Sutcliffe

Civil & Structural Engineers
Building Surveyors
Geo-Environmentalists

Interim Phase II Geotechnical & Environmental Assessment

at

Albert Street, Biddulph

Liverpool
T: **0151 227 3155**

Manchester
T: **0161 817 5180**

Wrexham
T: **01978 664071**

London
T: **020 74 584136**

Head Office
18-20 Harrington Street
Liverpool L2 9QA
T: **0151 227 3155**
F : 0151 227 3156
E: **enquiries@sutcliffe.co.uk**
www.sutcliffe.co.uk

Client Name: Ascent
Our ref: 26357LG
Date: Jan 2013

SUTCLIFFE INVESTIGATIONS

Interim Geotechnical and Environmental Assessment

DOCUMENT VERIFICATION

Report Reference: LG26357 Issue Date: January 2013

Prepared by:

Name:	D Bowen		
Title:	Environmental Scientist		
Qualifications:	BSc (Hons)		

Checked / Approved by:

Name:	W G Baldwin		
Title:	Director		
Qualifications:	BEng (Hons) CEng MIStructE AIEMA		

Revision History:

Rev	Date	Description	Prepared	Checked	Approved

EXECUTIVE SUMMARY

The site is to be developed with 4 new houses along with associated parking and gardens. Based on the proposed end use, the site will be assessed against a residential with plant uptake end scenario.

Issue	Remarks
Made Ground	Window sample logs revealed Made Ground in all Window Samples extending to a maximum depth of 0.70mbgl. Made Ground was noted in a number of layers on the site with dark brown gravelly SAND noted below Bituminous macadam across the majority of the site; the Gravel material was noted to be formed of a variety constituents ranging from clinker, brick, sandstone and limestone. Below this strata in WS1 & 2 firm fissured orangish brown sandy gravelly CLAY. Gravel is sub-angular fine to coarse of clinker is noted.
Natural Ground	Window sample logs revealed natural ground consisting of Firm fissured orangish brown sandy gravelly CLAY. Gravel is sub-rounded to rounded fine to coarse of various lithologies. Cobbles are sub-angular of sansdtone; over medium dense, occasionally loose, orangish brown clayey gravelly medium and coarse SAND. Gravel is sub-angular to sub-rounded of various lithologies; over soft to firm greyish brown very sandy gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of various lithologies.
Solid Geology	Solid Geology was noted in any of the exploratory holes, however a trace of coal was noted in WS3.
Coal Report	The coal report states the site is not within the likely zone of influence from past underground workings.
Asbestos	6No. Asbestos samples have been taken from both the Made Ground and the Natural Ground across the site. No Asbestos fibres have been noted in any of the samples.
Contamination	**Soil** Elevated levels of contamination are noted in all four of the samples taken from the Made Ground, with exceedences of >C16 to C21 aromatic, >C21 to C35 aromatic, Benzo(a)antharcene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene & Indeono(123cd)pyrene noted. Due to only two samples being tested for TPH's no statistical analysis was able to be undertaken on them, however due to the results for the PAH's indicating site wide contamination for a number of contaminants these elevated levels will be removed as part of the proposed remedial measures. Benzo(a)antharcene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene & Indeono(123cd)pyrene are noted to fail the statistical test with no outliers indicating site wide contamination within the made ground, Naphthalene is also noted to fail the statistical test due to three samples being reported as <1.1, as these are within the Made Ground they will be removed as part of the remedial measures.

Issue	Remarks
	Leachates **Environmental Quality Standards (EQS)** The EQS for Sulphide is 0.25ug/l; all sulphide values are above this assessment level however this is due to detection limits. The EQS assessment value is 0.02ug/l, both of the leachate samples are above the assessment criteria with a value of 0.04 in WS1 and 0.91 in WS4. The EQS assessment value is 0.03ug/l, both of the leachate samples are above the assessment criteria with a value of 3.3 in WS1 and 7.5 in WS4. **UK Drinking Water Standards (UK DWS)** All contaminants are below their associated UK DWS assessment criteria, with the exception of Benzo(a)pyrene with a value of 3.3 in WS1 and 7.5 in WS4 which are above the level of 0.01ug/l which is the UK DWS assessment level.
Hazardous Gas	Based on gas monitoring to date a Green classification is recommended for the site, however gas monitoring is currently on going. A final gas risk assessment will be carried out upon completion of six ground gas monitoring reading over a period of three months.
Geotechnical Results	Samples were taken from WS2 & WS3 for the purpose of geotechnical testing and were sent to PTS. The results of the plasticity testing show the Clay on site to be of low plasticity and of medium strength.
Foundations	SPT Values in the natural ground vary between the CLAY & SAND strata, the initial band of CLAY has an average N value of 16.2 with values ranging from 12-21; the SAND band has an average N value of 8 with values ranging from 3 -19; the second layer of CLAY has an average N value of 26.8 with values ranging from 9-86. Due to the variability of the natural material and the nature of the sand strata it would be our recommendation that a piled foundation is implemented to competent strata.
Ground Floor Construction	Based upon the amount of Made Ground noted on site it is not recommended that a ground-bearing slab is utilised on site. Sutcliffe Investigations therefore propose a suspended P.C Unit ground floor be adopted. Ground gas monitoring is incomplete and based on the current readings a GREEN classification gas protection measures are noted with no remedial measures being required at this stage. The gas reading will be complete by the end of January 2013.
Remediation	Based on the soil contamination results and the statistical analysis site wide remediation will be required, this will be formed by a 600mm capping layer in the garden/landscaped area to be formed of clean tested material and a minimum of 150mm topsoil as a growing medium; the amount of material to be stripped from the site will be determined by the finished floor levels of the new development.

Issue	Remarks
Groundwater & Excavations	Groundwater was noted in all of the exploratory holes during the site investigation works within the sand layer, groundwater has been noted in WS2 during monitoring visits. All exploratory holes were noted to be stable.

1.0 INTRODUCTION

Assent Housing has appointed Sutcliffe Investigations to undertake a Phase II Geo-technical and Environmental Assessment at Albert Street, Biddulph.

The site was investigated using the Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination R & D Technical Report P5-006/TR.

The site area is 1100m^2 ÷ 4 sample positions = 275m^2 ÷ 0.8 = 343.75

√343.75m^2 = a 18.54m grid.

Therefore this gives an 80% probability of finding a circular area of interest of 343.75m^2.

Window Sample holes were distributed across the site to determine the following:

- Depth of Made Ground
- Geo-technical properties of soils on site
- Extent of any contamination on site
- To install wells and to monitor for ground gas and water
- Undertake a post sampling conceptual model and risk assessment

The site is to be developed for the purpose of new houses and associated parking. Based on this end use the site will be assessed against a residential with plant uptake end use.

2.0 SITE INVESTIGATION

The Phase I Desk Study revealed the site was noted to be field land until 1954-1960 when garage lock-ups were built on the site. A walkover of the site for the purpose of the Desk Study indicated that the garages are still noted on site.

Site investigation works consisted of 4No. Window Samples carried out using a Dando Terrier Rig on the 6th September 2012. Samples for contamination testing purposes have been taken from all Window Sample. A site plan indicating the positions of the investigation holes can be found in Appendix A

Made Ground

Window sample logs revealed Made Ground in all Window Samples extending to a maximum depth of 0.70mbgl. Made Ground was noted in a number of layers on the site with dark brown gravelly SAND noted below Bituminous macadam across the majority of the site; the Gravel material was noted to be formed of a variety constituents ranging from clinker, brick, sandstone and limestone. Below this strata in WS1 & 2 firm fissured orangish brown sandy gravelly CLAY. Gravel is sub-angular fine to coarse of clinker is noted.
Detailed descriptions for each Window Sample hole can be found in Appendix B.

Natural Ground

Window sample logs revealed natural ground consisting of Firm fissured orangish brown sandy gravelly CLAY. Gravel is sub-rounded to rounded fine to coarse of various lithologies. Cobbles are sub-angular of sansdtone; over medium dense, occasionally loose, orangish brown clayey gravelly medium and coarse SAND. Gravel is sub-angular to sub-rounded of various lithologies; over soft to firm greyish brown very sandy gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of various lithologies.

Solid Geology

The coal report states the site is not within the likely zone of influence from past underground workings.

2No. Ground gas and water monitoring wells have been installed and can be found in WS2 and WS3.

2No. Geo-technical tests were taken from WS2 at 1.00-2.00mbgl and WS3 at 1.00-2.00mbgl. This consisted of the following:

- Moisture Content
- Index Property
- Triaxial

4No. Contamination tests have been taken from the Made Ground and 2 No. Natural soils from across the site as a whole.

LEACHATE

2No. leachate tests have been taken from the Made Ground.

Environmental Quality Standards (EQS)

The EQS for Sulphide is 0.25ug/l; all sulphide values are above this assessment level however this is due to detection limits.

The EQS assessment value is 0.02ug/l, both of the leachate samples are above the assessment criteria with a value of 0.04 in WS1 and 0.91 in WS4.

The EQS assessment value is 0.03ug/l, both of the leachate samples are above the assessment criteria with a value of 3.3 in WS1 and 7.5 in WS4.

UK Drinking Water Standards (UK DWS)

All contaminants are below their associated UK DWS assessment criteria, with the exception of Benzo(a)pyrene with a value of 3.3 in WS1 and 7.5 in WS4 which are above the level of 0.01ug/l which is the UK DWS assessment level.

Groundwater was noted in all of the exploratory holes during the site investigation works within the sand layer, groundwater has been noted in WS2 during monitoring visits.

3.0 GEO-TECHNICAL TESTING

Samples were taken to PTS laboratory for geo-technical testing. Geotechnical test results are currently awaited.

Soluble Sulphate and pH

The highest water-soluble sulphate concentration and the lowest pH value for each soil type are shown below:

Soluble Sulphate and pH Classification

Soil Type	Lowest pH Value	Highest Soluble Sulphate Concentration (g/l)
Made Ground	7	0.69
Natural Ground	6.8	0.13

Based on the above and in accordance with the guidelines given in BRE: Special Digest (2005) for sub-surface concrete, the Digest Sulphate Class for the Made Ground can be given as DS-2, with an ACEC classification of AC-1s.

Based on the above and in accordance with the guidelines given in BRE: Special Digest (2005) for sub-surface concrete, the Digest Sulphate Class for the Natural Ground can be given as DS-1, with an ACEC classification of AC-1s.

Geo-technical Solutions Design Parameters

Geo-technical Solution Design Parameters are provided for guidance only and to assist in discussion in the following section. The Structural Engineer is responsible for determining appropriate temporary and permanent works design parameters to suit.

Made Ground

The nature and compaction characteristics of the Made Ground across the site are likely to be variable leading to a lack of predictability of its properties. Made Ground would be an unsuitable medium for foundation support.

Note: Existing garages are still noted on site.

Groundwater

Groundwater was noted in all of the exploratory holes during the site investigation works within the sand layer, groundwater has been noted in WS2 during monitoring visits.

4.0 FOUNDATIONS

SPT Values in the natural ground vary between the CLAY & SAND strata, the initial band of CLAY has an average N value of 16.2 with values ranging from 12-21; the SAND band has an average N value of 8 with values ranging from 3 -19; the second layer of CLAY has an average N value of 26.8 with values ranging from 9-86. Due to the variability of the natural material and the nature of the sand strata it would be our recommendation that a piled foundation is implemented to competent strata.

5.0 GROUND FLOOR CONSTRUCTION

Based upon the amount of Made Ground noted on site it is not recommended that a ground-bearing slab is utilised on site. Sutcliffe Investigations therefore propose a suspended P.C Unit ground floor be adopted.

Ground gas monitoring is incomplete and based on the current readings a GREEN classification gas protection measures are noted with no remedial measures being required at this stage.

The gas reading will be complete by the end of January 2013.

6.0 GAS MONITORING

Gas monitoring wells were installed within two of the window samples across the site WS2 and WS3. To date four gas readings have been undertaken. A copy of all gas monitoring readings and water levels to date can be found in Appendix C.

Window Sample	Visit No	1 18/10/12	2 02/11/12	3 16/11/12	4 06/12/12	5	6
WS2	Methane %	0.1	0.1	0.1	0.1		
	CO_2 %	0.6	0.5	1.7	1.6		
	O_2 %	20.1	20.5	19.6	20.7		
	Atmospheric Pressure	974mb (R)	961mb (R)	991mb (S)	989mb (S)		
	Flow Rate	+0.1	+0.1	0.1	0.0		
WS3	Methane %	0.1	0.1	0.1	0.1		
	CO_2 %	0.3	0.4	0.4	0.5		
	O_2 %	20.6	20.6	21.1	21.0		
	Atmospheric Pressure	974mb (R)	961mb (R)	991mb (S)	989mb (S)		
	Flow Rate	+0.1	+0.1	0.0	0.0		

(S) Steady (F) Falling (R) Rising

It is recommended in CIRIA C665 that to provide a suitable risk assessment for ground gas, readings with atmospheric pressures of less than 1000mb and falling are required. The lowest atmospheric pressure to date is 961mb however gas monitoring is still on going.

CIRIA C665 – Assessing risks posed by hazardous ground gases to buildings the NHBC Traffic light system has been used to determine the gas characterisation for the site.

The site is to be developed for the purpose of new housing with associated car parking. To date the soil gas investigation has identified a maximum methane concentration of 0.1 per cent and a worst case flow rate of 0.1l/hr. The GSV will be calculated as:

Limiting volume flow rate of gas = gas concentration x measured borehole flow rate

GSV= 0.001 x 0.1 (gas concentration in table is %)

GSV= 0.0001

The soil gas investigation has identified a maximum Carbon Dioxide concentration of 1.7 per cent carbon dioxide and a worst case flow rate of 0.1l/hr. The GSV will be calculated as:

Limiting volume flow rate of gas = gas concentration x measured borehole flow rate

GSV= 0.017 x 0.1 (gas concentration in table is %)

GSV= 0.0017

Based on the above Methane and Carbon Dioxide readings, the GSV's would currently classify the site as green however ground gas monitoring is still on going.

A final gas risk assessment will be carried out upon completion of six ground gas monitoring reading over a period of three months.

7.0 CONTAMINATION

MADE GROUND

Elevated levels of contamination are noted in all four of the samples taken from the Made Ground, with exceedences of >C16 to C21 aromatic, >C21 to C35 aromatic, Benzo(a)antharcene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene & Indeono(123cd)pyrene noted.

Due to only two samples being tested for TPH's no statistical analysis was able to be undertaken on them, however due to the results for the PAH's indicating site wide contamination for a number of contaminants these elevated levels will be removed as part of the proposed remedial measures. Benzo(a)antharcene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene & Indeono(123cd)pyrene are noted to fail the statistical test with no outliers indicating site wide contamination within the made ground, Naphthalene is also noted to fail the statistical test due to three samples being reported as <1.1, as these are within the Made Ground they will be removed as part of the remedial measures.

NATURAL GROUND

Two samples from the Natural Ground was analysed for contaminant parameters, the samples did not contain any contaminants which could be classified as elevated above the Generic Assessment Criteria (GAC).

ASBESTOS

6No. Asbestos samples have been taken from both the Made Ground and the Natural Ground across the site. No Asbestos fibres have been noted in any of the samples.

A copy of the contamination results, are included in Appendix D and the statistical analysis report can be found in Appendix E.

8.0 LEACHATES

Leachate analysis was carried out on the following samples:

- WS1 at 0.40m
- WS4 at 0.30m

Environmental Quality Standards (EQS)

The EQS for Sulphide is 0.25ug/l; all sulphide values are above this assessment level however this is due to detection limits.

The EQS assessment value is 0.02ug/l, both of the leachate samples are above the assessment criteria with a value of 0.04 in WS1 and 0.91 in WS4.

The EQS assessment value is 0.03ug/l, both of the leachate samples are above the assessment criteria with a value of 3.3 in WS1 and 7.5 in WS4.

UK Drinking Water Standards (UK DWS)

All contaminants are below their associated UK DWS assessment criteria, with the exception of Benzo(a)pyrene with a value of 3.3 in WS1 and 7.5 in WS4 which are above the level of 0.01ug/l which is the UK DWS assessment level

A copy of the leachate results can be found in Appendix D.

9.0 CONCLUSIONS

9.1 Foundations

SPT Values in the natural ground vary between the CLAY & SAND strata, the initial band of CLAY has an average N value of 16.2 with values ranging from 12-21; the SAND band has an average N value of 8 with values ranging from 3 -19; the second layer of CLAY has an average N value of 26.8 with values ranging from 9-86. Due to the variability of the natural material and the nature of the sand strata it would be our recommendation that a piled foundation is implemented to competent strata.

9.2 Ground Floor Construction

Based upon the amount of Made Ground noted on site it is not recommended that a ground-bearing slab is utilised on site. Sutcliffe Investigations therefore propose a suspended P.C Unit ground floor be adopted.

Ground gas monitoring is incomplete and based on the current readings a GREEN classification gas protection measures are noted with no remedial measures being required at this stage.

The gas reading will be complete end January 2013.

9.3 Contamination

Due to only two samples being tested for TPH's no statistical analysis was able to be undertaken on them, however due to the results for the PAH's indicating site wide contamination for a number of contaminants these elevated levels will be removed as part of the proposed remedial measures. Benzo(a)antharcene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene & Indeono(123cd)pyrene are noted to fail the statistical test with no outliers indicating site wide contamination within the made ground, Naphthalene is also noted to fail the statistical test due to three samples being reported as <1.1, as these are

within the Made Ground they will be removed as part of the remedial measures.

9.4 Ground Gas

Based on gas monitoring to date a Green classification is recommended for the site, however gas monitoring is currently on going.

A final gas risk assessment will be carried out upon completion of six ground gas monitoring reading over a period of three months expected January 2013.

****

It should be noted that Sutcliffe investigations have used reasonable skill, care and diligence in the design of the investigation of this site. The inherent infinite variation of ground conditions allows only definition of the actual conditions at the location and depth of exploratory holes, while those at intermediate locations can only be inferred. This site has not been checked for Japanese Knotweed or other detrimental plants.

****

Prepared by:

Date: 01.02.13

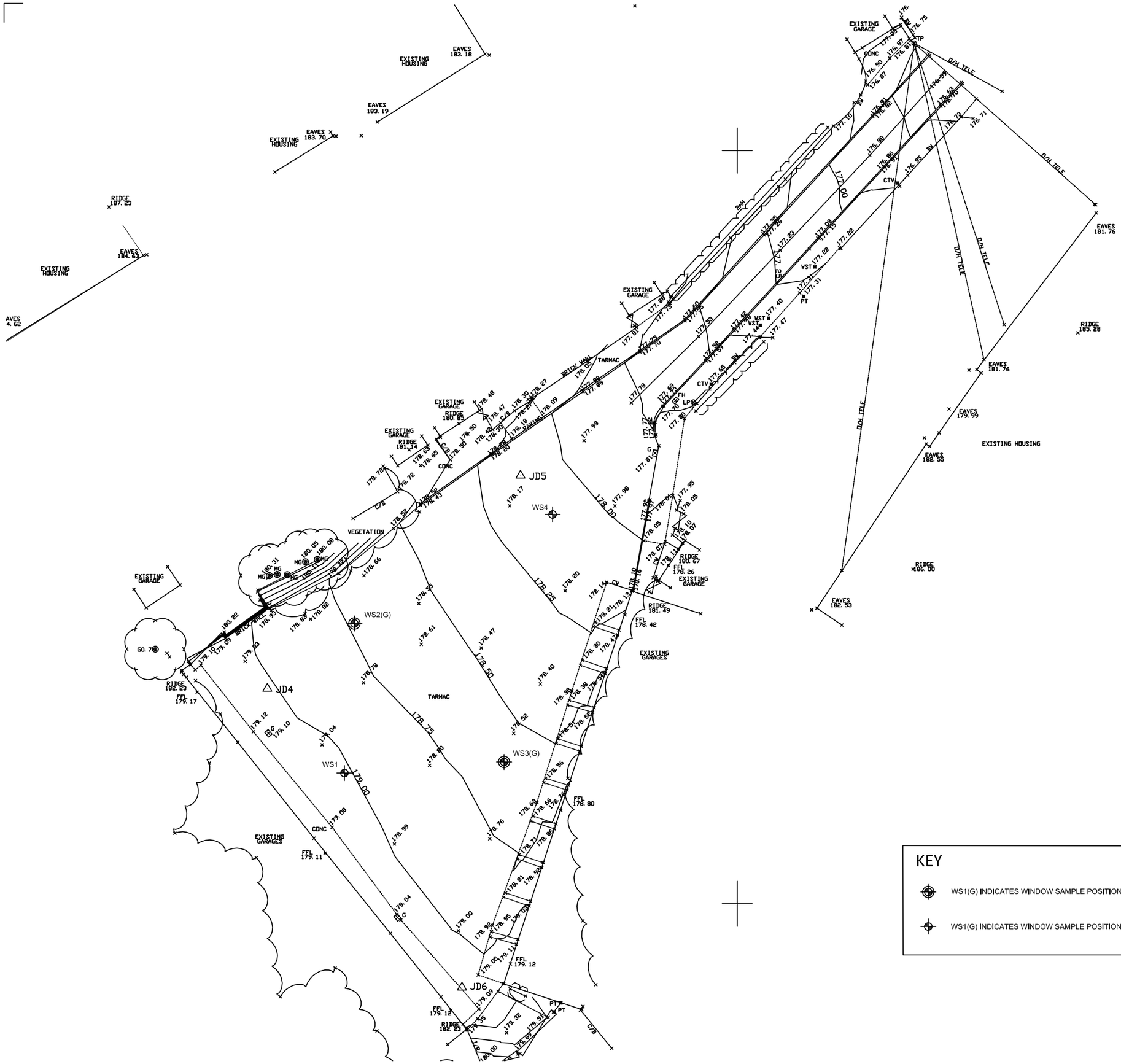
D Bowen
BSc (Hons)

Reviewed by:

Date: 01.02.13

W G Baldwin
BEng (Hons) CEng MIStructE AIEMA
Director

APPENDIX A – DRAWINGS



DO NOT SCALE OFF THIS DRAWING

GENERAL NOTES

This drawing to read in conjunction with all relevant structural and architectural drawings and specifications.

All dimensions to be checked on site by the contractor / fabricator prior to commencement of works.

All dimensions are in millimetres unless stated otherwise.

All works to be carried out in strict accordance with the engineer's specifications, relevant British Standards and where applicable Local Authorities requirements.

For final setting out information relating to grid lines and wall positions refer to the architect's drawings.

KEY

WS1(G) INDICATES WINDOW SAMPLE POSITION WITH GAS INSTALLATION

WS1(G) INDICATES WINDOW SAMPLE POSITION

Rev	Date	Checked	Description	By
A	30.01.13	WGB	SI PLAN	DB

NOT WORKING DRAWING

Sutcliffe

18-20 Harrington Street, Liverpool L2 9QA
t: 0151 227 3155 f: 0151 227 3156
e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

Client
ASCENT

Project
ALBERT STREET
BIDDULPH
STAFFORDSHIRE

Drawing title
SITE INVESTIGATION PLAN ON TOPOGRAPHICAL SURVEY

Scale at A3	1:250	Drawing number	26357-700
Drawn by	D.BOWEN		
Date	30.01.13	Revision suffix	A

DO NOT SCALE OFF THIS DRAWING

GENERAL NOTES

This drawing to read in conjunction with all relevant structural and architectural drawings and specifications.

All dimensions to be checked on site by the contractor / fabricator prior to commencement of works.

All dimensions are in millimetres unless stated otherwise.

All works to be carried out in strict accordance with the engineer's specifications, relevant British Standards and where applicable Local Authorities requirements.

For final setting out information relating to grid lines and wall positions refer to the architect's drawings.

KEY

WS1(G) INDICATES WINDOW SAMPLE POSITION WITH GAS INSTALLATION

WS1(G) INDICATES WINDOW SAMPLE POSITION

Rev	Date	Checked	Description	By
A	30.01.13	WGB	SI PLAN ON PROPOSED	DB

NOT WORKING DRAWING

Sutcliffe
18-20 Harrington Street, Liverpool L2 9QA
t: 0151 227 3155 f: 0151 227 3156
e: sutcliffe@sutcliffe.co.uk w: www.sutcliffe.co.uk

Client
ASCENT

Project
ALBERT STREET
BIDDULPH
STAFFORDSHIRE

Drawing title
SITE INVESTIGATION PLAN ON PROPOSED PLAN

Scale at A3	1:250	Drawing number	26357-701
Drawn by	D.BOWEN		
Date	30.01.13	Revision suffix	A

APPENDIX B - WINDOW SAMPLE HOLE LOGS

Sutcliffe Investigations

Site	Number
Albert Street	WS1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dando Terrier Rig.		179.00	Ascent	26357LG
	Location See Location Plan.	**Dates** 06/09/2012	**Engineer** GF	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				178.95	(0.05)	Bituminous macadam.		
					0.05			
					(0.45)	MADE GROUND comprising dark brown gravelly SAND with half bricks and cobble sized sub angular fragments of clinker. Gravel is sub angular fine to coarse of brick and clinker.		
0.40-0.40	S1		P.I.D 0.0	178.50	0.50			
					(0.20)			
				178.30	0.70	MADE GROUND comprising firm fissured orangish brown sandy gravelly CLAY. Gravel is sub angular fine to coarse of clinker.		
1.00-1.00	N2		P.I.D 0.0					
1.00-1.45	SPT N=21		1,4/4,4,6,7					
1.20	CU 21kPa		Very sandy CLAY giving low Shear Vane values to 1.60m bgl		(1.50)	Firm fissured orangish brown very sandy gravelly slightly cobbly CLAY. Gravel is sub rounded to rounded fine to coarse of various lithologies. Cobbles are sub angular of sandstone.		
1.40	CU 12kPa							
1.60	CU 8kPa							
1.80	CU 102kPa							
1.90	CU 72kPa							
2.00-2.45	SPT N=12		1,1/1,3,3,5					
2.30	CU 42kPa			176.80	2.20			
					(0.30)	Medium dense orangish brown clayey gravelly medium and coarse SAND. Gravel is sub angular to sub rounded of various lithologies.		
2.60	CU 26kPa			176.50	2.50			▽1
2.80	CU 42kPa		minor(1) at 2.60m.			Firm greyish brown very sandy gravelly CLAY. Gravel is sub angular to sub rounded fine to coarse of various lithologies.		
2.90	CU 90kPa							
3.00-3.45	SPT N=15		1,2/4,2,4,5			SAND band 3.30m bgl - 3.40m bgl.		
3.50	CU 54kPa							
3.70	CU 42kPa							
3.90	CU 61kPa				(2.95)			
4.00-4.45	SPT N=21		4,4/3,5,5,8					
4.40	CU 59kPa					Strata becomes stiff.		
4.60	CU 112kPa		Very brittle CLAY is breaking before completion of Shear Vane test to 5.00m bgl.					
4.80	CU 86kPa							
4.90	CU 77kPa							
5.00-5.45	SPT N=26		3,4/4,6,7,9	173.55	5.45	Complete at 5.45m		

Remarks
Window Sample hole terminated at 5.45m bgl after SPT in firm CLAY.

Scale (approx)	Logged By
1:50	GF

Figure No. 26357LG.WS1

Sutcliffe Investigations

Site	Number
Albert Street	WS2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dando Terrier Rig.		178.75	Ascent	26357LG
	Location See Location Plan.	**Dates** 06/09/2012	**Engineer** GF	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				178.70	(0.05)	Bituminous macadam.			
					0.05				
					(0.45)	MADE GROUND comprising dark brown gravelly SAND with angular boulders of clinker and sandstone block. Gravel is sub angular fine to coarse of brick and clinker.			
0.40-0.40	S1		P.I.D 0.0	178.25	0.50				
					(0.20)				
0.90	CU 54kPa			178.05	0.70	MADE GROUND comprising firm fissured orangish brown sandy gravelly CLAY. Gravel is sub angular fine to coarse of clinker.			
1.00-1.45	SPT N=13		0,2/2,3,4,4						
1.00-2.00	G3		P.I.D 0.0		(1.10)				
1.10-1.10	N2					Firm fissured orangish brown very sandy gravelly slightly cobbly CLAY. Gravel is sub rounded to rounded fine to coarse of various lithologies. Cobbles are sub angular of sandstone.			
				176.95	1.80				
					(0.40)				
2.00-2.45	SPT N=4		0,0/1,1,1,1 minor seepage(1) at 2.10m.	176.55	2.20	Medium dense orangish brown clayey gravelly medium and coarse SAND. Gravel is sub angular to sub rounded of various lithologies.		▽1	
2.50	CU 29kPa					Firm fissured orangish brown very sandy gravelly slightly cobbly CLAY. Gravel is sub rounded to rounded fine to coarse of various lithologies. Cobbles are sub angular of sandstone.			
2.70	CU 77kPa								
2.90	CU 56kPa								
			No recovery 3.00m bgl - 3.50m bgl.						
3.00-3.45	SPT N=9		2,2/1,2,3,3		(2.20)				
3.70	CU 62kPa								
3.90	CU 55kPa								
4.00-4.45	SPT N=21		3,3/4,4,6,7						
4.50	CU 41kPa			174.35	4.40	Firm dark greyish brown very sandy gravelly CLAY. Gravel is sub angular to sub rounded fine and medium of various lithologies.			
4.70	CU 39kPa								
4.90	CU 53kPa				(1.05)				
5.00-5.45	SPT N=21		3,3/4,5,6,6						
				173.30	5.45	Complete at 5.45m			

Remarks
Window Sample hole terminated at 5.45m bgl after SPT in firm CLAY.

Scale (approx)	Logged By
1:50	GF

Figure No. 26357LG.WS2

Sutcliffe Investigations

Site	Number
Albert Street	WS3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dando Terrier Rig.		178.62	Ascent	26357LG
	Location See Location Plan.	**Dates** 06/09/2012	**Engineer** GF	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
				178.57	(0.05)	Bituminous macadam.			
					0.05				
					(0.55)	MADE GROUND comprising dark brown gravelly slightly cobbly slightly bouldery SAND with fine ash. Gravel is sub angular fine to coarse of limestone. Cobbles are sub angular of limestone. Boulders are sub angular of limestone.			
0.50-0.50	S1		P.I.D 0.0	178.02	0.60				
0.70	CU 100kPa								
0.90	CU 38kPa		CLAY crumbles during Shear Vane test 0.70m bgl - 3.90m bgl.						
1.00-1.00	N2								
1.00-2.00	G3		P.I.D 0.0		(1.20)	Firm fissured orangish brown sandy gravelly slightly cobbly CLAY. Gravel is sub angular to sub rounded fine to coarse of various lithologies.			
1.00-1.45	SPT N=18		3,4/5,4,5,4						
				176.82	1.80				
2.00-2.45	SPT N=7		2,1/2,2,1,2			Loose brown silty gravelly medium to coarse SAND. Gravel is sub angular to sub rounded fine to coarse of various lithologies.		▽1	
			minor(1) at 2.70m.		(2.00)	CLAY band 2.60m bgl - 2.70m bgl. CLAY band 2.80m bgl - 2.90m bgl.			
3.00-3.45	SPT N=5		0,0/0,1,2,2			CLAY band 3.50m bgl - 3.60m bgl.			
3.90	CU 34kPa			174.82	3.80				
4.00-4.45	SPT N=20		4,4/4,4,5,7			Soft to firm greyish brown very sandy gravelly CLAY with coal traces. Gravel is sub angular to sub rounded fine to coarse of various lithologies.			
4.60	CU 92kPa				(1.50)				
4.70	CU 53kPa								
4.90	CU 55kPa					COAL trace.			
5.00-5.45	SPT N=86		4,15/36,50						
				173.32	5.30	Unknown OBSTRUCTION.			
						Complete at 5.45m			

Remarks
Window Sample hole terminated at 5.30m bgl after SPT refusal on unknown OBSTRUCTION.

Scale (approx)	Logged By
1:50	GF

Figure No. 26357LG.WS3

Sutcliffe Investigations

Site	Number
Albert Street	WS4

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dando Terrier Rig.		178.10	Ascent	26357LG
	Location See Location Plan.	**Dates** 06/09/2012	**Engineer** GF	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				178.05	(0.05)	Bituminous macadam.		
					0.05			
0.30-0.30	S1		P.I.D 0.0	177.70	(0.35)	MADE GROUND comprising dark brown gravelly SAND with half bricks and cobble sized sub angular fragments of clinker. Gravel is sub angular fine to coarse of brick and clinker.		
					0.40			
0.70	CU 53kPa					Firm closely fissured thinly laminated dessicated orangish brown sandy gravelly slightly cobbly CLAY. Surfaces are planar rough with fine light grey silt. Gravel is sub angular to sub rounded fine to coarse of various lithologies. Cobbles are sub angular of sandstone.		
0.90	CU 77kPa		CLAY shatters under					
0.90-0.90	N2		Shear Vane 0.70m bgl - 0.90m bgl. P.I.D 0.0		(1.45)			
1.00-1.45	SPT N=17		2,3/4,3,4,6					
1.50	CU 70kPa					SAND band 1.55m bgl - 1.70m bgl.		
1.75	CU 120kPa							
				176.25	1.85			
2.00-2.45	SPT N=19		3,6/6,4,4,5			Medium dense becoming loose gravelly slightly clayey medium and coarse SAND. Gravel is sub angular fine to coarse of coal and other various lithologies.		
						CLAY band at 2.70m bgl - 2.80m bgl.		▽1
			minor(1) at 3.00m.					
3.00-3.45	SPT N=6		3,2/2,2,1,1		(2.85)			
						Machine drilled under own weight 4.00m bgl - 4.50m bgl.		
4.00-4.45	SPT N=3		1,1/1,0,1,1					
				173.40	4.70	Soft to firm dark grey very sandy gravelly CLAY. Gravel is sub rounded to rounded fine to coarse of various lithologies.		
5.00-5.45	SPT N=17		2,3/3,4,4,6					
					(1.20)			
5.45-5.90	SPT N=55		7,7/9,14,15,17					
				172.20	5.90	Refusal.		
						Complete at 5.90m		

Remarks
Window Sample hole terminated at 5.90m bgl after SPT refusal in stiff CLAY.

Scale (approx)	Logged By
1:50	GF

Figure No. 26357LG.WS4

APPENDIX C - GROUND GAS RESULTS

	SUTCLIFFE INVESTIGATIONS TEL: 0151 227 3155 FAX: 0151 227 3156	**GAS MEASUREMENTS AND WATER LEVELS**	**Sheet No.: 1 of 1** **Atmospheric Pressure: 976 mb** **Weather: Cloudy** **Pressure Trend: Rising**
	CLIENT: Ascent	**SITE: Albert Street**	
	Date of Fieldwork: 18.10.12	**Logged By: CB**	**Job No.: 26357LG**

B/H REF	CH_4		CO_2	O_2	Relative Pressure	Flow Rate	P.I.D	Base of Borehole	Water Level	Reduced Water Level
	%LEL	%by vol	%by vol	%by vol	(mb)	(l/h)		(mbgl)	(mbgl)	(m) A.O.D
WS2		0.1	0.6	20.5	0.0	+0.1	0.0	3.10	1.30	-
		0.1	0.5	20.1						
		0.1	0.4	20.4						
		0.1	0.3	20.4						
WS3		0.1	0.3	20.6	0.0	+0.1	0.0	1.40	Dry	-
		0.1	0.3	20.6						
		0.1	0.2	20.6						
		0.1	0.2	20.6						

COMMENTS:

INSTRUMENT USED:	ACCURACY OF INSTRUMENT (% by volume)	CH_4	CO_2	O_2
		± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 1.0%

A = Accumulated Type Sample SS = Steady State Type SampleP = Peak Type Sample l/h = Litres per hour

%LEL = Lower Explosive Limit (for CH4 in air 100% = 5% by volume) mb = Millibar mbgl = Metres Below Ground Level

	SUTCLIFFE INVESTIGATIONS TEL: 0151 227 3155 FAX: 0151 227 3156	**GAS MEASUREMENTS AND WATER LEVELS**	**Sheet No.: 1 of 1** **Atmospheric Pressure: 964 mb** **Weather: Clear** **Pressure Trend: Rising**
	CLIENT: Ascent	**SITE: Albert Street**	
	Date of Fieldwork: 02.11.12	**Logged By: CB**	**Job No.: 26357LG**

B/H REF	CH_4		CO_2	O_2	Relative Pressure	Flow Rate	P.I.D	Base of Borehole	Water Level	Reduced Water Level
	%LEL	%by vol	%by vol	%by vol	(mb)	(l/h)		(mbgl)	(mbgl)	(m) A.O.D
WS2		0.1	0.5	20.6	0.0	+0.1	0.0	3.10	1.30	-
		0.1	0.4	20.5						
		0.1	0.3	20.6						
		0.1	0.3	20.6						
WS3		0.1	0.4	20.6	0.0	+0.1	0.0	1.40	Dry	-
		0.1	0.3	20.6						
		0.1	0.3	20.6						
		0.1	0.3	20.6						

COMMENTS:

INSTRUMENT USED:	ACCURACY OF INSTRUMENT (% by volume)	CH_4	CO_2	O_2
		± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 1.0%

A = Accumulated Type Sample SS = Steady State Type SampleP = Peak Type Sample l/h = Litres per hour

%LEL = Lower Explosive Limit (for CH4 in air 100% = 5% by volume) mb = Millibar mbgl = Metres Below Ground Level

	SUTCLIFFE INVESTIGATIONS TEL: 0151 227 3155 FAX: 0151 227 3156	**GAS MEASUREMENTS AND WATER LEVELS**	**Sheet No.: 1 of 1** **Atmospheric Pressure: 991 mb** **Weather: Clear** **Pressure Trend: Steady**
	CLIENT: Ascent	**SITE: Albert Street**	
	Date of Fieldwork: 16.11.12	**Logged By: CB**	**Job No.: 26357LG**

B/H REF	CH_4		CO_2	O_2	Relative Pressure	Flow Rate	P.I.D	Base of Borehole	Water Level	Reduced Water Level
	%LEL	%by vol	%by vol	%by vol	(mb)	(l/h)		(mbgl)	(mbgl)	(m) A.O.D
WS2		0.1	1.7	20.8	0.0	+0.1	0.0	3.10	1.50	-
		0.1	1.4	19.6						
		0.1	1.0	20.0						
		0.1	0.9	20.1						
WS3		0.1	0.4	21.1	0.0	0.0	0.0	1.40	Dry	-
		0.1	0.3	21.1						
		0.1	0.2	21.1						
		0.1	0.2	21.1						

COMMENTS:

INSTRUMENT USED:	ACCURACY OF INSTRUMENT (% by volume)	CH_4	CO_2	O_2
		± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 1.0%

A = Accumulated Type Sample SS = Steady State Type SampleP = Peak Type Sample l/h = Litres per hour

%LEL = Lower Explosive Limit (for CH4 in air 100% = 5% by volume) mb = Millibar mbgl = Metres Below Ground Level

	SUTCLIFFE INVESTIGATIONS TEL: 0151 227 3155 FAX: 0151 227 3156	**GAS MEASUREMENTS AND WATER LEVELS**	**Sheet No.: 1 of 1** **Atmospheric Pressure: 989 mb** **Weather: Overcast** **Pressure Trend: Steady**
	CLIENT: Ascent	**SITE: Albert Street**	
	Date of Fieldwork: 6.12.12	**Logged By: CB**	**Job No.: 26357LG**

B/H REF	CH_4		CO_2	O_2	Relative Pressure	Flow Rate	P.I.D	Base of Borehole	Water Level	Reduced Water Level
	%LEL	%by vol	%by vol	%by vol	(mb)	(l/h)		(mbgl)	(mbgl)	(m) A.O.D
WS2		0.1	1.6	21.0	0.0	0.0	0.0	3.10	2.00	-
		0.1	1.2	20.7						
		0.1	0.9	20.8						
		0.1	0.8	20.8						
WS3		0.1	0.4	21.1	0.0	0.0	0.0	1.40	Dry	-
		0.1	0.5	21.0						
		0.1	0.4	21.0						
		0.1	0.4	21.0						

COMMENTS:

INSTRUMENT USED:	ACCURACY OF INSTRUMENT (% by volume)	CH_4	CO_2	O_2
		± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 0.5% @ 5% ± 1.0% @15% ±3.0% @>15%	± 1.0%

A = Accumulated Type Sample SS = Steady State Type SampleP = Peak Type Sample l/h = Litres per hour

%LEL = Lower Explosive Limit (for CH4 in air 100% = 5% by volume) mb = Millibar mbgl = Metres Below Ground Level

APPENDIX D - CONTAMINATION RESULTS

Job Name:	Albert Street
Job Number:	26357LG

Contaminant	Units	SGV	REVISED 31/03/11 RESIDENTIAL WITH PLANT UPTAKE: Atkins Atrisk 1% SOM	Additional Values for 1% SOM (mg/kg) See notes	Atkins Atrisk 6% SOM	Additional Values for 6% SOM (mg/kg) See notes	LQM: SOM 1%	LQM: SOM 2.5%	LQM: SOM 5%	12-68454 442908 WS1 0.40m	12-68454 442909 WS1 1.00m	12-68454 442910 WS2 0.40m	12-68454 442911 WS3 0.50m	12-68454 442912 WS4 0.30m	12-68454 442913 WS4 0.90m
Arsenic (Total)	mg/kg	32	32		32					5.8	6.5	5.3	6.2	7.5	7.3
Boron (Soluble)	mg/kg						291			3.5	1.2	4.6	3.8	2.7	1.1
Cadmium (Total)	mg/kg		10		10		3			0.7	0.5	0.4	0.6	0.8	0.7
Chromium III	mg/kg		12800		12900		627			19	22	16	14	19	23
Chromium VI	mg/kg		14.2		14.5		4.3			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper (Total)	mg/kg		3970		4020		2330			33	19	15	22	23	28
Lead (Total)	mg/kg		276		342					17	9.8	16	26	26	13
Mercury (Total)	mg/kg	170	170		170					< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Total)	mg/kg	130	130		130					22	22	14	7.6	12	27
Selenium (Total)	mg/kg	350	350		350					2.8	< 0.5	3.7	5.2	4	< 0.5
Zinc (Total)	mg/kg		16900		17200		3750			71	43	63	120	110	59
Cyanide (Total)	mg/kg		34		34					6.2	0.8	0.2	0.5	0.3	0.4
Phenols (Total)	mg/kg		162		420		210	390	780	1.2	0.6	< 0.3	< 0.3	< 0.3	< 0.3
Organic matter	%									7.9	0.8	6.7	5.4	5.6	0.7
Sulphate (Total) as SO3	%									0.17	0.08	0.11	0.21	0.16	0.07
Sulphate as Water Soluble	g/l									0.69	0.13	0.49	0.58	0.25	0.073
Sulphide	mg/kg									1500	16	2100	3200	4400	63
pH	pH units									8.5	9.4	7	9.8	10.3	6.8
Sulphur (Elemental)	mg/kg									260	34	150	110	170	4.3
>> TPH SUITE <<															
TPH (Total)															
Total Aliphatic															
>C5 to C6 aliphatic	mg/kg		30.1		259		30	55	110	< 0.01	N/S	N/S	N/S	< 0.01	N/S
>C6 to C8 aliphatic	mg/kg		69.8		14700	769	73	160	370	< 0.01	N/S	N/S	N/S	< 0.01	N/S
>C8 to C10 aliphatic	mg/kg		9.79		144		19	46	110	< 0.01	N/S	N/S	N/S	< 0.01	N/S
>C10 to C12 aliphatic	mg/kg		1390	49.9	4140	297	93	230	540	< 1.5	N/S	N/S	N/S	< 1.5	N/S
>C12 to C16 aliphatic	mg/kg		5100	21	5260	126	740	1700	3000	3.4	N/S	N/S	N/S	8.9	N/S
>C16 to C21 aliphatic	mg/kg		145000		145000		45000	64000	76000	23	N/S	N/S	N/S	38	N/S
>C21 to C35 aliphatic	mg/kg		145000		145000		45000	64000	76000	290	N/S	N/S	N/S	430	N/S
Total Aromatic															
>C5 to C7 aromatic (Benzene)	mg/kg		0.0493		0.33		65	130	280	< 0.01	N/S	N/S	N/S	< 0.01	N/S
>C7 to C8 aromatic (Toluene)	mg/kg		86.9		610		120	270	611	0.01	N/S	N/S	N/S	< 0.01	N/S
>C8 to C10 aromatic	mg/kg		14.8		177		27	65	151	< 0.01	N/S	N/S	N/S	< 0.01	N/S
>C10 to C12 aromatic	mg/kg		57.3		389		69	160	346	< 0.9	N/S	N/S	N/S	< 0.9	N/S
>C12 to C16 aromatic	mg/kg		142		687		140	310	593	3.7	N/S	N/S	N/S	25	N/S
>C16 to C21 aromatic	mg/kg		272		804		250	480	770	53	N/S	N/S	N/S	440	N/S
>C21 to C35 aromatic	mg/kg		888		1220		890	1100	1230	440	N/S	N/S	N/S	1600	N/S
>> BTEX SUITE <<															
benzene	mg/kg	0.33	0.0493		0.33					< 0.01	N/S	N/S	N/S	< 0.01	N/S
toluene	mg/kg	610	86.9		610					0.01	N/S	N/S	N/S	< 0.01	N/S
ethylbenzene	mg/kg	350	38.2		350					< 0.01	N/S	N/S	N/S	< 0.01	N/S
xylene	mg/kg	230	17.2		230					< 0.01	N/S	N/S	N/S	< 0.01	N/S
>> PAH SUITE <<															
naphthalene	mg/kg		0.585		8.71		1.5	3.7	8.7	0.3	< 0.1	< 1.1	< 1.1	< 1.1	< 0.1
acenaphthylene	mg/kg						170	400	850	< 0.1	< 0.1	< 1.1	< 1.1	1.2	< 0.1
acenaphthene	mg/kg		588	157	2130	937	210	480	1000	0.2	< 0.1	5.1	< 1.1	12	< 0.1
fluorene	mg/kg		615	125	1930	746	160	380	780	0.2	< 0.1	5.8	1.2	16	< 0.1
phenanthrene	mg/kg						92	200	380	0.4	< 0.1	32	7.5	90	< 0.1
anthracene	mg/kg		8270	3.48	18300	20.9	2300	4900	9200	0.2	< 0.1	14	5.8	43	< 0.1
fluoranthene	mg/kg		822	18.9	2160	113	260	460	670	2.4	< 0.1	92	100	270	0.1
pyrene	mg/kg		563	2.2	1550	13.2	560	1000	1600	2.6	< 0.1	85	110	230	< 0.1
benzo(a)anthracene	mg/kg		4.52	1.71	8.54		3.1	4.7	5.9	1.5	< 0.1	44	66	130	0.1
chrysene	mg/kg		585	0.44	927	2.64	6	8	9.3	1.8	< 0.1	45	68	130	< 0.1
benzo(b)fluoranthene	mg/kg		7.72	1.22	9.86	7.29	5.6	6.5	7	1.3	< 0.1	34	57	110	< 0.1
benzo(k)fluoranthene	mg/kg		84.4	0.686	100	4.12	8.5	9.6	10	0.9	< 0.1	20	35	60	< 0.1
benzo(a)pyrene	mg/kg		0.818		0.998		0.83	0.94	1	1.5	< 0.1	43	79	140	0.1
dibenzo(ah)anthracene	mg/kg		0.838	0.00393	1	0.0236	0.76	0.86	0.9	0.4	< 0.1	7.3	6.8	15	< 0.1
benzo(ghi)perylene	mg/kg		96.2	0.0187	103	0.112	44	46	47	2.5	< 0.1	41	55	98	< 0.1
indeno(123cd)pyrene	mg/kg		7.31	0.0614	9.75	0.368	3.2	3.9	4.2	1.7	< 0.1	40	59	100	< 0.1

Job Name:	Albert Street
Job Number:	26357LG

		LEACHATES		12-68454-1	12-68454-1
CAS Number:	**Units**	**Site Specific Guidelines**		**442914**	**442915**
Sample Ref				**WS1**	**WS4**
Determinand Name		**EQS**	**UK DWS**	**0.4**	**0.3**
Leachate Prep (10:1 Std NRA)*				Y	Y
Arsenic (Soluble)*	µg/l	50	10	0.8	0.8
Boron (Soluble)	mg/l	2000	1000	0.31	0.33
Cadmium (Soluble)	µg/l	5	5	< 0.030	< 0.030
Chromium (Soluble)	µg/l	5 to 250	50	< 0.25	< 0.25
Copper (Soluble)	µg/l	1 to 28	2000	< 0.40	0.64
Lead (Soluble)	µg/l	4 to 250	25	< 0.090	< 0.090
Mercury (Soluble)	µg/l	1	1	< 0.05	< 0.05
Nickel (Soluble)	µg/l	50 to 200	50	< 0.50	< 0.50
Selenium (Soluble)*	µg/l		10	1.1	1.7
Sulphur (Free)	mg/l			< 0.09	< 0.09
Zinc (Soluble)	µg/l	8 to 500	5000	1.3	< 1.3
Cyanide (Total)*	mg/l		50	< 0.04	< 0.04
Phenols (Total)	mg/l			< 0.0005	< 0.0005
Sulphate as SO3	mg/l	400	250	82	16
Sulphide as S	µg/l	0.25		< 10.0	< 10.0
pH	pH units			7.8	8.3
EPH >C10 - C40				61	260
>> PAH SUITE <<*					
naphthalene*	µg/l	5		0.11	0.24
acenaphthylene*	µg/l			< 0.01	< 0.01
acenaphthene*	µg/l			< 0.01	0.52
fluorene*	µg/l			< 0.01	0.09
phenanthrene*	µg/l			0.11	2
anthracene*	µg/l	0.02		0.04	0.91
fluoranthene*	µg/l			4.4	16
pyrene*	µg/l			5.1	17
benzo(a)anthracene*	µg/l			2.3	6
chrysene*	µg/l			1.6	4.4
benzo(b)fluoranthene*	µg/l			3.6	6.4
benzo(k)fluoranthene*	µg/l			1.9	3.5
benzo(a)pyrene*	µg/l	0.03	0.01	3.3	7.5
dibenzo(ah)anthracene*	µg/l			0.47	1.5
benzo(ghi)perylene*	µg/l			2.1	1.7
indeno(123cd)pyrene*	µg/l			4.2	4.7

Certificate of Analysis

2139

Date: 14/09/2012

Certificate Number: 12-68454

Client:	Sutcliffe 18-20 Harrington Street Liverpool Merseyside L2 9QA
Our Reference:	12-68454
Client Reference:	26357LG
Contract Title:	Albert Street
Description:	6 soil samples, 2 leachate samples
Date Received:	07 September 2012
Date Started:	07 September 2012
Date Completed:	14 September 2012
Test Procedures:	Identified by prefix DETSn (details on request), Asbestos Analysis (DETS 082).
Notes:	Observations and interpretations are outside the scope of UKAS accreditation
Approved By:	Rob Brown, Business Manager

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • Fax 01207 582444 • email: info@dets.co.uk • www.dets.co.uk

Information in Support of the Analytical Results

Analysis

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425um sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample.

Key

*	Denotes test not included in laboratory scope of accreditation
#	Denotes test that holds MCERTS accreditation, however, MCERTS accreditation is only implied if the report carries the MCERTS logo
$	Denotes tests completed by an approved subcontractor
I/S	Denotes insufficient sample to carry out test
U/S	Denotes that the sample is not suitable for testing

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month
Liquids - 2 weeks
Asbestos (test portion) - 6 months

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

			Lab No.	442908	442909	442910	442911
			Sample ID	WS1	WS1	WS2	WS3
			Depth	0.40	1.00	0.40	0.50
			Sample Ref				
			Sample Type				
			Sampling Date	06/09/2012	06/09/2012	06/09/2012	06/09/2012
			Sampling Time				
Test	**Units**	**DETSxx**	**LOD**				
Moisture Content	%	DETS 046*	0.1	17	16	9.0	10
Arsenic	mg/kg	DETS 042#	0.2	5.8	6.5	5.3	6.2
Cadmium	mg/kg	DETS 042#	0.1	0.7	0.5	0.4	0.6
Chromium III	mg/kg	DETS 042*	0.15	19	22	16	14
Chromium	mg/kg	DETS 042#	0.15	19	22	16	14
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	33	19	15	22
Lead	mg/kg	DETS 042#	0.3	17	9.8	16	26
Mercury	mg/kg	DETSC 2325#	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	mg/kg	DETS 042#	1	22	22	14	7.6
Selenium	mg/kg	DETS 042#	0.5	2.8	< 0.5	3.7	5.2
Zinc	mg/kg	DETS 042#	1	71	43	63	120
Boron (water soluble)	mg/kg	DETS 020#	0.2	3.5	1.2	4.6	3.8
Cyanide total	mg/kg	DETSC 2130#	0.1	6.2	0.8	0.2	0.5
Organic matter	%	DETSC 2002#	0.1	7.9	0.8	6.7	5.4
Sulphur (free)	mg/kg	DETSC 3049#	0.75	260	34	150	110
Sulphide	mg/kg	DETSC 2024#	10	1500	16	2100	3200
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.17	0.08	0.11	0.21
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	690	130	490	580
pH		DETSC 2008#		8.5	9.4	7.0	9.8
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01			
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01			
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01			
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5			
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	3.4			
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	23			
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	290			
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01			
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	0.01			
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01			
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	< 0.9			
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	3.7			
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	53			
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	440			
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	320			
Aromatic C5-C35	mg/kg	DETSC 3072*	10	500			
TPH Ali/Aro	mg/kg	DETSC 3072*	10	820			

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

			Lab No.	442908	442909	442910	442911
			Sample ID	WS1	WS1	WS2	WS3
			Depth	0.40	1.00	0.40	0.50
			Sample Ref				
			Sample Type				
			Sampling Date	06/09/2012	06/09/2012	06/09/2012	06/09/2012
			Sampling Time				
Test	**Units**	**DETSxx**	**LOD**				
Acenaphthene	mg/kg	DETSC 3301	0.1	0.2	< 0.1	5.1	< 1.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	< 0.1	< 0.1	< 1.1	< 1.1
Anthracene	mg/kg	DETSC 3301	0.1	0.2	< 0.1	14	5.8
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	1.5	< 0.1	44	66
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	1.5	< 0.1	43	79
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	1.3	< 0.1	34	57
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	0.9	< 0.1	20	35
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	2.5	< 0.1	41	55
Chrysene	mg/kg	DETSC 3301	0.1	1.8	< 0.1	45	68
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	0.4	< 0.1	7.3	6.8
Fluoranthene	mg/kg	DETSC 3301	0.1	2.4	< 0.1	92	100
Fluorene	mg/kg	DETSC 3301	0.1	0.2	< 0.1	5.8	1.2
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	1.7	< 0.1	40	59
Naphthalene	mg/kg	DETSC 3301	0.1	0.3	< 0.1	< 1.1	< 1.1
Phenanthrene	mg/kg	DETSC 3301	0.1	0.4	< 0.1	32	7.5
Pyrene	mg/kg	DETSC 3301	0.1	2.6	< 0.1	85	110
PAH	mg/kg	DETSC 3301	1.6	18	< 1.6	510	650
Benzene	mg/kg	DETS 062#	0.01	< 0.01			
Ethylbenzene	mg/kg	DETS 062#	0.01	< 0.01			
Toluene	mg/kg	DETS 062#	0.01	0.01			
Xylene	mg/kg	DETS 062#	0.01	< 0.01			
MTBE	mg/kg	DETS 062	0.01	< 0.01			
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	1.2	0.6	< 0.3	< 0.3
Stones >2mm	% m/m	DETSC 1003*	1	52	< 1.0	54	50

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

			Lab No.	442912	442913
			Sample ID	WS4	WS4
			Depth	0.30	0.90
			Sample Ref		
			Sample Type		
			Sampling Date	06/09/2012	06/09/2012
			Sampling Time		
Test	**Units**	**DETSxx**	**LOD**		
Moisture Content	%	DETS 046*	0.1	8.0	11
Arsenic	mg/kg	DETS 042#	0.2	7.5	7.3
Cadmium	mg/kg	DETS 042#	0.1	0.8	0.7
Chromium III	mg/kg	DETS 042*	0.15	19	23
Chromium	mg/kg	DETS 042#	0.15	19	23
Hexavalent Chromium	mg/kg	DETSC 2204*	1	< 1.0	< 1.0
Copper	mg/kg	DETS 042#	0.2	23	28
Lead	mg/kg	DETS 042#	0.3	26	13
Mercury	mg/kg	DETSC 2325#	0.05	< 0.05	< 0.05
Nickel	mg/kg	DETS 042#	1	12	27
Selenium	mg/kg	DETS 042#	0.5	4.0	< 0.5
Zinc	mg/kg	DETS 042#	1	110	59
Boron (water soluble)	mg/kg	DETS 020#	0.2	2.7	1.1
Cyanide total	mg/kg	DETSC 2130#	0.1	0.3	0.4
Organic matter	%	DETSC 2002#	0.1	5.6	0.7
Sulphur (free)	mg/kg	DETSC 3049#	0.75	170	4.3
Sulphide	mg/kg	DETSC 2024#	10	4400	63
Total Sulphate as SO4	%	DETSC 2321#	0.01	0.16	0.07
Sulphate Aqueous Extract as SO4	mg/l	DETSC 2076#	10	250	73
pH		DETSC 2008#		10.3	6.8
Aliphatic C5-C6	mg/kg	DETSC 3321*	0.01	< 0.01	
Aliphatic C6-C8	mg/kg	DETSC 3321*	0.01	< 0.01	
Aliphatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	
Aliphatic C10-C12	mg/kg	DETSC 3072#	1.5	< 1.5	
Aliphatic C12-C16	mg/kg	DETSC 3072#	1.2	8.9	
Aliphatic C16-C21	mg/kg	DETSC 3072#	1.5	38	
Aliphatic C21-C35	mg/kg	DETSC 3072#	3.4	430	
Aromatic C5-C7	mg/kg	DETSC 3321*	0.01	< 0.01	
Aromatic C7-C8	mg/kg	DETSC 3321*	0.01	< 0.01	
Aromatic C8-C10	mg/kg	DETSC 3321*	0.01	< 0.01	
Aromatic C10-C12	mg/kg	DETSC 3072#	0.9	< 0.9	
Aromatic C12-C16	mg/kg	DETSC 3072#	0.5	25	
Aromatic C16-C21	mg/kg	DETSC 3072#	0.6	440	
Aromatic C21-C35	mg/kg	DETSC 3072#	1.4	1600	
Aliphatic C5-C35	mg/kg	DETSC 3072*	10	470	
Aromatic C5-C35	mg/kg	DETSC 3072*	10	2100	
TPH Ali/Aro	mg/kg	DETSC 3072*	10	2600	

Summary of Chemical Analysis
Soil Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

			Lab No.	442912	442913
			Sample ID	WS4	WS4
			Depth	0.30	0.90
			Sample Ref		
			Sample Type		
			Sampling Date	06/09/2012	06/09/2012
			Sampling Time		
Test	**Units**	**DETSxx**	**LOD**		
Acenaphthene	mg/kg	DETSC 3301	0.1	12	< 0.1
Acenaphthylene	mg/kg	DETSC 3301	0.1	1.2	< 0.1
Anthracene	mg/kg	DETSC 3301	0.1	43	< 0.1
Benzo(a)anthracene	mg/kg	DETSC 3301	0.1	130	0.1
Benzo(a)pyrene	mg/kg	DETSC 3301	0.1	140	0.1
Benzo(b)fluoranthene	mg/kg	DETSC 3301	0.1	110	< 0.1
Benzo(k)fluoranthene	mg/kg	DETSC 3301	0.1	60	< 0.1
Benzo(g,h,i)perylene	mg/kg	DETSC 3301	0.1	98	< 0.1
Chrysene	mg/kg	DETSC 3301	0.1	130	< 0.1
Dibenzo(a,h)anthracene	mg/kg	DESTC 3301	0.1	15	< 0.1
Fluoranthene	mg/kg	DETSC 3301	0.1	270	0.1
Fluorene	mg/kg	DETSC 3301	0.1	16	< 0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	DETSC 3301	0.1	100	< 0.1
Naphthalene	mg/kg	DETSC 3301	0.1	< 1.1	< 0.1
Phenanthrene	mg/kg	DETSC 3301	0.1	90	< 0.1
Pyrene	mg/kg	DETSC 3301	0.1	230	< 0.1
PAH	mg/kg	DETSC 3301	1.6	1400	< 1.6
Benzene	mg/kg	DETS 062#	0.01	< 0.01	
Ethylbenzene	mg/kg	DETS 062#	0.01	< 0.01	
Toluene	mg/kg	DETS 062#	0.01	< 0.01	
Xylene	mg/kg	DETS 062#	0.01	< 0.01	
MTBE	mg/kg	DETS 062	0.01	< 0.01	
Phenol - Monohydric	mg/kg	DETSC 2130#	0.3	< 0.3	< 0.3
Stones >2mm	% m/m	DETSC 1003*	1	42	2.0

Summary of Asbestos Analysis
Soil Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

Lab No	Sample Ref	Material Type*	Result	Comment	Analyst
442908	WS1 0.40	Soil	NAD	None	Keith Wilson
442909	WS1 1.00	Soil	NAD	None	Keith Wilson
442910	WS2 0.40	Soil	NAD	None	Keith Wilson
442911	WS3 0.50	Soil	NAD	None	Keith Wilson
442912	WS4 0.30	Soil	NAD	None	Keith Wilson
442913	WS4 0.90	Soil	NAD	None	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. NAD = No Asbestos Detected. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETS 082 using polarised light microscopy in accordance with HSG248 and documented in-house methods. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'.

Summary of Chemical Analysis
Leachate Samples

Our Ref: 12-68454
Client Ref: 26357LG
Contract Title: Albert Street

			Lab No.	442914	442915
			Sample ID	WS1	WS4
			Depth	0.40	0.30
			Sample Ref		
			Sample Type		
			Sampling Date	06/09/2012	06/09/2012
			Sampling Time		
Test	**Units**	**DETSxx**	**LOD**		
NRA Leachate Preparation		DETS 036*		Y	Y
Arsenic, Dissolved	ug/l	DETSC 2306	0.16	0.80	0.80
Cadmium, Dissolved	ug/l	DETSC 2306	0.03	< 0.030	< 0.030
Chromium III Dissolved	ug/l	DETSC 2302*	5	< 5.0	< 5.0
Chromium, Dissolved	ug/l	DETSC 2306	0.25	< 0.25	< 0.25
Hexavalent Chromium	ug/l	DETSC 2203	10	< 10	< 10
Copper, Dissolved	ug/l	DETSC 2306	0.4	< 0.40	0.64
Lead, Dissolved	ug/l	DETSC 2306	0.09	< 0.090	< 0.090
Mercury Dissolved	ug/l	DETSC 2324	0.05	< 0.05	< 0.05
Nickel, Dissolved	ug/l	DETSC 2306	0.5	< 0.50	< 0.50
Selenium, Dissolved	ug/l	DETSC 2306	0.25	1.1	1.7
Zinc, Dissolved	ug/l	DETSC 2306	1.25	1.3	< 1.3
Sulphate as SO4	mg/l	DETSC 2055*	0.1	82	16
Boron	ug/l	DETS 020	100	310	330
Cyanide total	ug/l	DETSC 2130	40	< 40.0	< 40.0
Sulphur (free)	ug/l	DETSC 3049	90	< 90.0	< 90.0
Sulphide	ug/l	DETSC 2208	10	< 10.0	< 10.0
Total Organic Carbon	mg/l	*	2	< 2.0	< 2.0
pH		DETSC 2008		7.8	8.3
Acenaphthene	ug/l	DETS 074*	0.01	< 0.01	0.52
Acenaphthylene	ug/l	DETS 074*	0.01	< 0.01	< 0.01
Anthracene	ug/l	DETS 074*	0.01	0.04	0.91
Benzo(a)anthracene	ug/l	DETS 074*	0.01	2.3	6.0
Benzo(a)pyrene	ug/l	DETS 074*	0.01	3.3	7.5
Benzo(b)fluoranthene	ug/l	DETS 074*	0.01	3.6	6.4
Benzo(k)fluoranthene	ug/l	DETS 074*	0.01	1.9	3.5
Benzo(g,h,i)perylene	ug/l	DETS 074*	0.01	2.1	1.7
Chrysene	ug/l	DETS 074*	0.01	1.6	4.4
Dibenzo(a,h)anthracene	ug/l	DETS 074*	0.01	0.47	1.5
Fluoranthene	ug/l	DETS 074*	0.01	4.4	16
Fluorene	ug/l	DETS 074*	0.01	< 0.01	0.09
Indeno(1,2,3-c,d)pyrene	ug/l	DETS 074*	0.01	4.2	4.7
Naphthalene	ug/l	DETS 074*	0.01	0.11	0.24
Phenanthrene	ug/l	DETS 074*	0.01	0.11	2.0
Pyrene	ug/l	DETS 074*	0.01	5.1	17
PAH	ug/l	DETS 074*	0.2	29	72
PRO (C6-C10)	ug/l	DETSC 3322	1	< 1.0	< 1.0
EPH (C10-C40)	ug/l	DETSC 3311	10	61	260
Phenol	ug/l	DETS 079*	0.5	< 0.50	< 0.50

Sample Comments

DETS cannot be held responsible for the integrity of sample(s) received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating.

Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note "Guidance on Deviating Samples".

All samples received are listed below. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations.

If no sampled date (soils) or date/time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters), this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Lab No.	Sample ID	Date Sampled	Containers Received	Deviating due to holding time being exceeded for test	Deviating due to inappropriate container for test
442908	WS1 0.40 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442909	WS1 1.00 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442910	WS2 0.40 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442911	WS3 0.50 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442912	WS4 0.30 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442913	WS4 0.90 SOIL	06/09/2012	Glass Jar 250ml or less, Glass Vial, Plastic Tub 1 litre		
442914	WS1 0.40 LEACHATE	06/09/2012	Glass Jar 1 litre		
442915	WS4 0.30 LEACHATE	06/09/2012	Glass Jar 1 litre		

APPENDIX E - STATISTICAL ANALYSIS

Client/client ref: Ascent
Project ref: 26357LG
Site ref: Albert Street
Data description: Made Ground
Contaminant(s): Metals
Test scenario: Planning
Date: 30.01.13
User details: DB

	Arsenic (Total) (mg/kg)	Boron (Soluble) (mg/kg)	Cadmium (Total) (mg/kg)	Chromium III (mg/kg)	Chromium VI (mg/kg)	Copper (Total) (mg/kg)	Lead (Total) (mg/kg)	Mercury (Total) (mg/kg)	Nickel (Total) (mg/kg)	Selenium (Total) (mg/kg)	Zinc (Total) (mg/kg)	Cyanide (Total) (mg/kg)	Phenols (Total) (mg/kg)
Critical concentration, C_c	**32**	**291**	**10**	**12800**	**14.2**	**3970**	**276**	**170**	**130**	**350**	**16900**	**34**	**162**
Notes	Atkins 1% SOM Res With	LQM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With
Sample size, n	4	4	4	4	4	4	4	4	4	4	4	4	4
Sample mean, $\overline{X}$	6.2	3.65	0.625	17	1	23.25	21.25	0.025	13.9	3.925	91	1.8	0.525
Standard deviation, s	0.94162979	0.78528127	0.17078251	2.44948974	0	7.41057803	5.5	0	6.02550136	0.99121138	28.2016548	2.93598365	0.45
Number of non-detects	0	0	0	0	**4**	0	0	**4**	0	0	0	0	**3**
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Detection limit
Outliers?	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
Distribution	Normal	Normal	Normal	Normal	Single value	Normal	Normal	Single value	Normal	Normal	Normal	Non-normal	Non-normal
Statistical approach	Auto: One-sample t-	Auto: One-sample t-	Auto: One-sample t-	Auto: One-sample t-	Auto: Chebychev	Auto: One-sample t-	Auto: One-sample t-	Auto: Chebychev	Auto: One-sample t-	Auto: One-sample t-	Auto: One-sample t-	Auto: Chebychev	Auto: Chebychev

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers					
t statistic, t_0 (or k_0)	-54.79860599	-731.8396922	-109.7887582	-10437.27579	N/A	-1065.166573	-92.63636364	N/A	-38.53621235	-698.2869789	-1192.057709	-21.93472705	-717.6666667
Upper confidence limit (on true mean concentration, μ)	7.30799856	4.57402611	0.82595666	19.8822698	1	31.9698917	27.7217494	0.025	20.9900973	5.09134031	124.184372	8.19882802	1.50575226
Evidence level	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**
Select dataset	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Go to summary

Data sheet

Project details

Easting	Northing	Sample ID	Arsenic (Total)	Boron (Soluble)	Cadmium (Total)	Chromium III	Chromium VI	Copper (Total)	Lead (Total)	Mercury (Total)	Nickel (Total)	Selenium (Total)	Zinc (Total)	Cyanide (Total)	Phenols (Total)
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		WS1 0.40m	5.8	3.5	0.7	19	< 1.0	33	17	< 0.05	22	2.8	71	6.2	1.2
		WS2 0.40m	5.3	4.6	0.4	16	< 1.0	15	16	< 0.05	14	3.7	63	0.2	< 0.3
		WS3 0.50m	6.2	3.8	0.6	14	< 1.0	22	26	< 0.05	7.6	5.2	120	0.5	< 0.3
		WS4 0.30m	7.5	2.7	0.8	19	< 1.0	23	26	< 0.05	12	4	110	0.3	< 0.3

Client/client ref: Ascent
Project ref: 26357LG
Site ref: Albert Street
Data description: Made Ground
Contaminant(s): PAH
Test scenario: Planning
Date: 30.01.13
User details: DB

	naphthalene (mg/kg)	acenaphthylene (mg/kg)	acenaphthene (mg/kg)	fluorene (mg/kg)	phenanthrene (mg/kg)	anthracene (mg/kg)	fluoranthene (mg/kg)	pyrene (mg/kg)	benzo(a)anthracene (mg/kg)	chrysene (mg/kg)	benzo(b)fluoranthene (mg/kg)	benzo(k)fluoranthene (mg/kg)	benzo(a)pyrene (mg/kg)	dibenzo(ah)anthracene (mg/kg)	benzo(ghi)perylene (mg/kg)	indeno(123cd)pyrene (mg/kg)
Critical concentration, C_c	**0.585**	**170**	**588**	**615**	**92**	**8270**	**822**	**563**	**4.52**	**585**	**7.72**	**84.4**	**0.818**	**0.838**	**96.2**	**7.31**
Notes	Atkins 1% SOM Res With	LQM 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	LQM 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With	Atkins 1% SOM Res With
Sample size, n	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Sample mean, $\bar{X}$	0.9	0.875	4.6	5.8	32.475	15.75	116.1	106.9	60.375	61.2	50.575	28.975	65.875	7.375	49.125	50.175
Standard deviation, s	0.4	0.51881275	5.37339123	7.22403396	40.6690197	19.0300639	111.733194	94.0236141	53.5838517	53.4492906	45.7360817	24.950668	58.6918152	5.97571474	39.425827	40.880996
Number of non-detects	**3**	**3**	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0
Set non-detect values to:	Detection limit	Detection limit	Detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Distribution	Non-normal	Non-normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t	Auto: One-sample t

Test scenario:	Planning: is true mean lower than critical concentration (μ < Cc)?				**Evidence level required:**		**95%**	Use Normal distribution to test for outliers								
t statistic, t_0 (or k_0)	1.575	-651.9693316	-217.1440622	-168.6592293	-2.927289636	-867.4957718	-12.63545727	-9.701818093	2.084769877	-19.59988595	1.874012746	-4.442766824	2.216901959	2.187855439	-2.388028539	2.097062411
Upper confidence limit (on true mean concentration, μ)	1.77177979	2.00572617	10.9227712	14.3003887	80.329492	38.1423283	247.574407	217.535868	123.426139	124.092803	104.391811	58.3339949	134.936586	14.4065143	95.5166498	98.2789206
Evidence level	**0%**	**100%**	**100%**	**100%**	**97%**	**100%**	**100%**	**100%**	**6%**	**100%**	**8%**	**99%**	**6%**	**6%**	**95%**	**6%**
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	**μ ≥ Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ < Cc**	**μ ≥ Cc**	**μ < Cc**	**μ ≥ Cc**	**μ < Cc**	**μ ≥ Cc**	**μ ≥ Cc**	**μ < Cc**	**μ ≥ Cc**
Select dataset	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	◉ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y	○ Y

Back to data | **Go to outlier test** | **Go to normality test** | **Show individual summary**

Go to summary

Data sheet

Project details

Easting	Northing	Sample ID	naphthalene	acenaphthylene	acenaphthene	fluorene	phenanthrene	anthracene	fluoranthene	pyrene	benzo(a)anthracene	chrysene	benzo(b)fluoranthene	benzo(k)fluoranthene	benzo(a)pyrene	dibenzo(ah)anthracene	benzo(ghi)perylene	indeno(123cd)pyrene
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
		WS1 0.40m	0.3	< 0.1	0.2	0.2	0.4	0.2	2.4	2.6	1.5	1.8	1.3	0.9	1.5	0.4	2.5	1.7
		WS2 0.40m	< 1.1	< 1.1	5.1	5.8	32	14	92	85	44	45	34	20	43	7.3	41	40
		WS3 0.50m	< 1.1	< 1.1	< 1.1	1.2	7.5	5.8	100	110	66	68	57	35	79	6.8	55	59
		WS4 0.30m	< 1.1	1.2	12	16	90	43	270	230	130	130	110	60	140	15	98	100