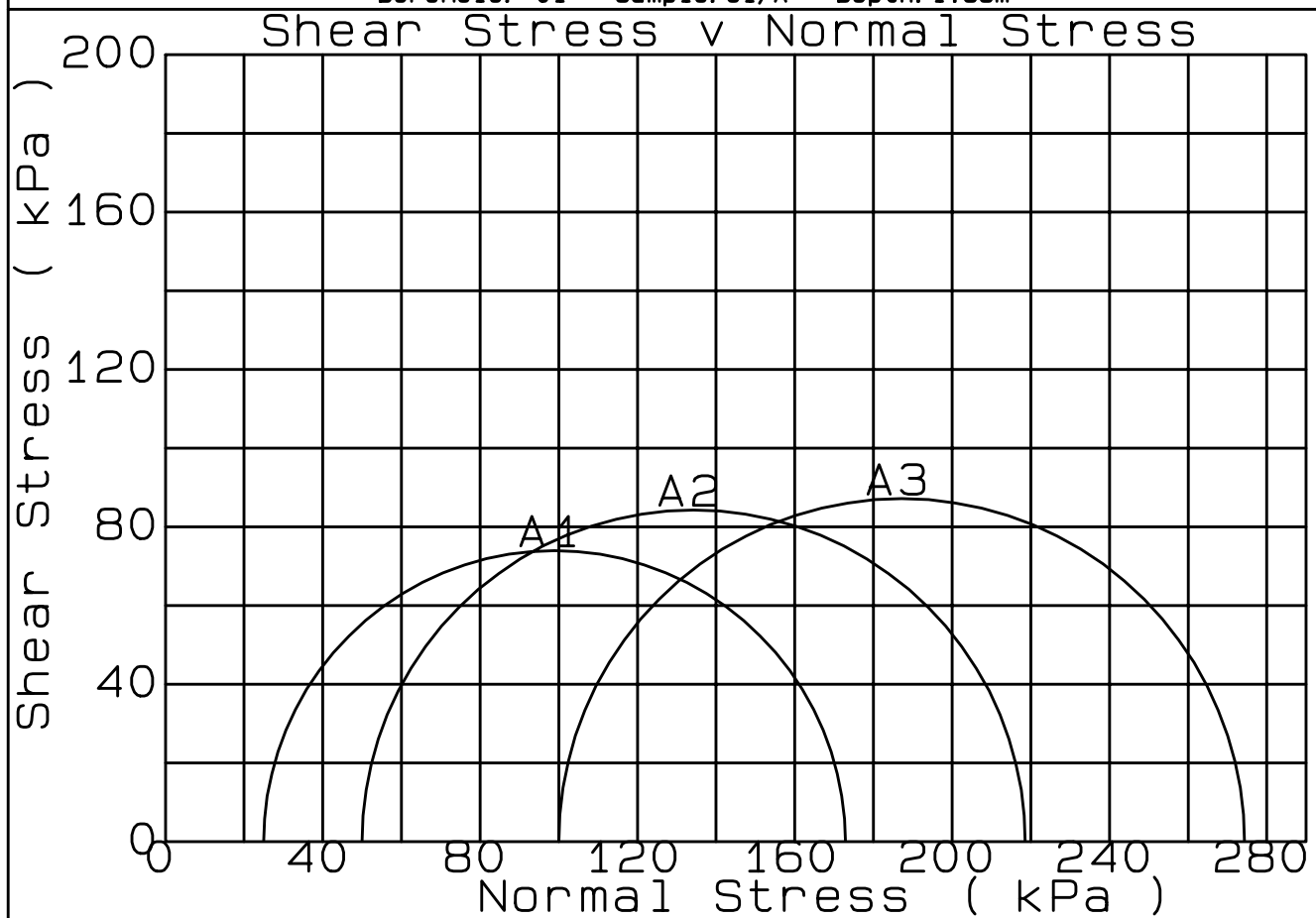
Job No.: 15067

Site Name: Land Adjacent to Meredith Close, Acrefair

Laboratory Test Result Summary

						Classification					Triaxial Compression								Chemical				
Location Number	Sample Type No.	Sample Depth Top m	Sample Depth Bottom m	Description	LL	PL	PI	% Retained 425µm	Moisture Content %	Bulk Density Mg/m³	Dry Density Mg/m³	Test Type	Specimen Diameter mm	Specimen Length mm	Lateral Pressure {Deviator Stress} kPa	Cohesion Intercept kPa	Friction Angle	Cu kPa	pH	SO₄ % Total	SO₄ mg/l 2:1 Extract	SO₄ mg/l in Water	Cl₂ %
BH7	S 1	1.00	1.45	Made Ground (dark grey and black angular mudstone gravel with coal fragments)															5.4		49.38		

APPENDIX 3.2 Triaxial Compression Tests Mohrs Circles

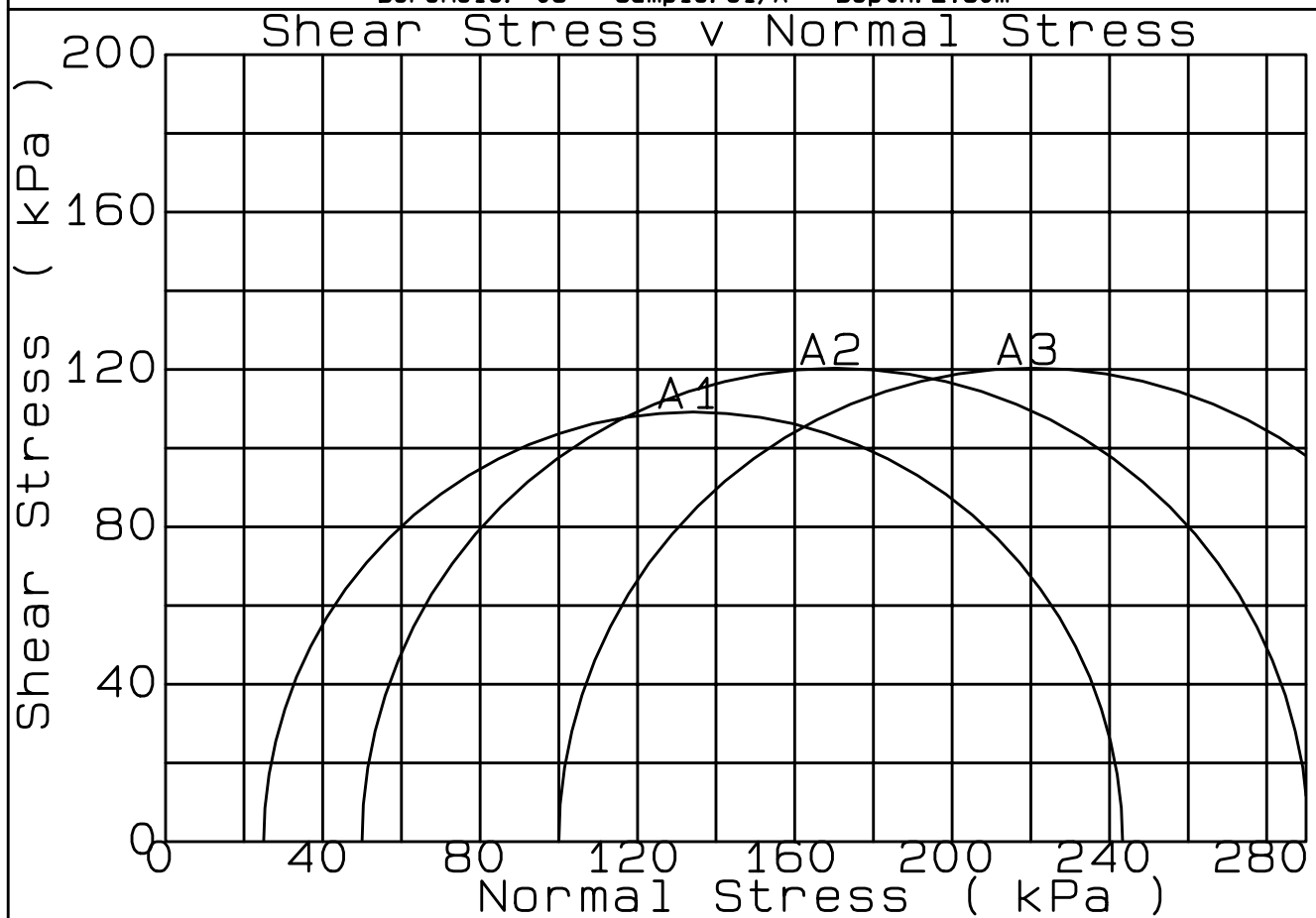
**Reference**

		A1	A2	A3
Height	mm	168.0	168.0	168.0
Diameter	mm	84.0	84.0	84.0
Bulk Density	Mg/cum	2.289	2.289	2.289
Moisture content	%	10.83	10.83	10.83
Dry Density	Mg/cum	2.065	2.065	2.065
Cell pressure	kPa	25	50	100
Loading rate	mm/min	3.886	3.714	3.828
Shear Stress *	kPa	73.9	84.3	87.2
Strain *	%	11.0	0.4	0.4

* At maximum deviator stress

Cohesion (c) 48 or 84 kPa

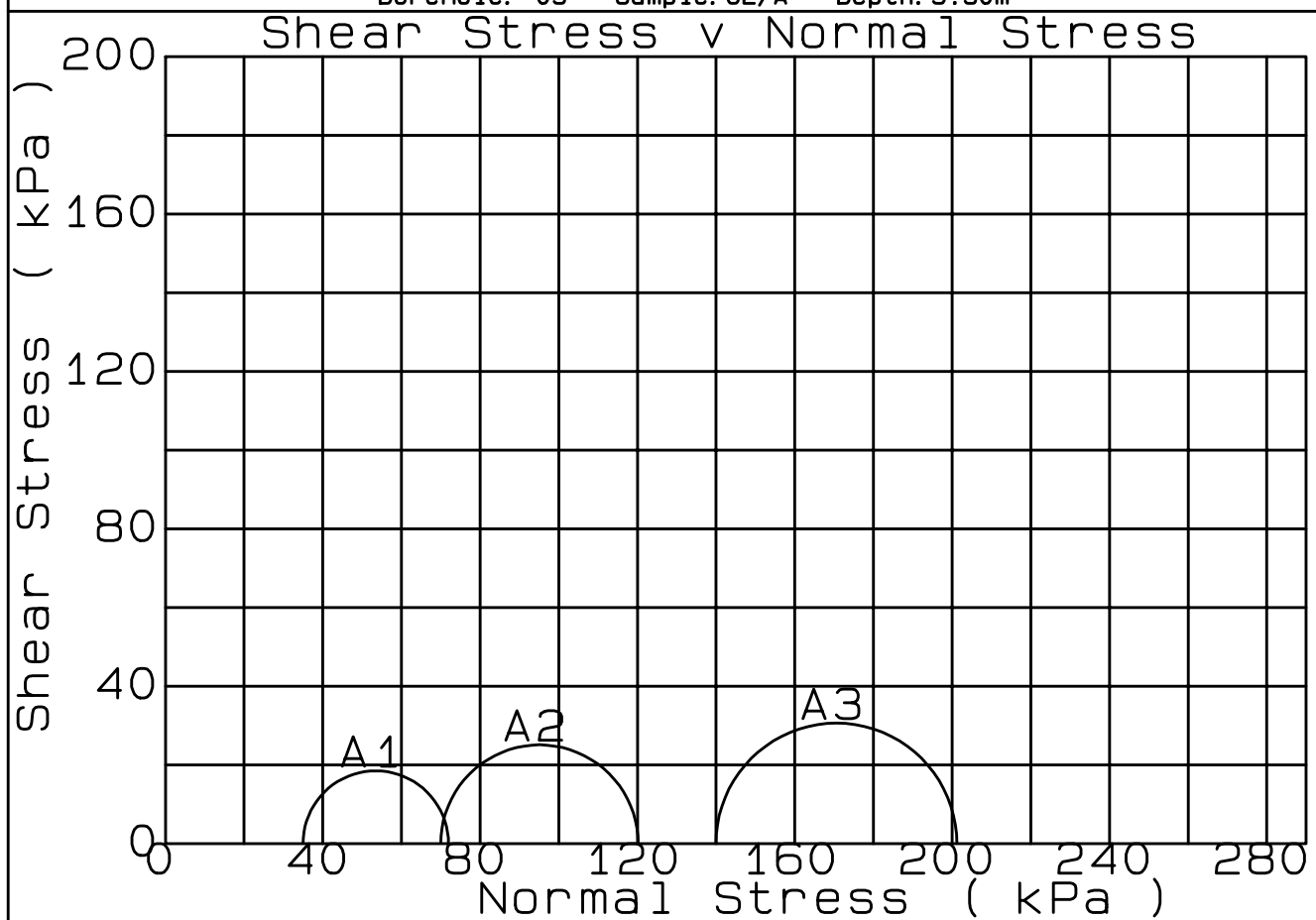
Angle of Shear Resistance (phi) 16 0 deg

**Reference**

		A1	A2	A3
Height	mm	168.0	168.0	168.0
Diameter	mm	84.0	84.0	84.0
Bulk Density	Mg/cum	2.250	2.250	2.250
Moisture content	%	12.28	12.28	12.28
Dry Density	Mg/cum	2.004	2.004	2.004
Cell pressure	kPa	25	50	100
Loading rate	mm/min	3.935	4.050	3.876
Shear Stress *	kPa	109.2	120.3	120.3
Strain *	%	12.5	0.3	0.2

* At maximum deviator stress

Cohesion (c)	72 or 120 kPa
Angle of Shear Resistance (phi)	18 0 deg

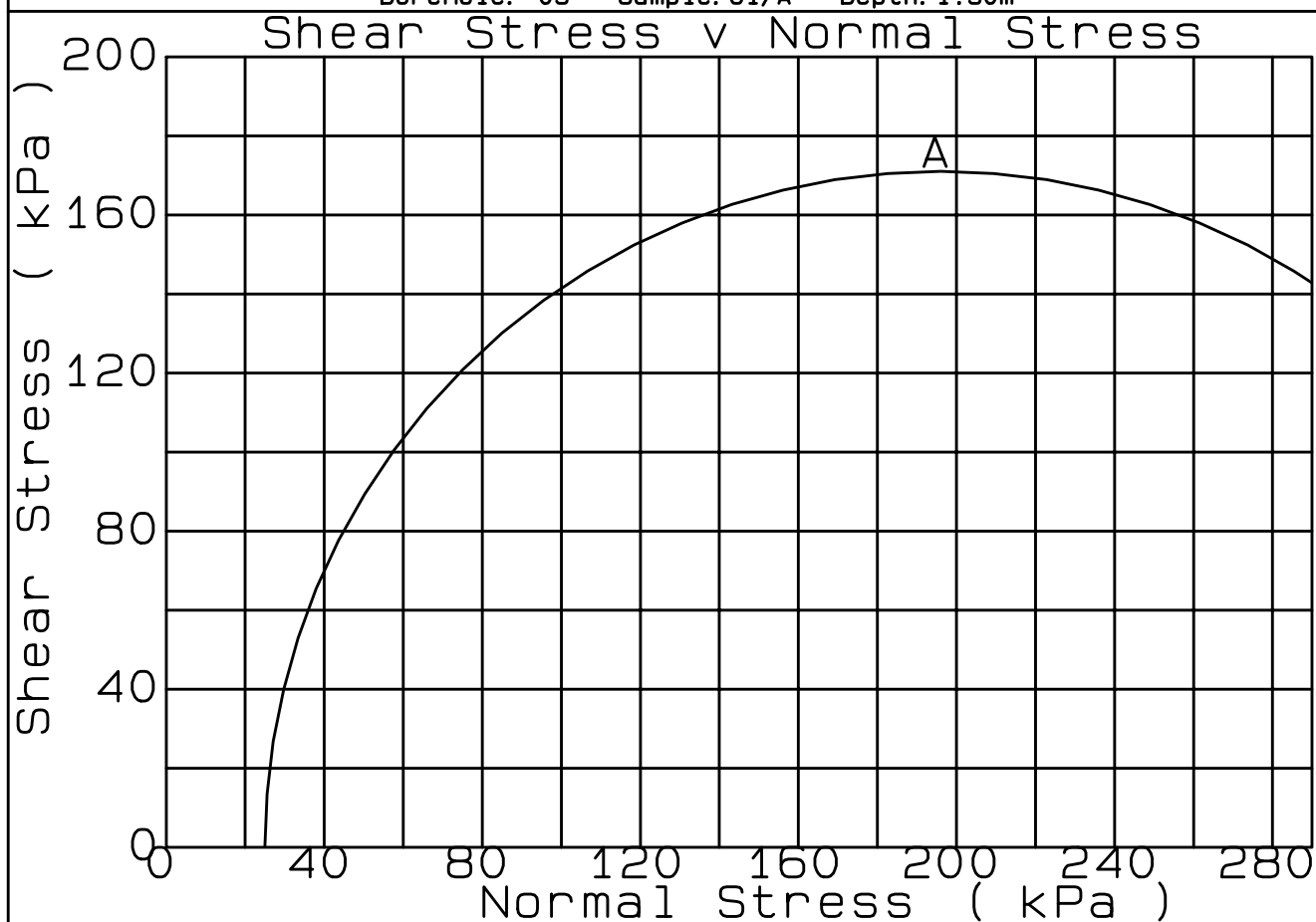
**Reference**

		A1	A2	A3
Height	mm	168.0	168.0	168.0
Diameter	mm	84.0	84.0	84.0
Bulk Density	Mg/cum	2.160	2.160	2.160
Moisture content	%	15.20	15.20	15.20
Dry Density	Mg/cum	1.875	1.875	1.875
Cell pressure	kPa	35	70	140
Loading rate	mm/min	3.861	3.924	3.508
Shear Stress *	kPa	18.5	25.1	30.6
Strain *	%	14.7	1.8	1.2

* At maximum deviator stress

Cohesion (c) 10 or 25 kPa

Angle of Shear Resistance (phi) 9 0 deg



Reference

A

Height	mm	168.0
Diameter	mm	84.0
Bulk Density	Mg/cum	2.078
Moisture content	%	19.08
Dry Density	Mg/cum	1.745

Cell pressure	kPa	25
Loading rate	mm/min	3.893

Shear Stress *	kPa	171.0
Strain *	%	10.5

* At maximum deviator stress

Cohesion (c)	171 kPa
Angle of Shear Resistance (phi)	0 deg

APPENDIX 3.3 Chemical Contamination Tests



Scientific Analysis Laboratories is a
limited company registered in England and
Wales (No 2514788) whose address is at
Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 229286-1

Date of Report: 11-Mar-2011

Customer: Strata Surveys Ltd
Strata House
Holmes Chapel Road
Middlewich
CW10 0JB

Customer Contact: Mr Carl Forster

Customer Job Reference: 15067

Customer Purchase Order: 6379

Customer Site Reference: Meredith Close

Date Job Received at SAL: 25-Feb-2011

Date Analysis Started: 01-Mar-2011

Date Analysis Completed: 10-Mar-2011

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs



Report checked
and authorised by :
Miss Emma Tibbitts
Senior Project Manager

Issued by :
Miss Emma Tibbitts
Senior Project Manager

SAL Reference: 229286 Project Site: Meredith Close Customer Reference: 15067 Soil Analysed as Soil MCERTS Preparation									
SAL Reference					229286 001	229286 002	229286 003	229286 004	229286 005
Customer Sample Reference					HD1 ES1	HD2 ES2	HD3 ES2	HD4 ES1	HD5 ES1
Depth					0.20	0.50	0.50	0.20	0.20
Date Sampled					23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011
Type					Topsoil	Topsoil	Sand	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Moisture	T277	AR	0.1	%	22	24	27	32	28
Moisture @ 105 C	T162	AR	0.1	%	25	26	23	37	30

SAL Reference: 229286							
Project Site: Meredith Close							
Customer Reference: 15067							
Soil				Analysed as Soil			
Miscellaneous							
SAL Reference				229286 003		229286 007	
Customer Sample Reference				HD3 ES2		BH7 ES1	
Depth				0.50		0.25	
Date Sampled				23-FEB-2011		23-FEB-2011	
Type				Sand			
Determinand		Method	Test Sample	LOD	Units		
Asbestos ID		T27	AR			N.D.	N.D.

SAL Reference: 229286 Project Site: Meredith Close Customer Reference: 15067 Soil Analysed as Soil Metals									
SAL Reference					229286 001	229286 002	229286 003	229286 004	229286 005
Customer Sample Reference					HD1 ES1	HD2 ES2	HD3 ES2	HD4 ES1	HD5 ES1
Depth					0.20	0.50	0.50	0.20	0.20
Date Sampled					23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011
Type					Topsoil	Topsoil	Sand	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Barium	T6	M40	1	mg/kg	250	220	1200	200	220
Arsenic	T6	M40	2	mg/kg	31	31	61	23	22
Boron (water-soluble)	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Beryllium	T6	M40	2	mg/kg	<2	3	7	2	2
Cadmium	T6	M40	1	mg/kg	1	1	3	1	1
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	26	26	46	26	27
Copper	T6	M40	1	mg/kg	130	58	190	65	52
Lead	T6	M40	1	mg/kg	160	160	370	170	160
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	31	42	90	36	34
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Sulphide	T4	AR	10	mg/kg	<10	<10	<10	<10	<10
Zinc	T6	M40	1	mg/kg	220	140	680	190	210
Vanadium	T6	M40	1	mg/kg	41	46	96	47	46

SAL Reference: 229286									
Project Site: Meredith Close									
Customer Reference: 15067									
Soil					Analysed as Soil				
Miscellaneous									
SAL Reference					229286 001	229286 002	229286 003	229286 004	229286 005
Customer Sample Reference					HD1 ES1	HD2 ES2	HD3 ES2	HD4 ES1	HD5 ES1
Depth					0.20	0.50	0.50	0.20	0.20
Date Sampled					23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011
Type					Topsoil	Topsoil	Sand	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Cyanide(Total)	T4	AR	1	mg/kg	<1	<1	<1	<1	<1
pH	T7	AR			7.3	7.3	6.8	6.8	7.0
Phenols(Mono)	T4	AR	1	mg/kg	<1	<1	<1	<1	<1
SO4(Total)	T6	M40	0.01	%	0.34	0.27	0.44	0.23	0.23

SAL Reference: 229286									
Project Site: Meredith Close									
Customer Reference: 15067									
Soil					Analysed as Soil				
Total and Speciated USEPA16 PAH									
SAL Reference					229286 001	229286 002	229286 003	229286 004	229286 005
Customer Sample Reference					HD1 ES1	HD2 ES2	HD3 ES2	HD4 ES1	HD5 ES1
Depth					0.20	0.50	0.50	0.20	0.20
Date Sampled					23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011	23-FEB-2011
Type					Topsoil	Topsoil	Sand	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units					
Naphthalene	T207	M105	0.1	mg/kg	0.2	<0.1	0.5	0.2	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	0.1	<0.1	0.2	0.3	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	1.7	0.3	0.9	1.7	<0.1
Anthracene	T207	M105	0.1	mg/kg	1.2	<0.1	0.2	1.4	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	2.1	0.1	2.4	6.8	0.1
Pyrene	T207	M105	0.1	mg/kg	1.6	0.1	2.1	5.2	0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.8	<0.1	1.2	3.4	<0.1
Chrysene	T207	M105	0.1	mg/kg	0.9	<0.1	1.3	3.4	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	1.1	0.1	1.8	4.7	0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.5	<0.1	0.8	2.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.2	<0.1	0.4	1.0	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	0.1	0.3	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.2	<0.1	0.5	0.9	<0.1
PAH(total)	T207	M105	0.1	mg/kg	11	0.6	12	31	0.3

SAL Reference: 229286 Project Site: Meredith Close Customer Reference: 15067 Leachate to BS EN 12457-1 (2:1) Analysed as Water Miscellaneous						
SAL Reference				229286 006	229286 007	
Customer Sample Reference				BH3 ES1	BH7 ES1	
Depth				1.00	0.25	
Date Sampled				23-FEB-2011	23-FEB-2011	
Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	2:1	0.2	µg/l	0.4	4.6
Ba (Dissolved)	T281	2:1	1	µg/l	37	32
Be (Dissolved)	T281	2:1	0.05	µg/l	0.13	0.06
Boron	T6	2:1	0.01	mg/l	0.06	0.08
Cd (Dissolved)	T281	2:1	0.02	µg/l	0.17	0.05
Cr (Dissolved)	T281	2:1	1	µg/l	<1	3
Chromium VI	T4	2:1	0.05	mg/l	<0.05	<0.05
Cu (Dissolved)	T281	2:1	0.5	µg/l	4.3	11
Pb (Dissolved)	T281	2:1	0.3	µg/l	<0.3	2.2
Hg (Dissolved)	T281	2:1	0.05	µg/l	<0.05	<0.05
Ni (Dissolved)	T281	2:1	1	µg/l	10	4
Se (Dissolved)	T281	2:1	0.5	µg/l	0.6	0.5
V (Dissolved)	T281	2:1	2	µg/l	<2	4
Zn (Dissolved)	T281	2:1	2	µg/l	21	13
SO4(Total)	T6	2:1	50	mg/l	<50	<50
Sulphide	T4	2:1	0.05	mg/l	<0.05	<0.05
Cyanide(Total)	T4	2:1	0.05	mg/l	<0.05	<0.05
Phenols(Mono)	T4	2:1	0.1	mg/l	<0.1	<0.1
pH	T7	2:1			7.3	7.2

SAL Reference: 229286 Project Site: Meredith Close Customer Reference: 15067 Leachate to BS EN 12457-1 (2:1) Analysed as Water Total and Speciated USEPA16 PAH						
SAL Reference				229286 006	229286 007	
Customer Sample Reference				BH3 ES1	BH7 ES1	
Depth				1.00	0.25	
Date Sampled				23-FEB-2011	23-FEB-2011	
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	2:1	0.01	µg/l	0.05	0.07
Acenaphthylene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Acenaphthene	T149	2:1	0.01	µg/l	0.02	⁽¹⁰⁰⁾ <0.02
Fluorene	T149	2:1	0.01	µg/l	0.02	⁽¹⁰⁰⁾ <0.02
Phenanthrene	T149	2:1	0.01	µg/l	<0.01	0.03
Anthracene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Fluoranthene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Pyrene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Benzo(a)Anthracene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Chrysene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Benzo(b/k)Fluoranthene	T149	2:1	0.01	µg/l	0.03	0.05
Benzo(a)Pyrene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Indeno(123-cd)Pyrene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Dibenzo(ah)Anthracene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
Benzo(ghi)Perylene	T149	2:1	0.01	µg/l	<0.01	⁽¹⁰⁰⁾ <0.02
PAH(total)	T149	2:1	0.01	µg/l	0.12	0.15

Index to symbols used in 229286-1

Value	Description
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
2:1	Leachate to BS EN 12457-1 (2:1)

M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
100	LOD determined by sample aliquot used for analysis
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

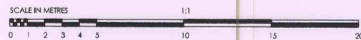
Value	Description
T281	ICP/MS (Filtered)
T27	PLM
T277	Grav (1 Dec) (40 C)
T6	ICP/OES
T207	GC/MS(MCERTS)
T4	Colorimetry
T149	GC/MS (SIR)
T7	Probe
T162	Grav (1 Dec) (105 C)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Naphthalene	T207	M105	0.1	mg/kg	M	001-005
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-005
Acenaphthene	T207	M105	0.1	mg/kg	M	001-005
Fluorene	T207	M105	0.1	mg/kg	M	001-005
Phenanthrene	T207	M105	0.1	mg/kg	M	001-005
Anthracene	T207	M105	0.1	mg/kg	U	001-005
Fluoranthene	T207	M105	0.1	mg/kg	M	001-005
Pyrene	T207	M105	0.1	mg/kg	M	001-005
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-005
Chrysene	T207	M105	0.1	mg/kg	M	001-005
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001-005
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-005
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-005
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-005
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-005
PAH(total)	T207	M105	0.1	mg/kg	U	001-005
Moisture	T277	AR	0.1	%	N	001-005
Moisture @ 105 C	T162	AR	0.1	%	N	001-005
Asbestos ID	T27	AR			SU	003,007
Cyanide(Total)	T4	AR	1	mg/kg	U	001-005
pH	T7	AR			M	001-005
Phenols(Mono)	T4	AR	1	mg/kg	U	001-005
SO4(Total)	T6	M40	0.01	%	N	001-005
Arsenic	T6	M40	2	mg/kg	M	001-005
Barium	T6	M40	1	mg/kg	U	001-005
Beryllium	T6	M40	2	mg/kg	U	001-005
Boron (water-soluble)	T6	AR	1	mg/kg	N	001-005
Cadmium	T6	M40	1	mg/kg	M	001-005
Chromium VI	T6	AR	1	mg/kg	N	001-005
Chromium	T6	M40	1	mg/kg	M	001-005
Copper	T6	M40	1	mg/kg	M	001-005
Lead	T6	M40	1	mg/kg	M	001-005
Mercury	T6	M40	1	mg/kg	M	001-005
Nickel	T6	M40	1	mg/kg	M	001-005
Selenium	T6	M40	3	mg/kg	M	001-005
Sulphide	T4	AR	10	mg/kg	N	001-005
Zinc	T6	M40	1	mg/kg	M	001-005
Vanadium	T6	M40	1	mg/kg	M	001-005
As (Dissolved)	T281	2:1	0.2	µg/l	U	006-007
Ba (Dissolved)	T281	2:1	1	µg/l	U	006-007
Be (Dissolved)	T281	2:1	0.05	µg/l	U	006-007
Boron	T6	2:1	0.01	mg/l	N	006-007
Cd (Dissolved)	T281	2:1	0.02	µg/l	U	006-007
Cr (Dissolved)	T281	2:1	1	µg/l	U	006-007

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Chromium VI	T4	2:1	0.05	mg/l	N	006-007
Cu (Dissolved)	T281	2:1	0.5	µg/l	U	006-007
Pb (Dissolved)	T281	2:1	0.3	µg/l	U	006-007
Hg (Dissolved)	T281	2:1	0.05	µg/l	U	006-007
Ni (Dissolved)	T281	2:1	1	µg/l	U	006-007
Se (Dissolved)	T281	2:1	0.5	µg/l	U	006-007
V (Dissolved)	T281	2:1	2	µg/l	U	006-007
Zn (Dissolved)	T281	2:1	2	µg/l	U	006-007
SO4(Total)	T6	2:1	50	mg/l	N	006-007
Sulphide	T4	2:1	0.05	mg/l	N	006-007
Cyanide(Total)	T4	2:1	0.05	mg/l	U	006-007
Phenols(Mono)	T4	2:1	0.1	mg/l	U	006-007
pH	T7	2:1			U	006-007
Naphthalene	T149	2:1	0.01	µg/l	U	006-007
Acenaphthylene	T149	2:1	0.01	µg/l	U	006-007
Acenaphthene	T149	2:1	0.01	µg/l	U	006-007
Fluorene	T149	2:1	0.01	µg/l	U	006-007
Phenanthrene	T149	2:1	0.01	µg/l	U	006-007
Anthracene	T149	2:1	0.01	µg/l	U	006-007
Fluoranthene	T149	2:1	0.01	µg/l	U	006-007
Pyrene	T149	2:1	0.01	µg/l	U	006-007
Benzo(a)Anthracene	T149	2:1	0.01	µg/l	U	006-007
Chrysene	T149	2:1	0.01	µg/l	U	006-007
Benzo(b/k)Fluoranthene	T149	2:1	0.01	µg/l	U	006-007
Benzo(a)Pyrene	T149	2:1	0.01	µg/l	U	006-007
Indeno(123-cd)Pyrene	T149	2:1	0.01	µg/l	U	006-007
Dibenzo(ah)Anthracene	T149	2:1	0.01	µg/l	U	006-007
Benzo(ghi)Perylene	T149	2:1	0.01	µg/l	U	006-007
PAH(total)	T149	2:1	0.01	µg/l	U	006-007

APPENDIX 4 BOREHOLE LOCATION PLAN



LEGEND:

- ROTARY LINES (SEE SPEC FOR CSH REQUIREMENTS)
- 3 BED HOUSE = 2.4 x 1.8m SHED (SEE SPEC FOR CSH REQUIREMENTS)
- BIN STORAGE AREA 1.0 x 2.0m (SEE SPEC FOR CSH REQUIREMENTS) ALLOW FOR 1800mm ACCESS TO BINS
- NEW PLANTING
- TURF
- TARMAC -FINISH TO PRIVATE DRIVE
- BLOCK PAVED DRIVEWAYS
- NEW 1.0m HIGH BRICK WALL
- NEW 1.8m HIGH BRICK WALL
- NEW 2.0m HIGH CLOSE BOARDED FENCE
- 1.8m HIGH CLOSE BOARDED FENCE
- 450mm KNEE RAIL FENCE
- COMPOST BIN (SEE SPEC FOR CSH REQUIREMENTS)

ALL FENCES, GATES AND SHEDS TO MEET SECURE BY DESIGN STANDARDS

ALL NEW PATHS TO BE A MIN 900mm WIDE AND USE 450 x 450mm PAVING SLABS

FOR PLANTING SPECIFICATION PLEASE REFER TO TREE HEALTH CONSULTING LANDSCAPING DRAWING

NOTES:
ALL DIMENSIONS TO BE CHECKED AND CONFIRMED ON SITE PRIOR TO ANY WORKS OR FABRICATION.
DO NOT SCALE OFF THIS DRAWING.
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Project

**GARDEN PLOT,
KING STREET,
ACREFAIR,
WREXHAM**

Scale

1:200 @ A2

Date

SEPT '10

Drawn

NTJ

Drawing Title

PROPOSED SITE PLAN

Project No.

210

Drawing No.

P.102

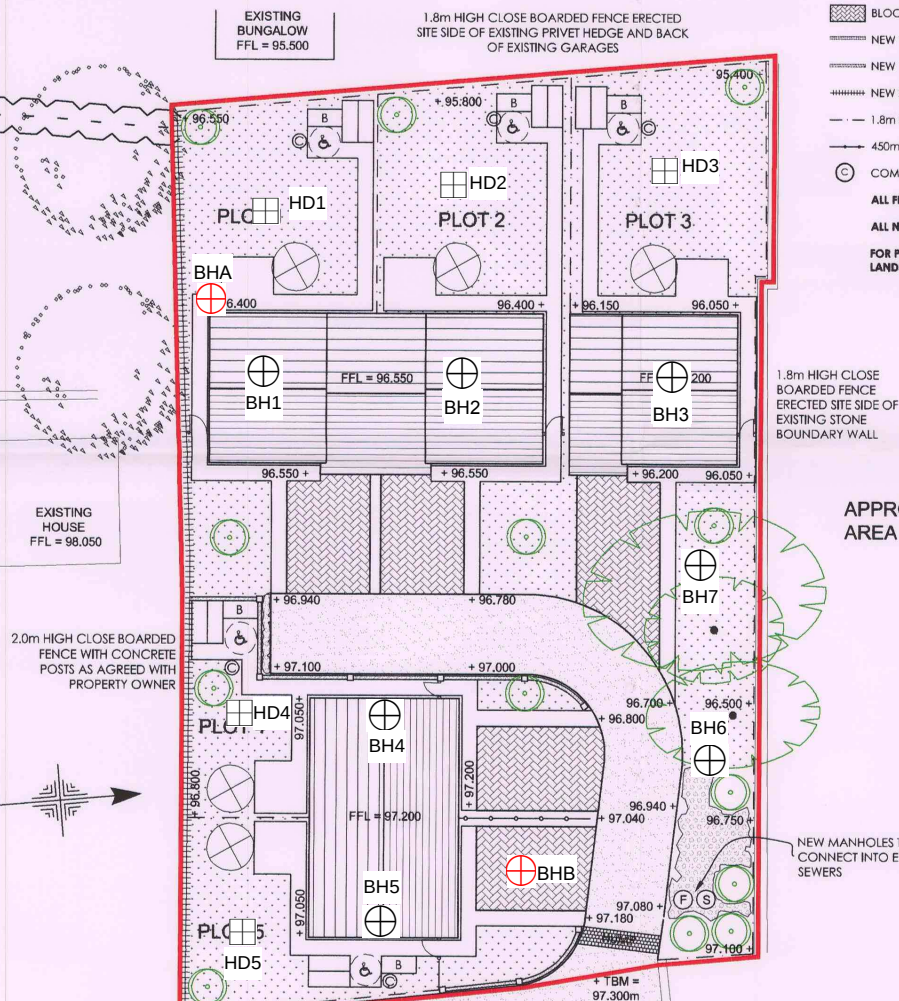
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**WREXHAM COUNTY
BOROUGH COUNCIL**
27 SEP 2010

PLANNING DEPARTMENT

P / 2010 / 0820



APPENDIX 5 SITE LOCATION PLAN

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SITE LOCATION □



MEREDITH CLOSE, ACREFAIR

