

**REPORT ON A
GROUND INVESTIGATION
AT
GLASSWORKS, BARNSELEY**

DRAFT



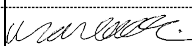
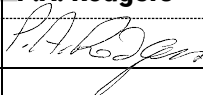
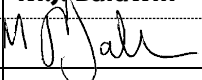
REPORT QUALITY ASSURANCE SHEET

Title:

REPORT ON A GROUND INVESTIGATION

AT

GLASSWORKS, BARNSELEY

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GROUND INVESTIGATION: GLASSWORKS, BARNLEY

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GROUND INVESTIGATION: GLASSWORKS, BARNLEY

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1.0 INTRODUCTION

In October 2017 Soil Engineering Geoservices Ltd were instructed by Henry Boot (The Employer) to carry out a ground investigation at the Glassworks, Barnsley under the supervision of Mott MacDonald (The Engineer). It is proposed to demolish the current structure across the site and construct new retail, cinema, car parking and landscaped/pedestrianised facilities. A large proportion of the site is underlain by a basement. The investigation comprised the formation of dynamic sampler holes with rotary follow on, windowless sampler holes, trial pitting and in situ testing.

This factual report presents the results of the fieldwork and laboratory testing undertaken together with information on the ground and groundwater conditions encountered. The fieldwork was carried out between 6th November 2017 and 13th December 2017.

2.0 PURPOSE, SCOPE AND REPORT FORMAT

2.1 Purpose

The purpose of this investigation was to determine the subsurface ground and groundwater conditions at the site of the proposed retail, cinema, car parking and landscaped/pedestrianised facilities. This information was obtained from a combination of intrusive investigation techniques and laboratory testing.

2.2 Scope of Work

The brief for this factual report comprised the following items:

1. To form exploratory holes on site.
2. To install gas and groundwater monitoring instruments.
3. To monitor on site installations.
4. To undertake laboratory tests on samples recovered from exploratory holes.

The sources of information used in the compilation of this report are detailed in the list of references on page 12.

2.3 Limitations

This report has been prepared in accordance with the project specification. Soil Engineering accepts no liability for any deficiencies in the report that arise from the specification's non-compliance with either European or British Standards. This particularly applies to exploratory hole spacings and depths and to the scope of laboratory testing.

It should be noted that the investigation data on which this report is based is only indicative of the actual ground, groundwater and ground gas conditions that exist at the locations of the exploratory holes and may not be representative of the conditions that exist on the site as a whole.

2.4 Report Format

This report is presented in the following format:

Factual information comprising: -

- Description of fieldwork
- Exploratory hole logs

- Laboratory test results
- Maps and plans
- Photographs

3.0 DESK STUDY INFORMATION

3.1 Scope of Study

A formal comprehensive (phase I) desk study was not required by the Engineer for this investigation. The following sections however provide general details of site location and description, together with site geology as ascertained from published maps.

3.2 Site Location and Description

The site comprises two distinct areas. The first area is located directly off Lambra Road and comprises the Barnsley Skills Centre and at the time of the investigation a compound utilised by Henry Boot as well as Barnsley Meat and Fish Market and local carparks.

The second area comprises a compound/parking area utilised by Henry Boot as a construction site compound for the construction of Barnsley Library as part of the Barnsley Glassworks project. This area also incorporates the outside market area and Kendary Street. The location of the compound is between Eldon Street to the north and Midland Street to the south.

The site is bounded on all sides by retail and leisure units comprising Barnsley town centre. It was noted by the site engineer that the site comprised multiple levels that were generally level and that to the south of the site was a railway line and Barnsley Interchange.

Site levels vary between 90.70mAoD in the centre of the site below the Market and 97.71mAoD to the east of the site off Eldon Road.

The location of the site is indicated on Figure 1 in Section C of this report.

3.3 Geology

From the available information on the 1:50,000 scale British Geological Survey map of the area (Sheet 87, Solid and Drift Edition for Barnsley) indicates that the site is underlain by the Pennine Middle Coal Measures comprising interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams. To the north west of the site the Kent's Rock, a sandstone flag within the Pennine Middle Coal Measures outcrops. There are three coal outcrops indicated to be present within the site. No superficial deposits are indicated to underlay the site.

3.4 Previous Investigations

No previous investigation information has been supplied or referenced.

4.0 FIELDWORK

4.1 Scope of Fieldwork

The scope of the fieldwork was specified by the Engineer and was undertaken in general accordance with

Eurocodes¹ and, where there is no conflict, also with BS 5930². Soil and rock logging has been undertaken in accordance with the relevant European Standards^{3,4,5}, listed in the references for this report. In accordance with the specification and drawings provided by the Engineer, Soil Engineering were required to set out and survey the exploratory holes and to undertake the testing and sampling regime.

The purpose of the ground investigation was to obtain information to inform and assist in the design of the structural foundations (shallow and deep), retaining walls, earthworks and pavements. The site works comprised dynamic sampling boreholes with rotary follow on, windowless samples, trial pits and in-situ standard penetration testing; as well as the installation of gas and groundwater monitoring standpipes. The exploratory hole locations are shown on the site plan presented in Section C of this report.

4.2 Inspection Pits

In order to reduce the risk of damaging buried services, the location of each exploratory hole was scanned using a cable avoidance tool (CAT). As a further precaution, an inspection pit was hand excavated to a maximum depth of 1.20m at each location, followed by a further scan of the base of each pit with the CAT.

Several inspection pits were terminated at shallower depths due to obstructions and encountering services.

4.3 Dynamic Sampling

Boreholes designated BH01E, BH02, BH03 and BH03A; WS01 to WS07 inclusive; WS11A, WS11B, WS12 and WS15; WS30, WS31C, WS32 and WS33; WS37, WS38 and WS40 inclusive were formed to depths between 0.60m and 5.00m using conventional equipment, which comprised 1.00m long steel cylinders with an internal plastic liner. The steel cylinders were repeatedly driven into the ground to progressive depths using rods connected to a hand held motor driven percussion hammer.

In granular materials or where the presence of coarse material prevented the taking of open tube samples, Standard Penetration Tests⁶ were carried out using either a split spoon sampler or a solid 60° cone. The results of these tests are given as a Standard Penetration "N" value or as a blow count for a given penetration at the appropriate position on the borehole logs, where the use of either the sampler or cone is also recorded.

Where appropriate / required, environmental samples were also obtained for chemical testing.

Disturbed representative samples of the strata being penetrated were recovered from the window sampler for geotechnical description and laboratory testing. The depths of the samples recovered are shown on the relevant exploratory hole logs presented in Section A of this report.

The samples recovered from the boreholes were described by an Engineering Geologist, in accordance with the terminology presented in Appendix 1 of this report. A detailed description of all strata encountered, groundwater conditions and the position and type of samples taken are included on the borehole logs presented in Section A of this report.

¹ Eurocode 7 Part 2 (BS EN 1997-2: 2007)

² BS 5930: 2015: Code of Practice for Site Investigation. British Standards Institution

³ BS EN ISO 14688-1: 2002: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 1: Identification and Description.

⁴ BS EN ISO 14688-2: 2004 + A1: 2013: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 2: Principles for a Classification

⁵ BS EN ISO 14689-1: 2003: Geotechnical Investigation and testing – Identification and Classification of Rock – Part 1: Identification and description.

⁶ BS EN ISO 22476-3:2005 + A1: 2011: Geotechnical Investigation and Testing – Field Testing – Part 3: Standard Penetration Test.

4.4 Rotary Drilling

In order to obtain information on the solid geology beneath the site boreholes BH01E, BH02, BH03, BH03A, WS30, WS31C and WS32 were extended using rotary drilling techniques. These boreholes were extended to depths between 2.95m and 26.70m, using a T6116 core barrel together with a protective semi rigid plastic liner and a Polycrystalline Diamond (PCD) core bit with water flush to produce cores of 89mm nominal diameter.

Details of the strata encountered are given on the borehole logs along with the Engineering Geologist's assessment of Total Core Recovery (TCR), Solid Core Recovery (SCR), and Rock Quality Designation (RQD) each expressed as a percentage of the individual core runs. Where applicable a fracture spacing (l_f) has also been determined and this information is given on the logs.

The symbols and abbreviations used on the rotary borehole logs are explained on the exploratory hole log legend and notation sheet presented in Section A of this report.

The core samples recovered were transported to the Leeds laboratory of Soil Engineering where they were photographed, sampled and described by an Engineering Geologist in accordance with the terminology presented in Appendix 1 of this report. The borehole logs are presented in Section A of this report and photographic records are presented in Section D of this report.

4.5 Trial Pits

Two trial pits designated TP03 and TP04 inclusive were formed using a 17T 360 degree wheeled excavator to depths of 2.20m and 4.00m respectively. These trial pits were formed to provide a reasonable indication of the presence of any made ground and in particular to assess the mass soil fabric of the near surface natural deposits.

BH03 encountered an obstruction at shallow depth, so during the trial pitting the excavator was utilised to expose any obstructions / structures, and locate a suitable location to place the hole. The hole was then designated as BH03A.

Where appropriate / required, environmental samples were obtained for chemical testing

The trial pits were not shored and were logged from the surface by an Engineering Geologist. The Engineering Geologist provided a detailed description of the ground conditions encountered in each pit and also obtained disturbed soil samples at regular intervals for geotechnical and chemical analysis. The strata encountered in the trial pits are described on the trial pit logs presented in Section A of this report and the location of each of the trial pits is indicated on the site plan presented in Section C of this report. Trial pit photographs are included in Section D of this report

4.6 Installations / Instrumentation

A slotted 50mm diameter UPVC tube was installed in each of boreholes BH02, WS03, WS04, WS06, WS11A, WS30, WS31C, WS32, and WS33. This tubing was slotted over various depths with the slotted sections being surrounded by pea gravel and any upper sections being surrounded by a bentonite seal. A metal stopcock cover was concreted into place on each of the installations and a plastic cap with a gas valve was placed onto each tube to facilitate long-term groundwater and gas monitoring. A schematic of each installation is shown on the relevant borehole logs presented in section A of this report.

4.7 Groundwater and Gas Monitoring

In accordance with the Engineer's instruction monitoring of gas in boreholes BH02, WS03, WS04, WS06, WS11A, WS30, WS31C, WS32, and WS33 was carried out at weekly intervals for six weeks after completion of the site works. Monitoring for methane, carbon dioxide, and oxygen gases was carried out using a Geotechnical Instruments GA5000 gas analyser. Where practical, visits to site were made on days of low or falling barometric pressure in order to try to record the more onerous gas conditions. The results are presented in Section A of this report.

4.8 Dynamic Probing

Three Dynamic Probe holes designated⁷ DP34 to DP36 were formed to depths between 2.80 and 5.00m. Testing was performed using the super heavy A probing apparatus. Each probe hole was formed by driving a 44mm diameter sacrificial cone of 1600mm nominal area with a sliding 63.5 kg weight falling through 500mm. The number of blows required to drive the cone through 100mm increments was recorded until a refusal was obtained. Unless stated otherwise each probe hole was terminated once 25 blows for no penetration had been achieved. A plot of the blows required to drive the cone through successive 100mm increments is presented for each probe hole in Section B of the report.

5.0 LABORATORY TESTING

5.1 Scope of Testing

All geotechnical (soils and rock) and chemical (environmental) testing was specified and scheduled by the Engineer. The scope of the testing was required to assist the Engineer in establishing any foundation design to be made and in establishing any potential site contamination levels.

5.2 Geotechnical Soils Testing

The programme of laboratory testing was carried out in accordance with BS 1377⁸. The testing was carried out at the Leeds laboratory of Soil Engineering, a UKAS accredited testing laboratory No 1265.

Results are given on the summary sheets with individual test plots presented in Section B of this report.

In addition, chemical (sulfate and pH) testing was undertaken by Concept Life Sciences, a UKAS accredited testing laboratory No. 1549. Testing was undertaken in order to assess concrete requirements from BRE Special Digest No 1⁹. Samples were prepared in general accordance with BS 1377, although final analysis of total sulfate was performed using ICP and aqueous extract using Ion Chromatography.

5.3 Geotechnical Rock Testing

In order to provide an indication of the strength of the sandstone, mudstone, and siltstone encountered within boreholes, BH01E BH02, BH03A, WS30, WS31C, and WS32 point load testing and unconfined compressive strength testing¹⁰ was undertaken on selected core samples. These tests were performed in accordance with the specifications indicated on the individual test plots.

Results are presented in Section B of this report.

⁷ BS EN ISO 22476-2: 2005+A1: 2011

⁸ BS 1377: 1990: Parts 1 to 9: Methods of Test for Soils For Civil Engineering Purposes. British Standards Institution

⁹ BRE Special Digest 1: 2005: Concrete in Aggressive Ground. BRE Construction Division.

¹⁰ ISRM 2007 The complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006. Ulusay, R. and Hudson, J.A. (Eds).

5.4 Environmental Testing

A programme of environmental testing was scheduled by the Engineer. Testing was carried out by ALS a UKAS accredited testing laboratory No. 1291.

Testing was carried out in accordance with the methods identified in the test reports.

The results of the environmental testing are presented in Section B of this report.

6.0 RESULTS OF THE INVESTIGATION

6.1 Scope of Commentary

The results of this investigation appear to broadly concur with the published geology summarised in Section 3.3 of this report. The following sections are only intended to provide a summary of the ground conditions encountered during this investigation whilst the logs presented in Section A of this report give a detailed account of all the strata observed.

6.2 Made Ground

Made ground was encountered to depths between 0.20m and 4.45m in all of the exploratory holes, and was seen to generally comprise bituminous material, paving slabs, or concrete intermittently underlain by brown fine to coarse sand overlaying light brown clayey gravel (wearing course).

Generally the wearing course was underlain by brown locally clayey fine to coarse sand and subangular to subrounded fine to coarse gravel of ash, brick, clinker, sandstone and limestone or brown slightly sandy slightly gravelly clay with similar gravel. Locally other materials where noted.

In BH01E a sequence of bituminous materials underlain by light brown fine to coarse gravel was encountered to 0.60m, and underlain by a reworked clay to 0.90m, another layer of bituminous material between 1.30m and 1.70m was noted, and a variable mix of ash, clinker, brick and clay was found to a depth of 3.20m.

In WS12 paving flags underlain by bituminous material were encountered to a depth of 0.80m and underlain by a mixture of sandstone, mudstone, concrete, ash and limestone gravel.

6.3 Superficial Deposits

Materials that may represent superficial deposits were encountered during this investigation, and comprised firm to stiff brown mottled grey and grey slightly sandy slightly gravelly clay. The gravel was seen to comprise of a mixture of sandstone, mudstone and coal.

In WS15, TP04, AND BH01 between 1.20m and 2.45m, 1.50m and 3.30m and 9.0mm and 9.50m respectively weathered mudstone generally comprising a slightly sandy slightly gravelly clay with low cobble content was encountered. The cobbles were found to comprise sandstone and mudstone.

In WS06 between 1.20m and 2.45m a very loose brown clayey fine to coarse sand and angular to subangular fine to coarse gravel was encountered comprising sandstone and mudstone.

In BH03A between 5.30m and 5.40m a very stiff thinly laminated grey mottled orangish brown clay was encountered.

6.4 Carboniferous Strata

In BH01E, BH02, BH03A, WS11B, WS15, WS30, WS31C, WS32 AND WS37 an extremely weak to weak grey mudstone was encountered at depths between 2.00m and 15.75m and extended to depths between 2.08m and 16.74m. In BH01E this was seen to be interlaminated with a weak grey siltstone.

In boreholes BH01E and BH03A at depth of 9.20m to 14.20m, 9.50m to 12.65m, 12.65m to 13.25m and 14.20m to 19.67m an extremely weak to medium strong locally thinly laminated Siltstone was encountered.

In WS03, WS07, WS13A, BH01E, BH02, AND BH03A at depths of 0.62m to 0.75m, 1.20m to 1.65m, 4.00m to 4.02m, 10.40m to 17.00m, 16.74m to 26.70m and 19.67m to 26.15m an extremely weak and weak to medium strong sandstone was encountered, In BH01E the sandstone was noted to be locally strong.

Coal was encountered within dynamic samples holes WS15 at 2.45m to 3.00m and WS40 at 4.00m to 4.02m at which depth this hole was terminated. Coal was also observed in trial pit TP04 between 3.30m and the base of the pit at 4.00m.

In boreholes BH01E and BH03 coal was encountered at depths between 6.75m to 7.60m and 13.25m to 14.00m respectively.

6.5 Groundwater

Groundwater was encountered in BH03, WS39, WS31C and TP03 at various depths. A summary of exploratory hole groundwater inflows is given in Table 1 in Section A, whilst the logs presented in Section A of this report provide full details of all groundwater information.

6.6 Gas Monitoring

The results of the gas monitoring are presented in Section A of this report. The monitoring (which was carried out where possible during days of low or falling atmospheric pressure) produced methane to a maximum of 0.3% and carbon dioxide to a maximum of 0.2% whilst Oxygen levels were in the range 18.9% to 21.4%. There was no detectable carbon monoxide or hydrogen sulphide

For and on behalf of

Soil Engineering Geoservices Ltd

M.P. Burton
Project Engineering Geologist

J. Duxbury
Principle Engineering Geologist

REPORT REFERENCES

1. BGS Sheet 87: Barnsley: 1:50,000 scale 2008. British Geological Survey.
2. BS EN 1997-2: 2007: Eurocode 7 – Geotechnical Design – Part 2: Ground Investigation and Testing
3. BS 5930: 2015: Code of Practice for Site Investigation. British Standards Institution
4. BS EN ISO 14688-1: 2002: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 1: Identification and Description.
5. BS EN ISO 14688-2: 2004 + A1: 2013: Geotechnical Investigation and testing – Identification and Classification of Soil – Part 2: Principles for a Classification
6. BS EN ISO 14689-1: 2003: Geotechnical Investigation and testing – Identification and Classification of Rock – Part 1: Identification and description.
7. BS EN ISO 22476-2: 2005:+ A1: 2011 Geotechnical Investigation and Testing – Field Testing – Part 2: Dynamic Probe
8. BS EN ISO 22476-3: 2005: + A1: 2011 Geotechnical Investigation and Testing – Field Testing – Part 3: Standard Penetration Test.
9. BS 1377: 1990: Parts 1 to 9: Methods of Test for Soils For Civil Engineering Purposes. British Standards Institution.
10. BRE Special Digest 1: 2005: Concrete in Aggressive Ground. BRE Construction Division.
11. ISRM 2007 The complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006. Ulusay, R. and Hudson, J.A. (Eds).

Where any documents referenced above are subject to any amendment, then the latest version incorporating such amendment shall be deemed to apply, unless specifically stated otherwise.



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION A

Exploratory Hole Records and Field Data

EXPLORATORY HOLE LOG LEGEND AND NOTATION SHEET

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SECTION A: EXPLORATORY HOLE LOG LEGENDS

CODE	DESCRIPTION	LEGEND	CODE	DESCRIPTION	LEGEND
101	Topsoil		806	Coal	
102	Made Ground		807	Breccia	
104	Concrete		808	Conglomerate	
201	Clay		809	Fine Grained Igneous	
301	Silt		810	Medium Grained Igneous	
401	Sand		811	Coarse Grained Igneous	
501	Gravel		812	Fine Grained Metamorphic	
601	Peat		813	Coarse / Medium Grained Metamorphic	
701	Cobbles		EVT	Evaporite	
730	Boulders		MWS	Mine Workings	
801	Mudstone		904	Grout	
802	Siltstone		905	Arisings	
803	Sandstone		BLK	Zone of No Recovery	
804	Limestone		WTR	Water	
805	Chalk		Note: Most soils types comprise a mixture of particle sizes. These soil types are represented graphically on the exploratory hole logs by combining the legends shown on this sheet.		

SECTION A: EXPLORATORY HOLE LOG LEGENDS

SAMPLING NOTATION

U	Undisturbed U100 or U38 sample (size given on log)
UT	Thin wall open drive tube sampler (size given on log)
P	Piston Sample
BLK	Block Sample
M	Mazier Sample
TW	Thin Walled Sample
L	Liner Sample obtained from windowless sampler
D	Small Disturbed Sample
B	Bulk Disturbed Sample
LB	Large Bulk Disturbed Sample
C	Core Sample
ES	Environmental Soil Sample
EW	Environmental Water Sample
W	Water Sample
UF	No Recovery in U Sample
UTF	No Recovery in UT Sample
PF	No Recovery in P Sample
TWF	No Recovery in TW Sample

IN SITU TEST NOTATION

SPT	Standard Penetration Test with a Split Spoon
SPT(C)	Standard Penetration Test with a Cone
C	Cone Penetration Test
NP	No Penetration for SPT or SPT(C)
V	Vane Test
HV	Hand Vane
HP	Hand Penetrometer
CBR	California Bearing Ratio Test
K	Permeability Test (test type not differentiated)
Pr	Pressuremeter Test

OTHER NOTATION

TCR	Total Core Recovery
SCR	Solid Core Recovery
RQD	Rock Quality Designation
FI	Fracture Index
If	Fracture Spacing
NI	Non Intact
NA	Data Not Applicable
NR	Data Not Recorded

GRAPHICS USED



Standing water level
Joining bar indicates level risen
Waterstrike level



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION A

Exploratory Hole Records and Field Data

DYNAMIC SAMPLING AND ROTARY DRILLING RECORDS

DRAFT

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID BH01E	
Project No. TA8066															
Engineer Mott MacDonald															
Employer Henry Boot														Sheet 1 of 1	
Ground Level +94.80mOD				Coordinates 434706.92E, 406390.44N				Grid OSGB							
Date Started 05/12/2017				Date Completed 12/12/2017				Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks			
0.00	1.20	IP	05/12/2017 08:00	05/12/2017 16:30	JM	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	050m x 0.50m x 1.20m			
1.20	9.50	WLS	06/12/2017 08:00	08/12/2017 10:30	JM	MPB	NA	NA	Commachio 205	NA	NA				
9.50	26.70	RC	08/12/2017 10:30	12/12/2017 16:30	JM	MPB	T6116	PCD	Commachio 205	NA	NA				
PROGRESS										WATER STRIKES					
Date Time	Depth	Depth Casing	Depth Water	Remarks			Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks		
05/12/2017 00:00	1.30	0.00	Dry	End of shift											
06/12/2017 08:00	1.30	0.00	Dry	Start of shift											
06/12/2017 16:30	4.85	0.00	Dry	End of Shift											
07/12/2017 08:00	4.85	0.00	Dry	Start of shift											
07/12/2017 16:30	9.00	9.00	Dry	End of shift											
08/12/2017 08:00	9.00	9.00	7.50	Start of Shift											
08/12/2017 16:30	14.00	10.00	9.50	End of shift											
11/12/2017 08:00	14.00	10.00	8.50	Start of shift											
11/12/2017 16:30	20.50	14.00	6.50	End of shift											
12/12/2017 00:00	26.70	14.00	12	End of hole											
12/12/2017 08:00	20.50	14.00	8.50	Start of shift											
CABLE PERCUSSION DETAILS							SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks		Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	
							1.70	S	N=56 (18,7/10,20,15,10,11)		AR503	60	0.00	Dry	
							3.25	S	N=50 (10,10,12,13,13,12)		AR503	60	0.00	Dry	
							4.35	S	50/275mm (12,10,12,14,16,8/50)		AR503	60	0.00	Dry	
							5.40	S	50/225mm (11,14,16,17,17,0/0)		AR503	60	0.00	Dry	
							6.55	S	50/270mm (12,10,13,15,16,6/45)		AR503	60	6.00	Dry	
							7.45	S	50/275mm (10,10,10,12,12,16/50)		AR503	60	6.00	Dry	
							8.45	S	N=50 (8,8,10,15,10,15)		AR503	60	6.00	Dry	
							9.50	S	50/170mm (15,10/25,18,20,12/20)		AR503	60	9.00	7.50	
ROTARY FLUSH DETAILS															
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks										
9.50	11.85	WATER	90	Grey											
11.85	12.65	WATER	80	Grey											
12.65	13.50	WATER	60	Grey											
13.50	14.00	WATER	40	Grey											
14.00	22.00	WATER	90	Grey											
22.00	26.50	WATER	75	Grey											
HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING											
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference						
26.70	116	14.00	140												
INSTALLATION DETAILS				PIPE CONSTRUCTION						DEPTH RELATED REMARKS					
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
BACKFILL DETAILS										LOCATION DETAILS					
Depth Top	Depth Base	Description			Remarks					Remarks					
0.00	0.10	Bituminous material													
0.10	0.50	Type 1													
0.50	26.70	Bentonite													
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.														 soil engineering Part of the Bachy Soletanche Group	
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Form No. SIEXPHOLEHDR Issue/Revision No. 2.02 Issue Date 22/06/2016														Part of the Bachy Soletanche Group	

Project Name		Barnsley Glassworks		Exploratory Hole Log				Hole ID				
Project No.		TA8066						BH01E				
Engineer		Mott MacDonald						Sheet 1 of 3				
Employer		Henry Boot										
Ground Level		+94.80mOD		Coordinates		434706.92E, 406390.44N		Grid		OSGB		
Hole Type		IP+WLS+RC		Inclination		90° from horizontal						
Description of Strata		Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery		In Situ Test Details	Install-ation
							Details		Dia.			
MADE GROUND: Bituminous material				0.07	94.73		B 3 0.20-0.30					
MADE GROUND: Light yellowish brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone				0.20	94.60		D 2 0.30					
				0.35	94.45		ES 1 0.30					
MADE GROUND: Light yellowish brown and dark grey sandy subangular to subrounded fine to coarse gravel sized fragments of limestone and bituminous material. Sand sized fragments are fine to coarse				0.60	94.20		B 6 0.50-0.60					
				(0.30)			D 5 0.50					
MADE GROUND: Light yellowish brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone.				0.90	93.90		ES 4 0.50					
				(0.40)			B 9 1.00-1.30					
MADE GROUND: Brown gravelly medium to coarse sand sized fragments with high cobble content. Gravel sized fragments are angular to subangular of brick, concrete, and sandstone. Cobble sized fragments are angular of brick				(0.40)	93.50		D 8 1.00					
				1.30			ES 7 1.00					
From 0.85m to 0.90m driller notes Boulder clay onto sand				(0.40)			U 10 1.30-1.60					
MADE GROUND: Brown gravelly medium to coarse sand sized fragments with medium cobble content. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone. Cobble sized fragments are angular to subangular of sandstone and brick.				1.70	93.10		D 11 1.60-1.70					
							D 12 1.70-2.15					
MADE GROUND: Bituminous material												
MADE GROUND: Dark grey to black locally brown and reddish brown slightly sandy slightly gravelly clay with cobble sized pockets of fine to coarse sand and subangular to subrounded fine to coarse gravel sized fragments. Gravel sized fragments are angular to subangular of ash, clinker, brick and coal.							ES 13 2.15					
				(1.55)			D 14 2.40-2.70					
Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, mudstone, and siltstone.							U 15 2.70-3.15					
From 4.25 - 4.35 with cobble sized pockets of coarse sand				3.25	91.55		D 16 3.15-3.25					
							D 17 3.25-3.70					
							D 19 3.70-3.80					
							ES 18 3.70					
							U 20 3.80-4.25					
							D 21 4.25-4.35					
							B 23 4.35-4.85					
							D 22 4.35-4.80					
							D 24 4.85					
							U 25 4.85-5.30					
							D 26 5.30-5.40					
							B 28 5.40-5.90					
							D 27 5.40-5.85					
							D 29 5.90-6.00					
							U 30 6.00-6.45					
							D 31 6.45-6.55					
							B 33 6.55-7.00					
							D 32 6.55-7.00					
							D 34 7.00					
							U 35 7.00-7.45					
							B 37 7.45-8.00					
							D 36 7.45-7.90					
							D 38 8.00					
							U 39 8.00-8.45					

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Project Name Barnsley Glassworks						Exploratory Hole Log				Hole ID BH01E			
Project No. TA8066 Engineer Mott MacDonald Employer Henry Boot										Sheet 3 of 3			
Ground Level +94.80mOD		Coordinates 434706.92E, 406390.44N		Grid OSGB									
Hole Type IP+WLS+RC		Inclination 90° from horizontal											
Description of Strata	Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery				In Situ Test Details	Install-ation
						Details	Dia.	TCR	SCR	RQD	IF		
From 21.90m to 22.00m Assumed zone of core loss			(9.96)			C 57 20.50-22.00	89	93	93	73	10 100 580		
						C 58 22.00-23.60	89	98	98	79			
						C 59 23.60-25.70	89	100	100	63			
						C 60 25.70-26.70	89	100	98	96			
End of borehole at 26.70m			26.70	68.10									
AGS Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.												Part of the Bachy Soletanche Group	
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Form No. SIEXPHOLERCLOG		Issue.Revision No. 2.03		Issue Date 22/06/2016									

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID BH02			
Project No. TA8066 Engineer Mott MacDonald Employer Henry Boot														Sheet 1 of 1			
Ground Level +97.71mOD				Coordinates 434595.42E, 406427.35N				Grid OSGB									
Date Started 17/11/2017				Date Completed 22/11/2017				Inclination 90° from horizontal									
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	17/11/2017 08:00	17/11/2017 13:00	JM	MPB	NA	NA	Concrete Corer & Hand Tools	None Used	All Faces Stable	Pit dug through 300mm concrete core					
1.20	5.20	WLS	20/11/2017 08:00	21/11/2017 14:00	JM	MPB	NA	NA	Comacchio 205	NA	NA						
5.20	17.00	RC	21/11/2017 14:00	22/11/2017 18:30	JM	MPB	T6116	PCD	Comacchio 205	NA	NA						
PROGRESS										WATER STRIKES							
Date Time		Depth	Depth Casing	Depth Water	Remarks			Date Time		Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks		
17/11/2017 12:30		1.20	0.00	Dry	End of Shift												
20/11/2017 08:00		1.20	0.00	Dry	Start of Shift												
20/11/2017 16:30		4.70	0.00	Dry	End of Shift												
21/11/2017 08:00		4.70	0.00	Dry	Start of Shift												
21/11/2017 16:30		8.25	5.20	1.80	End of Shift												
22/11/2017 08:00		8.25	8.25	4.30	Start of Shift												
22/11/2017 18:30		17.00	5.20	4.00	End of Hole												
CABLE PERCUSSION DETAILS										SPT DETAILS							
Depth Top	Depth Base	Time Start		Duration	Tool		Remarks		Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	
									1.20	S	N=5 (1,1,2,1,1,1)		AR503	60	0.00	Dry	
									3.20	S	N=24 (4,4,4,6,6,8)		AR503	60	0.00	Dry	
									4.70	S	N=24 (5,5,6,6,6,6)		AR503	60	0.00	Dry	
ROTARY FLUSH DETAILS																	
Depth Top	Depth Base	Flush Type		Flush Return	Flush Colour	Remarks											
5.20	6.75	WATER		90	Grey												
6.75	17.00	WATER		90	Grey/Brown												
HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING													
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference								
17.00	116	5.20	140														
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS							
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks				
16.80	01	SP	11.00	16.80	01	01	0.00	11.00	50	PLAIN							
								16.80	50	SLOTTED							
BACKFILL DETAILS										LOCATION DETAILS							
Depth Top	Depth Base	Description			Remarks					Remarks							
0.00	0.50	Concrete								1. Borehole terminated at 17.00m due to borehole position and hoardings.							
0.50	11.00	Bentonite															
11.00	16.50	Gravel															
16.50	17.00	Bentonite															
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.																	
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Form No. SIEXPHOLEHDR										Log checked by Jon Duxbury							
Issue/Revision No. 2.02										SOIL engineering							
Issue Date 22/06/2016										Part of the Bachy Soletanche Group							

Project Name Barnsley Glassworks					Exploratory Hole Log					Hole ID				
Project No. TA8066										BH02				
Engineer Mott MacDonald														
Employer Henry Boot										Sheet 1 of 2				
Ground Level +97.71mOD		Coordinates 434595.42E, 406427.35N		Grid OSGB										
Hole Type IP+WLS+RC		Inclination 90° from horizontal												
Description of Strata		Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery			In Situ Test Details	Install-ation	
							Details	Dia.						
MADE GROUND: Bituminous material and concrete.				0.20	97.51		ES 1 0.20							
MADE GROUND: Dark grey and grey clayey sandy subangular to subrounded fine to coarse gravel sized fragments of limestone, concrete and bituminous material.				0.30	97.41		B 3 0.30-0.50							
MADE GROUND: Dark grey and grey sandy subangular to subrounded fine to coarse gravel sized fragments of ash, brick, clinker, limestone and bituminous material.				(0.40)			D 2 0.30							
MADE GROUND: Dark grey and grey sandy subangular to subrounded fine to coarse gravel sized fragments of ash, brick, clinker, limestone and bituminous material.				0.70	97.01		ES 4 0.50							
MADE GROUND: Brown mottled grey slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone.				0.95	96.76		D 5 0.70							
MADE GROUND: Brown mottled grey slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone.				(1.25)			B 7 1.00-1.20							
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone ash and brick.							ES 6 1.00							
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone ash and brick.							D 8 1.20							
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone ash and brick.							U 9 1.20-1.65	100						
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone ash and brick.							D 10 1.65-1.70							
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone ash and brick.							D 11 1.70-2.20							
MADE GROUND: Brown mottled grey slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of ash, glass, clinker, pottery, sandstone. brick and mudstone.				2.20	95.51		ES 12 2.20							
MADE GROUND: Brown mottled grey slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of ash, glass, clinker, pottery, sandstone. brick and mudstone.				(1.00)			B 13 2.70-3.15							
Very stiff brown mottled orangish brown CLAY.				3.20	94.51		D 15 3.15-3.20							
Very stiff brown mottled orangish brown CLAY.				(1.00)			U 14 3.15-3.20	100						
Very stiff brown mottled orangish brown CLAY.							B 18 3.20-4.20							
Very stiff brown mottled orangish brown CLAY.							D 16 3.20-3.65							
Very stiff brown mottled orangish brown CLAY.							ES 17 3.65-3.70							
Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, coal and mudstone.				4.20	93.51		B 22 4.20-4.80							
Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, coal and mudstone.				(0.50)			U 19 4.20-4.65	100						
Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal.				4.70	93.01		D 20 4.65-4.70							
Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal.				(0.50)			D 21 4.70							
Very stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal.							B 23 4.80-5.20							
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.				5.20	92.51									
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.							C 25 5.20-6.75	89	100	70	0			
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.							D 24 6.75					NI 60 80		
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.				(5.20)			C 26 6.75-8.25	89	100	64	0			
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.														
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.							C 27 8.25-9.75	89	100	92	15	NI 60 200		
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.														
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.														
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown.														
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown.														

Project Name Barnsley Glassworks					Exploratory Hole Log					Hole ID BH02			
Project No. TA8066													
Engineer Mott MacDonald													
Employer Henry Boot										Sheet 2 of 2			
Ground Level +97.71mOD		Coordinates 434595.42E, 406427.35N		Grid OSGB									
Hole Type IP+WLS+RC		Inclination 90° from horizontal											
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery				In Situ Test Details	Installation
						Details	Dia.	TCR	SCR	RQD	IF		
Extremely weak to very weak grey stained orangish brown MUDSTONE. Discontinuities: 1) 0-10 degrees closely spaced planar smooth stained brown. 2) 70-90 degrees closely spaced planar smooth stained brown. Weak to medium strong grey fine to medium grained SANDSTONE with closely spaced thin laminations of siltstone. Discontinuities: 1) 0-10 degrees closely to medium locally widely spaced planar smooth. from 11.25m to 11.35m and 14.20m to 14.25m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments) From 14.70m to 15.40m Discontinuities 2) 30 to 50 degrees closely to medium spaced planar smooth			10.40	87.31		C 28 9.75-11.25	89	100	100	51	NI 40 160		
			C 29 11.25-12.75	89		100	96	65					
			C 30 12.75-14.25	89		100	95	53	NI 90 500				
			C 31 14.25-15.75	89		100	100	77					
			C 32 15.75-17.00	89		100	100	67					
End of borehole at 17.00m			17.00	80.71									

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Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations, see key.

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Form No. SIEXPHOLERCLOG

Issue/Revision No. 2.03

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID BH03			
Project No. TA8066																	
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +95.08mOD				Coordinates 434656.34E, 406417.43N				Grid OSGB									
Date Started 14/11/2017				Date Completed 15/11/2017				Inclination 90° from horizontal									
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	14/11/2017 13:00	14/11/2017 14:00	JM	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	0.50m x 0.50m x 1.20m					
1.20	2.75	WLS	14/11/2017 14:00	15/11/2017 08:00	JM	MPB	NA	NA	Comacchio 205	NA	NA						
2.75	2.95	RC	15/11/2017 08:00	15/11/2017 16:30	JM	MPB	T6116	PCD	Comacchio 205	NA	NA						
PROGRESS										WATER STRIKES							
Date Time		Depth	Depth Casing	Depth Water	Remarks					Date Time		Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
14/11/2017 15:00		2.40	1.20	Dry	End of Shift					14/11/2017 15:00		1.80	1.60		1.80	20	Not Sealed, Seepage
15/11/2017 08:00		2.40	1.20	1.80	Start oh Shift												
15/11/2017 16:30		2.60	2.60	1.80	End of hole												
CABLE PERCUSSION DETAILS										SPT DETAILS							
Depth Top	Depth Base	Time Start		Duration	Tool		Remarks			Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
										1.20	S	N=10 (1,1,2,2,3,3)		AR503	60	1.20	Dry
										2.40	S	50/245mm (17,8/30,14,15,11,10/20)		AR503	60	2.00	1.80
ROTARY FLUSH DETAILS										DRAFT							
Depth Top	Depth Base	Flush Type		Flush Return	Flush Colour	Remarks											
2.75	2.95	WATER			Grey / Brown												
HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING													
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference								
1.60	150	1.60	150														
2.95	116	2.60	140														
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS							
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks				
BACKFILL DETAILS										LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks							
0.00	2.95	Grout								1. Borehole terminated on concrete obstruction see BH03A for redrill							
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.																	
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Form No. SIEXPHOLEHDR										Log checked by Jon Duxbury							
Issue/Revision No. 2.02										SOIL engineering							
Issue Date 22/06/2016										Part of the Bachy Soletanche Group							

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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID BH03A	
Project No. TA8066															
Engineer Mott MacDonald															
Employer Henry Boot														Sheet 1 of 1	
Ground Level +95.06mOD					Coordinates 434657.10E, 406417.36N					Grid OSGB					
Date Started 22/11/2017					Date Completed 29/11/2017					Inclination 90° from horizontal					
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks			
0.00	2.50	IP	22/11/2017 10:00	22/11/2017 16:30	MPB	MPB	NA	NA	17T 360 Wheeled excavator	None Used	All Faces Stable	2.50m x 0.50m x 2.50m			
2.50	5.30	WLS	24/11/2017 09:00	27/11/2017 11:00	JM	MPB	NA	NA	Comacchio 205	NA	NA				
5.30	26.15	RC	27/11/2017 11:00	29/11/2017 16:30	JM	MPB	T6116	PCD	Comacchio 205	NA	NA				

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
22/11/2017 16:30	2.50	0.00	0.50	End of Shift								
24/11/2017 08:00	2.50	3.00	1.50	Start of Shift								
24/11/2017 16:30	4.00	4.00	1.20	End of Shift								
27/11/2017 08:00	4.00	4.00	1.60	Start of Shift								
27/11/2017 17:00	11.10	7.60	3.00	End of Shift								
28/11/2017 08:00	11.10	7.60	3.50	Start of Shift								
28/11/2017 16:30	15.80	7.60	3.80	End of Shift								
29/11/2017 08:00	15.80	7.60	3.50	Start of shift								
29/11/2017 16:30	26.00	7.60	7.50	End of hole								

CABLE PERCUSSION DETAILS						SPT DETAILS							
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	
						3.00	S	N=47 (15,10,15,10,10,12)	AR503	60	3.00	1.80	
						4.50	S	N=27 (5,5,5,6,8,8)	AR503	60	4.00	1.60	
						5.00	S	30/95mm (10,13,15,15/20)	AR503	60	4.00	1.60	
						7.60	S	50/170mm (12,13/30,14,15,21/20)	AR503	60	4.00	2.50	

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks
5.80	11.10	WATER	90	Grey	
11.10	13.85	WATER	80	Grey	
13.85	15.80	WATER	70	Grey	
15.80	16.80	WATER	90	Grey	
16.80	21.50	WATER	80	Grey	
21.50	22.95	WATER	75	Grey	
22.95	26.00	WATER	80	Grey	

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
26.15	116	7.60	140						

INSTALLATION DETAILS						PIPE CONSTRUCTION				DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	26.15	Grout								1. Inspection pit dug using excavator from 0.00m to 2.50m, samples taken in original BH03.			

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

DRAFT	Print date and time 16/01/2018 15:19	Log checked by Jon Duxbury	
Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

[illegible]

Project Name					Barnsley Glassworks					Exploratory Hole Log					Hole ID				
Project No.					TA8066										BH03A				
Engineer					Mott MacDonald														
Employer					Henry Boot										Sheet 2 of 3				
Ground Level					+95.06mOD					Coordinates					434657.10E, 406417.36N				
Hole Type					IP+WLS+RC					Inclination					90° from horizontal				
Description of Strata					Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery				In Situ Test Details	Install-ation		
										Details	Dia.	TCR	SCR	RQD	IF				
From 9.66m to 9.68m, 9.93m to 10.00m, 10.08m to 10.10m and 10.22m - 10.33m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments)										C 18 10.00-11.10		89	95	62	9	NI 30 140			
From 11.05m to 11.10m assumed zone of core loss										C 19 11.10-12.50		89	100	95	0				
From 11.34m to 11.40m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments) From 11.40m to 11.50m Soft grey slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of siltstone.										C 20 12.50-13.10		89	97	58	38				
From 12.40m to 12.60m and 13.30m to 13.13.40m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments)										C 21 13.10-13.85		89	100	85	40				
Thinly interlaminated weak grey SILTSTONE and medium strong grey fine to medium grained SANDSTONE. Discontinuities: 1) 0 - 10 degrees very closely to medium spaced planar smooth.										C 22 13.85-14.20		89	67	67	41	NI 90 190			
From 15.30m to 19.67m Discontinuities locally very closely spaced to closely spaced										C 23 14.20-15.80		89	94	88	71				
From 15.60m to 15.72m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments) From 15.72m to 15.78m assumed zone of core loss										C 24 15.80-16.80		89	95	85	40				
From 16.56m to 16.62m, 17.20m to 17.27m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments)										C 25 16.80-18.35		89	100	93	79	30 70 230			
Medium strong grey stained orangish brown fine to medium grained SANDSTONE. Discontinuities 1) 0 - 10 degrees closely to medium										C 26 18.35-19.90		89	100	100	65				

Project Name Barnsley Glassworks						Exploratory Hole Log					Hole ID BH03A			
Project No. TA8066														
Engineer Mott MacDonald														
Employer Henry Boot											Sheet 3 of 3			
Ground Level +95.06mOD		Coordinates 434657.10E, 406417.36N		Grid OSGB										
Hole Type IP+WLS+RC		Inclination 90° from horizontal												
Description of Strata	Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery					In Situ Test Details	Install-ation
						Details	Dia.	TCR	SCR	RQD	IF			
spaced planar smooth stained orangish brown.			(6.48)			C 27 19.90-21.50	89	100	100	93	60 220 530			
						C 28 21.50-22.95	89	98	98	83				
						C 29 22.95-24.55	89	97	97	93				
						C 30 24.55-26.15	89	100	100	88				
End of borehole at 26.15m			26.15	68.91										

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	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.										 soil engineering Part of the Bachy Soletanche Group
	DRAFT		Print date and time 16/01/2018 15:19			Log checked by Jon Duxbury					
Form No. SIEXPHOLERCLOG		Issue/Revision No. 2.03			Issue Date 22/06/2016						

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS01			
Engineer Mott MacDonald														Sheet 1 of 1			
Employer Henry Boot																	
Ground Level +91.19mOD					Coordinates 434699.15E, 406275.59N					Grid OSGB							
Date Started 15/11/2017					Date Completed 15/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	0.60	IP	15/11/2017 10:00	15/11/2017 11:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	Pit dug through 250mm concrete core					
0.60	0.76	WLS	15/11/2017 11:00	15/11/2017 11:30	GE	MPB	NA	NA		NA	NA						

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
15/11/2017 16:30	0.76	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						0.60	S	50/5mm (10,15,50/5)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

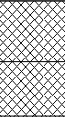
HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		

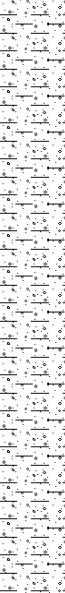
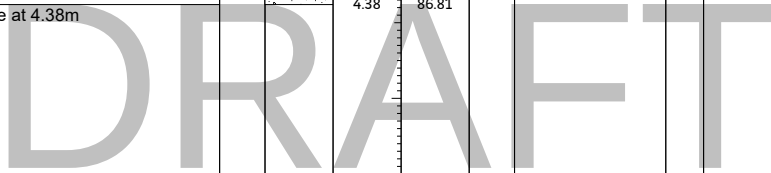
BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.76	Arisings								1. Borehole complete at 0.76m terminated on rock.			

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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DRAFT	Print date and time 16/01/2018 15:19	Log checked by Jon Duxbury	soil engineering
Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS01													
Project No. TA8066																					
Engineer Mott MacDonald																					
Employer Henry Boot								Sheet 1 of 1													
Ground Level +91.19mOD		Coordinates 434699.15E, 406275.59N		Grid OSGB																	
Hole Type IP+WLS		Inclination 90° from horizontal																			
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Installation											
						Details	Dia.														
MADE GROUND: Concrete.			(0.40)			ES 1 0.20			SPT(S) 50/5mm (10,15,50/5) 0.60												
MADE GROUND: Clayey sand and gravel. (Driller's description)			0.40	90.79		ES 2 0.50															
End of borehole at 0.76m			(0.36)			D 3 0.60															
			0.76	90.43																	
DRAFT																					
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.																					
DRAFT		Print date and time 16/01/2018 15:19			Log checked by Jon Duxbury			 SOIL engineering													
Form No. SIEXPHOLECPLOG		Issue/Revision No. 2.03			Issue Date 22/06/2016			Part of the Bachy Soletanche Group													

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS02					
Project No. TA8066																			
Engineer Mott MacDonald																			
Employer Henry Boot														Sheet 1 of 1					
Ground Level +91.19mOD					Coordinates 434663.96E, 406312.65N					Grid OSGB									
Date Started 15/11/2017					Date Completed 15/11/2017					Inclination 90° from horizontal									
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks							
0.00	1.20	IP	15/11/2017 13:00	15/11/2017 15:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	Pit dug through 250mm concrete core							
1.20	4.38	WLS	15/11/2017 15:00	15/11/2017 16:30	GE	MPB	NA	NA											
PROGRESS										WATER STRIKES									
Date Time		Depth	Depth Casing	Depth Water	Remarks					Date Time		Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks		
15/11/2017 16:30		4.38	0.00	Dry	End of Hole														
CABLE PERCUSSION DETAILS										SPT DETAILS									
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks					Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water		
										1.20	S	N=14 (2,2,2,4,4,4)		4	81	0.00	Dry		
										2.00	S	N=19 (4,4,4,5,5,5)		4	81	0.00	Dry		
										3.00	S	N=20 (4,3,6,5,4,5)		4	81	0.00	Dry		
										4.00	S	50/150mm (10,15,25,25,0/0)		4	81	0.00	Dry		
ROTARY FLUSH DETAILS																			
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks														
HOLE DIAMETER										CASING DIAMETER				DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference										
2.00	101			1.20	2.00	101	00:05:00	100	7										
4.00	90			1.20	2.00	101	00:05:00	100	8										
				2.00	3.00	90	00:05:00	90	10										
				3.00	4.00	80	00:05:00	90	13										
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS									
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks						
BACKFILL DETAILS										LOCATION DETAILS									
Depth Top	Depth Base	Description				Remarks				Remarks									
0.00	4.38	Arisings																	
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.															 soil engineering Part of the Bachy Soletanche Group				
DRAFT					Print date and time 16/01/2018 15:19					Log checked by Jon Duxbury									
Form No. SIEXPHOLEHDR					Issue/Revision No. 2.02					Issue Date 22/06/2016									

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS02		
Project No. TA8066										
Engineer Mott MacDonald										
Employer Henry Boot								Sheet 1 of 1		
Ground Level +91.19mOD		Coordinates 434663.96E, 406312.65N		Grid OSGB						
Hole Type IP+WLS		Inclination 90° from horizontal								
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Installation
						Details	Dia.			
MADE GROUND: Concrete.			(0.40)			B 4 0.20-0.50 ES 1 0.20				
Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone, mudstone and coal.			0.40	90.79		B 5 0.50-1.20 ES 2 0.50 ES 3 1.00 B 7 1.20-2.00 D 6 1.20-1.65 D 10 2.00-3.00 D 8 2.00-2.45 D 9 2.00 B 13 3.00-4.00 D 11 3.00-3.45 D 12 3.00 D 14 4.00 D 15 4.00-4.38			SPT(S) N=14 (2,2,2,4,4,4) 1.20 SPT(S) N=19 (4,4,4,5,5,5) 2.00 SPT(S) N=20 (4,3,6,5,4,5) 3.00 SPT(S) 50/150mm (10,15,25,25,0/0) 4.00	
End of borehole at 4.38m			4.38	86.81						
										
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.									 soil engineering Part of the Bachy Soletanche Group	
DRAFT			Print date and time 16/01/2018 15:19			Log checked by Jon Duxbury				
Form No. SIEXPHOLECPLOG			Issue/Revision No. 2.03			Issue Date 22/06/2016				

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS03			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +96.74mOD					Coordinates 434699.20E, 406360.65N					Grid OSGB							
Date Started 16/11/2017					Date Completed 16/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	16/11/2017 08:00	16/11/2017 09:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.30m x 0.30m x 1.20m					
1.20	4.02	WLS	16/11/2017 09:00	16/11/2017 12:00	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
16/11/2017 12:00	4.02	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=24 (3,5,5,6,6,7)			4	81	0.00	Dry
						2.00	S	N=23 (7,6,5,6,6,6)			4	81	0.00	Dry
						3.00	S	N=22 (3,3,3,6,6,7)			4	81	0.00	Dry
						4.00	S	50/0mm (25/20,50/0)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
3.00	101			1.20	2.00	101	00:05:00	100	8
4.00	90			2.00	3.00	101	00:05:00	100	11
				3.00	4.00	90	00:05:00	100	14

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
3.50	01	SP	1.00	3.50	01	01	0.00	1.00	50	PLAIN SLOTTED					

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.50	Concrete											
0.50	1.00	Bentonite											
1.00	3.50	Gravel											
3.50	4.02	Bentonite											

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	soil engineering Part of the Bachy Soletanche Group

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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS04			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +90.70mOD					Coordinates 434651.11E, 406345.59N					Grid OSGB							
Date Started 22/11/2017					Date Completed 22/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	22/11/2017 08:00	22/11/2017 10:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	Borehole cored out					
1.20	3.45	WLS	22/11/2017 10:00	22/11/2017 11:00	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
22/11/2017 11:00	3.45	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=2 (1,0,1,0,1,0)			4	81	0.00	Dry
						2.00	S	N=18 (4,6,3,4,4,7)			4	81	0.00	Dry
						3.00	S	N=50 (7,7,10,10,10,20)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
2.00	101			1.20	2.00	101	00:05:00	100	8
3.00	90			2.00	3.00	90	00:05:00	100	11

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
3.40	01	SP	1.00	3.40	01	01	0.00	3.00	50	PLAIN SLOTTED					

BACKFILL DETAILS						LOCATION DETAILS						
Depth Top	Depth Base	Description			Remarks		Remarks					
0.00	0.50	Concrete										
0.50	1.00	Bentonite										
1.00	3.45	Gravel										

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS05			
Engineer Mott MacDonald														Sheet 1 of 1			
Employer Henry Boot																	
Ground Level +95.20mOD					Coordinates 434644.73E, 406447.69N					Grid OSGB							
Date Started 22/11/2017					Date Completed 22/11/2017					Inclination 90° from horizontal							

Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks
0.00	1.20	IP	22/11/2017 12:00	22/11/2017 13:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	
1.20	3.16	WLS	22/11/2017 13:00	22/11/2017 16:00	GE	MPB	NA	NA		NA	NA	

PROGRESS					
Date Time	Depth	Depth Casing	Depth Water	Remarks	
22/11/2017 16:00	3.16	0.00	Dry	End of Hole	

WATER STRIKES						
Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks

CABLE PERCUSSION DETAILS					
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks

SPT DETAILS						
Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
1.20	S	N=17 (1,1,4,3,5,5)	4	81	0.00	Dry
2.00	S	N=21 (4,3,5,5,5,6)	4	81	0.00	Dry
3.00	S	50/10mm (10,15,50/10)	4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

DYNAMIC SAMPLING								
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery
2.00	101			1.20	2.00	101	00:05:00	100
3.00	90			2.00	3.00	90	00:05:00	100

INSTALLATION DETAILS					
Distance	ID	Type	Response Top	Response Base	Pipe Ref

PIPE CONSTRUCTION					
Pipe Ref	Top	Base	Diameter	Pipe Type	

DEPTH RELATED REMARKS		
Depth Top	Depth Base	Remarks

BACKFILL DETAILS				
Depth Top	Depth Base	Description	Remarks	
0.00	3.16	Grout		

LOCATION DETAILS	
Remarks	

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

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Print date and time 16/01/2018 15:19

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Form No. SIEXPHOLEHDR

Issue/Revision No. 2.02

Issue Date 22/06/2016

Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS05		
Project No. TA8066										
Engineer Mott MacDonald										
Employer Henry Boot					Sheet 1 of 1					
Ground Level +95.20mOD		Coordinates 434644.73E, 406447.69N		Grid OSGB						
Hole Type IP+WLS		Inclination 90° from horizontal								
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Installation
						Details	Dia.			
MADE GROUND: Bituminous material.			0.20	95.00		B 4 0.20-0.50				
MADE GROUND: Light yellowish brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone.			0.40	94.80		ES 1 0.20-0.50				
MADE GROUND: Cobble setts.			0.60	94.60		B 5 0.50-1.00				
Firm to stiff dark brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and mudstone.			0.80	94.40		ES 2 0.50-1.00				
Firm to stiff light brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and mudstone.						B 6 1.00-1.20				
						ES 3 1.00-1.20			SPT(S) N=17 (1,1,4,3,5) 1.20	
						B 8 1.20-2.00				
						D 7 1.20-1.65				
			(2.36)			B 11 2.00-3.00				
						D 10 2.00-2.45			SPT(S) N=21 (4,3,5,5,5,6) 2.00	
						D 9 2.00				
End of borehole at 3.16m			3.16	92.04		D 12 3.00			SPT(S) 50/10mm (10,15,50/10) 3.00	
						D 13 3.00-3.16				
DRAFT										
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.										
DRAFT		Print date and time 16/01/2018 15:19			Log checked by Jon Duxbury			soil engineering		
Form No. SIEXPHOLECPLOG		Issue/Revision No. 2.03			Issue Date 22/06/2016			Part of the Bachy Soletanche Group		

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS06			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +96.58mOD					Coordinates 434612.23E, 406410.29N					Grid OSGB							
Date Started 17/11/2017					Date Completed 17/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	17/11/2017 08:00	17/11/2017 10:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.50m x 0.50m x 1.20m					
1.20	4.45	WLS	17/11/2017 10:00	17/11/2017 13:00	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
17/11/2017 13:00	4.45	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=3 (1,0,0,1,1,1)			4	81	0.00	Dry
						2.00	S	N=2 (1,0,1,0,1,0)			4	81	0.00	Dry
						3.00	S	N=22 (7,7,5,5,6,6)			4	81	0.00	Dry
						4.00	S	N=54 (4,5,4,6,20,24)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference	
3.00	101			1.20	2.00	101	00:05:00	100	8	
4.00	90			2.00	3.00	101	00:05:00	100	11	
				3.00	4.00	90	00:05:00	90	14	

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
4.00	01	SP	0.50	4.00	01	01	0.50	0.50	50	PLAIN SLOTTED					

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.25	Concrete											
0.25	0.50	Bentonite											
0.50	4.00	Gravel											
4.00	4.45	Bentonite											

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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DRAFT	Print date and time 16/01/2018 15:19	Log checked by Jon Duxbury	
Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS06		
Project No. TA8066										
Engineer Mott MacDonald										
Employer Henry Boot								Sheet 1 of 1		
Ground Level +96.58mOD		Coordinates 434612.23E, 406410.29N		Grid OSGB						
Hole Type IP+WLS		Inclination 90° from horizontal								
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Installation
						Details	Dia.			
MADE GROUND: Sandstone flags.			0.20	96.38		B 4 0.20-0.80				
MADE GROUND: Brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone and sandstone.			0.40	96.18		ES 1 0.20				
MADE GROUND: Brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone, sandstone and brick.			(0.80)			B 5 0.50-1.00				
from 1.00m with low cobble content. Cobble sized fragments are angular to subangular of limestone and sandstone			1.20	95.38		ES 2 0.50			SPT(S) N=3 (1,0,0,1,1,1) 1.20	
Very loose brown clayey fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.			(1.25)			B 6 1.00-1.20				
			2.45	94.13		ES 3 1.00			SPT(S) N=2 (1,0,1,0,1,0) 2.00	
			(2.00)			D 7 1.20-1.65				
						D 8 1.20-2.00				
Firm to stiff brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and mudstone.			2.45	94.13		D 10 2.00-2.45				
			(2.00)			D 11 2.00-3.00				
						D 9 2.00				
						D 12 3.00			SPT(S) N=22 (7,7,5,5,6,6) 3.00	
						D 13 3.00-3.45				
						D 14 3.00-4.00				
from 4.00m thinly laminated						D 15 4.00			SPT(S) N=54 (4,5,4,6,20,24) 4.00	
						D 16 4.00-4.45				
End of borehole at 4.45m			4.45	92.13						

DRAFT

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.	
DRAFT Print date and time 16/01/2018 15:19 Log checked by Jon Duxbury Form No. SIEXPHOLECPLOG Issue/Revision No. 2.03 Issue Date 22/06/2016		
		soil engineering Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS07			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +94.46mOD					Coordinates 434756.37E, 406224.25N					Grid OSGB							
Date Started 01/12/2017					Date Completed 01/12/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	01/12/2017 12:00	01/12/2017 13:00	GE	MPB	NA	NA	Hand tools	None Used	All Faces Stable	0.50m x 0.50m x 1.20m					
1.20	1.65	WLS	01/12/2017 13:00	01/12/2017 14:00	GE	MPB	NA	NA	Premier 110	NA	NA						

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
01/12/2017 13:00	1.20	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=50 (3,4,10,10,20,10)			4	81	0.00	dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	1.65	Arisings											

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS11A			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +91.18mOD					Coordinates 434719.21E, 406307.62N					Grid OSGB							
Date Started 21/11/2017					Date Completed 21/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	21/11/2017 10:00	21/11/2017 11:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	Concrete cored out					
1.20	4.10	WLS	21/11/2017 11:00	21/11/2017 14:00	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
21/11/2017 14:00	4.10	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=2 (1,0,1,0,1,0)			4	81	0.00	Dry
						2.00	S	N=2 (1,0,1,0,1,0)			4	81	0.00	Dry
						3.00	S	N=16 (1,3,4,4,4,4)			4	81	0.00	Dry
						4.00	S	50/0mm (25,0/0,50/0)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
3.00	101			1.20	2.00	101	00:05:00	100	7
4.00	90			2.00	3.00	101	00:05:00	100	10
				3.00	4.00	90	00:05:00	90	13

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
3.00	01	SP	1.00	3.00	01	01	0.00	1.00	50	PLAIN SLOTTED					

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.50	Concrete											
0.50	1.00	Bentonite											
1.00	3.00	Gravel											
3.00	4.10	Bentonite											

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS11B			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +91.18mOD					Coordinates 434718.57E, 406308.41N					Grid OSGB							
Date Started 06/12/2017					Date Completed 06/12/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	06/12/2017 08:00	06/12/2017 09:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.50m x 0.50m x 1.20m					
1.20	4.45	WLS	06/12/2017 09:00	06/12/2017 11:30	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
06/12/2017 11:30	4.45	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=2 (1,0,0,1,0,1)			4	81	0.00	dry
						2.00	S	N=2 (1,0,0,1,0,1)			4	81	0.00	dry
						3.00	S	N=26 (3,4,4,6,7,9)			4	81	0.00	dry
						4.00	S	N=40 (5,6,8,9,11,12)			4	81	0.00	dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference	
3.00	101			1.20	2.00	101	00:05:00	100	8	
4.00	90			2.00	3.00	101	00:05:00	100	12	
				3.00	4.00	90	00:05:00	100	16	

INSTALLATION DETAILS						PIPE CONSTRUCTION					DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks	

BACKFILL DETAILS					LOCATION DETAILS				
Depth Top	Depth Base	Description			Remarks				
0.00	0.20	Concrete bentonite							
0.20	4.45								

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS12			
Engineer Mott MacDonald																	
Employer Henry Boot										Sheet 1 of 1							
Ground Level +93.56mOD				Coordinates 434711.74E, 406402.33N				Grid OSGB									
Date Started 16/11/2017				Date Completed 16/11/2017				Inclination 90° from horizontal									

Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks
0.00	1.20	IP	16/11/2017 13:00	16/11/2017 14:30	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.30m x 0.30m x 1.20m
1.20	2.45	WLS	16/11/2017 14:30									

PROGRESS					
Date Time	Depth	Depth Casing	Depth Water	Remarks	
16/11/2017 16:30	2.45	0.00	Dry	End of Hole	

WATER STRIKES						
Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks

CABLE PERCUSSION DETAILS					
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks

SPT DETAILS						
Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio
1.20	S	N=17 (5,5,5,4,4,4)			4	81
2.00	S	N=50 (2,2,4,5,5,36)			4	81

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

DYNAMIC SAMPLING								
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery
2.00	101			1.20	2.00	101	00:05:00	100

INSTALLATION DETAILS					
Distance	ID	Type	Response Top	Response Base	Pipe Ref

PIPE CONSTRUCTION					
Pipe Ref	Top	Base	Diameter	Pipe Type	

BACKFILL DETAILS					
Depth Top	Depth Base	Description		Remarks	
0.00	2.45	Arisings			

LOCATION DETAILS	
Remarks	

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

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Part of the Bachy Soletanche Group

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Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS13A			
Engineer Mott MacDonald																	
Employer Henry Boot										Sheet 1 of 1							
Ground Level +91.18mOD				Coordinates 434719.85E, 406343.17N				Grid OSGB									
Date Started 05/12/2017				Date Completed 15/12/2017				Inclination 90° from horizontal									

Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks
0.00	0.75	IP	05/12/2017 08:00	05/12/2017 14:00	GE	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	Inspection pit dug through 250mm concrete core

PROGRESS					
Date Time	Depth	Depth Casing	Depth Water	Remarks	
05/12/2017 10:00	0.75	0.00	Dry	End of hole	

WATER STRIKES						
Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks

CABLE PERCUSSION DETAILS					
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks

SPT DETAILS						
Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio
0.60	S	50/10mm (25/5,50/10)			4	81

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

DYNAMIC SAMPLING									
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference

INSTALLATION DETAILS					
Distance	ID	Type	Response Top	Response Base	Pipe Ref

PIPE CONSTRUCTION					
Pipe Ref	Top	Base	Diameter	Pipe Type	

BACKFILL DETAILS					
Depth Top	Depth Base	Description	Remarks		
0.00	0.20	Concrete			
0.20	0.62	Bentonite			

LOCATION DETAILS	
Remarks	

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

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[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS15			
Engineer Mott MacDonald																	
Employer Henry Boot										Sheet 1 of 1							
Ground Level +96.13mOD				Coordinates 434707.01E, 406236.59N				Grid OSGB									
Date Started 01/12/2017				Date Completed 01/12/2017				Inclination 90° from horizontal									

Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks
0.00	1.20	IP	01/12/2017 08:00	01/12/2017 09:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.50m x 0.50m x 1.20m
1.20	3.16	WLS	01/12/2017 09:00	01/12/2017 10:00	GE	MPB	NA	NA				

PROGRESS					
Date Time	Depth	Depth Casing	Depth Water	Remarks	
01/12/2017 10:00	3.16	0.00	Dry	End of hole	

WATER STRIKES						
Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks

CABLE PERCUSSION DETAILS					
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks

SPT DETAILS						
Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
1.20	S	N=3 (1,0,0,1,1,1)	4	81	0.00	Dry
2.00	S	N=22 (1,1,4,7,6,5)	4	81	0.00	Dry
3.00	S	50/10mm (10,15,50/10)	4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

DYNAMIC SAMPLING								
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery
3.00	101			1.20	2.00	101	00:05:00	100
				2.00	3.00	101	00:05:00	100

INSTALLATION DETAILS					
Distance	ID	Type	Response Top	Response Base	Pipe Ref

PIPE CONSTRUCTION					
Pipe Ref	Top	Base	Diameter	Pipe Type	

BACKFILL DETAILS					
Depth Top	Depth Base	Description	Remarks		
0.00	0.50	Tarmacadam			
0.50	3.16	Bentonite			

LOCATION DETAILS	
Remarks	

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

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[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS30			
Project No. TA8066																	
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +94.49mOD					Coordinates 434797.81E, 406221.30N					Grid OSGB							
Date Started 07/11/2017					Date Completed 10/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	07/11/2017 14:00	07/11/2017 15:00	RJ/LG	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	0.30m x 0.30m x 1.20m					
1.20	4.20	WLS	08/11/2017 08:00	09/11/2017 16:30	DC	MPB	NA	NA	Comacchio 205	NA	NA						
4.20	7.00	RC	10/11/2017 08:00	10/11/2017 16:30	DC	MPB	T6116	PCD	Comacchio 205	NA	NA						
PROGRESS										WATER STRIKES							
Date Time	Depth	Depth Casing	Depth Water	Remarks			Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks				
07/11/2017 15:00	1.20	0.00	Dry	End of Shift			09/11/2017 00:00	4.20	3.70		4.20	20	Heavy seepage				
09/11/2017 08:00	1.20	0.00	Dry	Start of Shift													
09/11/2017 16:30	4.20	4.20	3.70	End of Shift													
10/11/2017 08:00	4.20	4.30	3.30	Start of Shift													
10/11/2017 16:30	7.00	7.00	3.10	End of Hole													
CABLE PERCUSSION DETAILS										SPT DETAILS							
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks			Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water		
								1.20	S	N=40 (4,15,10,15,8,7)		AR503	60	0.00	Dry		
								2.70	S	N=19 (3,4,4,5,5,5)		AR503	60	2.20	Dry		
								3.70	S	N=27 (4,4,5,5,8,9)		AR503	60	2.20	Dry		
								5.20	S	N=22 (4,4,5,5,6,6)		AR503	60	4.20	4.00		
ROTARY FLUSH DETAILS																	
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks												
4.20	7.00	WATER	90	Brown													
HOLE DIAMETER										CASING DIAMETER				DYNAMIC SAMPLING			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference								
4.20	140	4.20	140	1.20	2.20	101	00:10:00										
7.00	116			3.00	3.20	101	00:02:00										
				3.70	4.20	101	00:05:00										
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS							
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks				
5.00	01	SP	3.50	5.00	01	01	0.00	3.50	50	PLAIN SLOTTED							
BACKFILL DETAILS										LOCATION DETAILS							
Depth Top	Depth Base	Description			Remarks			Remarks									
0.00	0.50	Concrete						101 windowless sample barrel used to clean out between U100's									
0.50	3.50	Bentonite															
3.50	5.00	Gravel															
5.00	7.00	Bentonite															
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.																	
DRAFT Print date and time 16/01/2018 15:19 Log checked by Jon Duxbury															soil engineering		
Form No. SIEXPHOLEHDR Issue/Revision No. 2.02 Issue Date 22/06/2016															Part of the Bachy Soletanche Group		

Project Name Barnsley Glassworks					Exploratory Hole Log					Hole ID WS30				
Project No. TA8066														
Engineer Mott MacDonald														
Employer Henry Boot										Sheet 1 of 1				
Ground Level +94.49mOD		Coordinates 434797.81E, 406221.30N		Grid OSGB										
Hole Type IP+WLS+RC		Inclination 90° from horizontal												

Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery				In Situ Test Details	Installation	
						Details	Dia.							
MADE GROUND: Brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of chert, ash, clinker and sandstone with low cobble content. Cobble sized fragments are angular to subangular of brick.			(1.20)			D 1 0.20 ES 2 0.20 D 3 0.50 ES 4 0.50						SPT(S) N=40 (4,15,10,15,8,7) 1.20		
MADE GROUND: Dark brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of sandstone, mudstone, ash, clinker and brick with low cobble content. Cobble sized fragments are angular to subangular of brick.			1.20 (0.80)	93.29		B 7 1.00-1.20 D 5 1.00 ES 6 1.00 B 8 1.20								
MADE GROUND: Brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of sandstone and mudstone.			2.00 (0.70)	92.49		ES 9 2.00 D 10 2.20 U 11 2.20-2.65	100							
Firm to stiff thinly laminated brown mottled grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone.			2.70 (1.50)	91.79		B 14 2.70-3.20 D 12 2.70 D 13 2.70-3.15 ES 15 3.00 D 17 3.20 U 16 3.20-3.65	100						SPT(S) N=19 (3,4,4,5,5,5) 2.70	
Extremely weak thinly laminated brown mottled grey MUDSTONE. Discontinuities: 1) 0-10 degrees very closely to closely spaced planar smooth. from 4.64m to 4.80m and 4.85m to 4.90m 1 No discontinuity 90 degrees planar stepped stained orangish brown from 4.90m to 4.97m and 5.04m to 5.10m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments locally very clayey) from 5.10m to 5.20m assumed zone of core loss			4.20 (1.20)	90.29		B 20 4.20 C 21 4.20-5.20		89	90	66	50	NI 60 180	SPT(S) N=22 (4,4,5,5,8,9) 5.20	
Assumed zone of core loss.			5.40 (0.45)	89.09		C 22 5.20-5.85		89	40	0	0	NR		
Extremely weak thinly laminated grey mottled brown MUDSTONE. Discontinuities: 1) 0-10 degrees very closely to closely spaced planar smooth. from 6.00m to 6.10m recovered as non intact core (subangular to subrounded fine to coarse gravel sized fragments)			5.85 (1.15)	88.64		C 23 5.85-7.00		89	100	91	78	30 60 180		
End of borehole at 7.00m			7.00	87.49										



Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations, see key.



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Form No. SIEXPHOLECPLOG Issue/Revision No. 2.03 Issue Date 22/06/2016

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS31C	
Project No. TA8066															
Engineer Mott MacDonald															
Employer Henry Boot														Sheet 1 of 1	
Ground Level +94.40mOD					Coordinates 434788.43E, 406233.89N					Grid OSGB					
Date Started 07/11/2017					Date Completed 13/11/2017					Inclination 90° from horizontal					
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks			
0.00	1.20	IP	07/11/2017 15:00	08/11/2017 08:00	LG/MPB	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	0.30m x 0.30m x 1.20m			
1.20	5.20	WLS	13/11/2017 08:00	13/11/2017 12:00	JM	MPB	NA	NA	Comacchio 205	NA	NA				
5.20	7.75	RC	13/11/2017 12:00	13/11/2017 16:00	JM	MPB	T6116	PCD	Comacchio 205	NA	NA				

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
07/11/2017 16:30	0.70	0.00	Dry	End of Shift		13/11/2017 15:00	4.70	4.70		4.70	20	Not sealed
08/11/2017 07:30	0.70	0.00	Dry	Start of Shift								
08/11/2017 08:00	1.20	0.00	Dry	End of IP								
13/11/2017 08:00	1.20	0.00	Dry	Start of Shift								
13/11/2017 16:30	7.75	4.50	3.10	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS							
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	
						1.20	S	N=17 (4,4,4,5,4,4)	AR503	60	0.00	Dry	
						2.20	S	N=20 (5,6,6,5,4,5)	AR503	60	1.60	Dry	
						3.20	S	N=27 (5,5,6,7,7,7)	AR503	60	1.60	Dry	
						4.70	S	N=33 (6,6,7,8,8,10)	AR503	60	4.80	4.80	
						5.20	S	N=31 (6,6,7,6,8,10)	AR503	60	4.80	4.80	

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks
5.20	7.75	WATER	100	Grey	

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
1.60	150	1.20	150	1.20	2.20	101	00:05:00		
4.80	140	4.80	140	2.20	3.20	101	00:05:00		
7.75	116			3.20	4.20	101	00:05:00		
				4.20	5.20	101	00:05:00		

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
3.50	01	SP	0.20	3.50	01	01	0.00	0.50	3.40	50					

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.20	Concrete								101 windowless sample barrel used to clean out between U100's			
0.20	3.50	Gravel											
3.50	7.75	Bentonite											

Notes: All depth in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water.
For details of abbreviations see key.

DRAFT	Print date and time 16/01/2018 15:19	Log checked by Jon Duxbury	soil engineering
Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS32			
Project No. TA8066																	
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +94.29mOD					Coordinates 434772.16E, 406267.43N					Grid OSGB							
Date Started 06/11/2017					Date Completed 08/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	06/11/2017 12:30	06/11/2017 14:30	JM	MPB	NA	NA	Hand Tools	None Used	All Faces Stable	0.50m x 0.50m x 1.20m					
1.20	3.70	WLS	07/11/2017 07:30	07/11/2017 16:30	JM	MPB	NA	NA	Comacchio 205	NA	NA						
3.70	7.65	RC	08/11/2017 08:00	08/11/2017 16:30	JM	MPB	T6116	PCD	Comacchio 205	NA	NA						
PROGRESS										WATER STRIKES							
Date Time	Depth	Depth Casing	Depth Water	Remarks			Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks				
06/11/2017 12:30	1.70	2.00	Dry	End of Shift													
07/11/2017 08:00	1.70	2.00	Dry	Start of Shift													
07/11/2017 16:30	3.70	3.00	Dry	End of Shift													
08/11/2017 08:00	3.70	3.50	0.30	Start of Shift													
08/11/2017 16:30	7.65	3.90	2.10	End of Hole													
CABLE PERCUSSION DETAILS										SPT DETAILS							
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks			Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water		
								1.20	S	N=24 (3,4,10,6,5,3)		AR503	60	0.00	Dry		
								2.20	S	N=16 (2,4,5,4,4,3)		AR503	60	1.70	Dry		
								3.70	S	50/75mm (25/10,50,0/0)		AR503	60	3.00	0.30		
								4.50	S	50/0mm (18,7/10,50/0)		AR503	60	3.90	2.30		
								5.25	S	50/0mm (14,11/40,50/0)		AR503	60	3.90	2.10		
ROTARY FLUSH DETAILS																	
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks												
4.00	4.50	WATER	80	Black													
4.50	5.25	WATER	75	Black													
5.25	6.25	WATER	95	Black													
6.25	6.50	WATER	80	Black													
HOLE DIAMETER										CASING DIAMETER				DYNAMIC SAMPLING			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference								
1.60	150	1.60	150	1.20	2.20	101	00:15:00										
3.70	101	4.80	140	2.20	3.00	101	00:15:00										
7.75	116			3.00	3.20	101	00:10:00										
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS							
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks				
5.25	01	SP	4.00	5.25	01	01 01	0.00 4.00	4.00 5.25	50 50	PLAIN SLOTTED							
BACKFILL DETAILS										LOCATION DETAILS							
Depth Top	Depth Base	Description			Remarks			Remarks									
0.00	0.50	Concrete						101 windowless sample barrel used to clean out between U100's									
0.50	4.00	Bentonite															
4.00	5.25	Gravel															
5.25	7.65	Bentonite															
		Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.															
DRAFT		Print date and time 16/01/2018 15:19					Log checked by Jon Duxbury					soil engineering					
Form No. SIEXPHOLEHDR		Issue/Revision No. 2.02					Issue Date 22/06/2016					Part of the Bachy Soletanche Group					

[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID			
Project No. TA8066														WS33			
Engineer Mott MacDonald																	
Employer Henry Boot														Sheet 1 of 1			
Ground Level +91.17mOD					Coordinates 434701.63E, 406319.32N					Grid OSGB							
Date Started 30/11/2017					Date Completed 30/11/2017					Inclination 90° from horizontal							
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks					
0.00	1.20	IP	30/11/2017 12:00	30/11/2017 14:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.30m x 0.30m x 1.20m					
1.20	2.08	WLS	30/11/2017 14:00	30/11/2017 15:00	GE	MPB	NA	NA									

PROGRESS						WATER STRIKES						
Date Time	Depth	Depth Casing	Depth Water	Remarks		Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks
30/11/2017 15:00	2.08	0.00	Dry	End of Hole								

CABLE PERCUSSION DETAILS						SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result			Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water
						1.20	S	N=2 (1,1,0,0,1,1)			4	81	0.00	Dry
						2.00	S	50/5mm (25/10,50/5)			4	81	0.00	Dry

ROTARY FLUSH DETAILS					
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks

HOLE DIAMETER		CASING DIAMETER		DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference
2.08	101			1.20	0.00	101	00:05:00	100	8
				2.00	2.08	101	00:05:00	100	11

INSTALLATION DETAILS						PIPE CONSTRUCTION						DEPTH RELATED REMARKS			
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks		
2.08		SP	1.00	2.00	01	01	0.00	1.00	50	PLAIN SLOTTED					

BACKFILL DETAILS						LOCATION DETAILS							
Depth Top	Depth Base	Description				Remarks				Remarks			
0.00	0.20	Concrete											
0.20	1.00	Bentonite											
1.00	2.08	Gravel											

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.	
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DRAFT	Print date and time 16/01/2018 15:19	Log checked by Jon Duxbury	soil engineering
Form No. SIEXPHOLEHDR	Issue/Revision No. 2.02	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks						Exploratory Hole Log		Hole ID WS33 Sheet 1 of 1				
Project No.		TA8066										
Engineer		Mott MacDonald										
Employer		Henry Boot										
Ground Level		+91.17mOD		Coordinates		434701.63E, 406319.32N		Grid OSGB				
Hole Type		IP+WLS		Inclination		90° from horizontal						
Description of Strata				Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling Details Dia.	Blow Count and Sample Recovery	In Situ Test Details	Installation
MADE GROUND: Concrete						0.20	90.97		B 4 0.20-0.50 ES 1 0.20-0.50 B 5 0.50-1.00 ES 2 0.50-1.00			
MADE GROUND: Dark greyish brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of ash clinker, and brick,						(1.00)						
MADE GROUND: Grey slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of ash, brick, and sandstone.						1.20	89.97		B 6 1.00-1.20 ES 3 1.00-1.20 B 8 1.20-2.00 D 7 1.20-1.65 ES 10 1.20-2.00		SPT(S) N=2 (1,1,0,0,1,1) 1.20	
Weak grey mottled orangish brown MUDSTONE. End of borehole at 2.08m						2.00 2.08	89.17 89.09		B 12 2.00-2.45 D 11 2.00-2.45 D 9 2.00 D 13 2.08		SPT(S) 50/5mm (25/10,50/5) 2.00	
DRAFT												
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.												
Form No. SIEXPHOLECPLOG		Issue.Revision No. 2.03		Issue Date 22/06/2016		Part of the Bachy Soletanche Group						

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS37																																														
Project No. TA8066																																																												
Engineer Mott MacDonald																																																												
Employer Henry Boot														Sheet 1 of 1																																														
Ground Level +97.43mOD					Coordinates 434700.89E, 406260.27N					Grid OSGB																																																		
Date Started 06/12/2017					Date Completed 06/12/2017					Inclination 90° from horizontal																																																		
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks																																																
0.00	1.20	IP	06/12/2017 12:00	06/12/2017 13:00	GE	MPB	NA	NA	Hand tools	None Used	All Faces Stable	0.50m x 0.50m x 1.20m																																																
1.20	5.02	WLS	06/12/2017 13:00	06/12/2017 16:30	GE	MPB	NA	NA	Premier 110	NA	NA																																																	
PROGRESS <table border="1"> <tr> <th>Date Time</th><th>Depth</th><th>Depth Casing</th><th>Depth Water</th><th>Remarks</th> </tr> <tr> <td>06/12/2017 16:30</td><td>5.02</td><td>0.00</td><td>Dry</td><td>End of hole</td> </tr> </table> WATER STRIKES <table border="1"> <tr> <th>Date Time</th><th>Depth Strike</th><th>Depth Casing</th><th>Depth Sealed</th><th>Water Rose To</th><th>Time Elapsed</th><th>Remarks</th> </tr> </table>													Date Time	Depth	Depth Casing	Depth Water	Remarks	06/12/2017 16:30	5.02	0.00	Dry	End of hole	Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks																															
Date Time	Depth	Depth Casing	Depth Water	Remarks																																																								
06/12/2017 16:30	5.02	0.00	Dry	End of hole																																																								
Date Time	Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks																																																						
CABLE PERCUSSION DETAILS <table border="1"> <tr> <th>Depth Top</th><th>Depth Base</th><th>Time Start</th><th>Duration</th><th>Tool</th><th>Remarks</th> </tr> </table> SPT DETAILS <table border="1"> <tr> <th>Depth Top</th><th>Test Type</th><th>Reported Result</th><th>Hammer Serial Number</th><th>Energy Ratio</th><th>Depth Casing</th><th>Depth Water</th> </tr> <tr> <td>1.20</td><td>S</td><td>N=17 (3,4,4,4,5,4)</td><td>4</td><td>81</td><td>0.00</td><td>Dry</td> </tr> <tr> <td>2.00</td><td>S</td><td>N=32 (2,3,7,8,7,10)</td><td>4</td><td>81</td><td>0.00</td><td>Dry</td> </tr> <tr> <td>3.00</td><td>S</td><td>N=2 (1,0,1,0,1,0)</td><td>4</td><td>81</td><td>0.00</td><td>Dry</td> </tr> <tr> <td>4.00</td><td>S</td><td>N=12 (2,3,3,3,3,3)</td><td>4</td><td>81</td><td>0.00</td><td>Dry</td> </tr> <tr> <td>5.00</td><td>S</td><td>50/5mm (25/10,50/5)</td><td>4</td><td>81</td><td>0.00</td><td>Dry</td> </tr> </table>													Depth Top	Depth Base	Time Start	Duration	Tool	Remarks	Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	1.20	S	N=17 (3,4,4,4,5,4)	4	81	0.00	Dry	2.00	S	N=32 (2,3,7,8,7,10)	4	81	0.00	Dry	3.00	S	N=2 (1,0,1,0,1,0)	4	81	0.00	Dry	4.00	S	N=12 (2,3,3,3,3,3)	4	81	0.00	Dry	5.00	S	50/5mm (25/10,50/5)	4	81	0.00	Dry
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks																																																							
Depth Top	Test Type	Reported Result	Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water																																																						
1.20	S	N=17 (3,4,4,4,5,4)	4	81	0.00	Dry																																																						
2.00	S	N=32 (2,3,7,8,7,10)	4	81	0.00	Dry																																																						
3.00	S	N=2 (1,0,1,0,1,0)	4	81	0.00	Dry																																																						
4.00	S	N=12 (2,3,3,3,3,3)	4	81	0.00	Dry																																																						
5.00	S	50/5mm (25/10,50/5)	4	81	0.00	Dry																																																						
ROTARY FLUSH DETAILS <table border="1"> <tr> <th>Depth Top</th><th>Depth Base</th><th>Flush Type</th><th>Flush Return</th><th>Flush Colour</th><th>Remarks</th> </tr> </table>													Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks																																										
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Depth Base	Diameter																																																											
3.00	101																																																											
4.00	98																																																											
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Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference																																																							
1.20	2.00	101	00:05:00	100	8																																																							
2.00	3.00	101	00:05:00	100	12																																																							
3.00	4.00	98	00:10:00	75	16																																																							
4.00	5.00	84	00:10:00	75	19																																																							
INSTALLATION DETAILS <table border="1"> <tr> <th>Distance</th><th>ID</th><th>Type</th><th>Response Top</th><th>Response Base</th><th>Pipe Ref</th><th>Pipe Ref</th><th>Top</th><th>Base</th><th>Diameter</th><th>Pipe Type</th> </tr> </table> PIPE CONSTRUCTION <table border="1"> <tr> <th>Top</th><th>Base</th><th>Diameter</th><th>Pipe Type</th> </tr> </table> DEPTH RELATED REMARKS <table border="1"> <tr> <th>Depth Top</th><th>Depth Base</th><th>Remarks</th> </tr> </table>													Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks																														
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Depth Top	Depth Base	Description	Remarks																																																									
0.00	0.20	Concrete																																																										
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Remarks																																																												
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.  																																																												
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Form No. SIEXPHOLEHDR Issue/Revision No. 2.02 Issue Date 22/06/2016 Part of the Bachy Soletanche Group																																																												

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS37		
Project No. TA8066										
Engineer Mott MacDonald										
Employer Henry Boot								Sheet 1 of 1		
Ground Level +97.43mOD		Coordinates 434700.89E, 406260.27N		Grid OSGB						
Hole Type IP+WLS		Inclination 90° from horizontal								
Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Installation
						Details	Dia.			
MADE GROUND: Concrete			0.20	97.23		B 4 0.20-0.50 ES 1 0.20-0.50				
MADE GROUND: Light brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone			(1.00)			B 5 0.50-1.00 ES 2 0.50-1.00				
MADE GROUND: Brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of ash, brick, clinker sandstone and mudstone with low cobble content. Cobbles are subangular to subrounded of sandstone, mudstone, brick, and clinker.			1.20	96.23		B 6 1.00-1.20 ES 3 1.00-1.20 B 8 1.20-2.00 D 10 1.20-2.00 D 7 1.20-1.65			SPT(S) N=17 (3,4,4,4,5,4) 1.20	
MADE GROUND: Grey mottled brown slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of sandstone and mudstone.			2.00	95.43		B 12 2.00-3.00 D 11 2.00-2.45 D 9 2.00 ES 14 2.00-3.00			SPT(S) N=32 (2,3,7,8,7,10) 2.00	
			(1.00)							
MADE GROUND: Brown and grey slightly sandy slightly gravelly clay with low cobble content. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subangular fine to coarse of brick, ash, and clinker. Cobble sized fragments are angular of brick and clinker.			3.00	94.43		B 16 3.00-4.00 D 13 3.00 D 15 3.00-3.45 ES 18 3.00-4.00			SPT(S) N=2 (1,0,1,0,1,0) 3.00	
			(1.90)							
						B 19 4.00-5.00 D 17 4.00 D 21 4.00-4.45			SPT(S) N=12 (2,3,3,3,3,3) 4.00	
Extremely weak grey MUDSTONE.			4.90	92.53						
End of borehole at 5.02m			5.02	92.41		D 20 5.00 D 22 5.00-5.02			SPT(S) 50/5mm (25/10,50/5) 5.00	

DRAFT

	Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.	
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		soil engineering Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS38				
Project No. TA8066																		
Engineer Mott MacDonald																		
Employer Henry Boot														Sheet 1 of 1				
Ground Level +95.13mOD					Coordinates 434728.66E, 406275.95N					Grid OSGB								
Date Started 04/12/2017					Date Completed 04/12/2017					Inclination 90° from horizontal								
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks						
0.00	1.20	IP	04/12/2017 09:00	04/12/2017 10:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.50m x 0.50m x 1.20m						
1.20	3.60	WLS	04/12/2017 10:00	04/12/2017 14:00	GE	MPB	NA	NA										
PROGRESS										WATER STRIKES								
Date Time		Depth	Depth Casing	Depth Water	Remarks					Date Time		Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks	
04/12/2017 16:30		3.60	0.00	Dry	End of Hole													
CABLE PERCUSSION DETAILS										SPT DETAILS								
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks					Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water	
										1.20	S	N=26 (5,19,9,8,5,4)		4	81	0.00	Dry	
										2.00	S	N=38 (2,1,6,8,11,13)		4	81	0.00	Dry	
										3.00	S	50/5mm (25/1,50/5)		4	81	0.00	Dry	
ROTARY FLUSH DETAILS																		
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks													
HOLE DIAMETER										CASING DIAMETER		DYNAMIC SAMPLING						
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference									
3.00	101			1.20	2.00	101	00:10:00	100	8									
3.60	98			2.00	3.00	101	00:10:00	100	12									
				3.00	3.60	98	00:10:00	100	15									
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS								
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks					
BACKFILL DETAILS										LOCATION DETAILS								
Depth Top	Depth Base	Description			Remarks					Remarks								
0.00	0.20	Concrete Bentonite																
0.20	3.60																	
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.																	 soil engineering	
DRAFT					Print date and time 16/01/2018 15:19					Log checked by Jon Duxbury					Part of the Bachy Soletanche Group			
Form No. SIEXPHOLEHDR					Issue/Revision No. 2.02					Issue Date 22/06/2016								

[illegible]

Project Name Barnsley Glassworks										Exploratory Hole Log				Hole ID WS40					
Project No. TA8066																			
Engineer Mott MacDonald																			
Employer Henry Boot														Sheet 1 of 1					
Ground Level +95.47mOD					Coordinates 434632.54E, 406438.29N					Grid OSGB									
Date Started 30/11/2017					Date Completed 30/11/2017					Inclination 90° from horizontal									
Top	Base	Type	Date Time Start	Date Time End	Rig Crew	Logger	Barrel Type	Drill Bit	Plant Used	Shoring Used	Pit Stability	Remarks							
0.00	1.20	IP	30/11/2017 08:00	30/11/2017 10:00	GE	MPB	NA	NA	Hand Tools Premier 110	None Used	All Faces Stable	0.30m x 0.30m x 1.20m							
1.20	4.02	WLS	30/11/2017 10:00	30/11/2017 11:00	GE	MPB	NA	NA		NA	NA								
PROGRESS										WATER STRIKES									
Date Time		Depth	Depth Casing	Depth Water	Remarks					Date Time		Depth Strike	Depth Casing	Depth Sealed	Water Rose To	Time Elapsed	Remarks		
30/11/2017 11:00		4.02	0.00	Dry	End of Hole														
CABLE PERCUSSION DETAILS										SPT DETAILS									
Depth Top	Depth Base	Time Start	Duration	Tool	Remarks					Depth Top	Test Type	Reported Result		Hammer Serial Number	Energy Ratio	Depth Casing	Depth Water		
										1.20	S	N=12 (1,1,2,3,3,4)		4	81	0.00	Dry		
										3.00	S	N=19 (4,4,4,5,5,5)		4	81	0.00	Dry		
										4.00	S	50/10mm (25/10,50/10)		4	81	0.00	Dry		
ROTARY FLUSH DETAILS																			
Depth Top	Depth Base	Flush Type	Flush Return	Flush Colour	Remarks														
HOLE DIAMETER										CASING DIAMETER				DYNAMIC SAMPLING					
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Diameter	Duration	Sample Recovery	Run Reference										
3.00	101			1.20	2.00	101	00:10:00	95	8										
4.00	98			2.00	3.00	101	00:10:00	95	12										
				3.00	4.00	98	00:10:00	90	15										
INSTALLATION DETAILS					PIPE CONSTRUCTION					DEPTH RELATED REMARKS									
Distance	ID	Type	Response Top	Response Base	Pipe Ref	Pipe Ref	Top	Base	Diameter	Pipe Type	Depth Top	Depth Base	Remarks						
3.70	01	SP	1.00	3.70	01	01	0.00	1.00	50	PLAIN SLOTTED									
BACKFILL DETAILS										LOCATION DETAILS									
Depth Top	Depth Base	Description				Remarks					Remarks								
0.00	0.50	Concrete																	
0.50	1.00	Bentonite																	
1.00	3.70	Gravel																	
3.70	4.02	Bentonite																	
 Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations see key.										 soil engineering Part of the Bachy Soletanche Group									
DRAFT										Print date and time 16/01/2018 15:19					Log checked by Jon Duxbury				
Form No. SIEXPHOLEHDR										Issue/Revision No. 2.02					Issue Date 22/06/2016				

Project Name Barnsley Glassworks					Exploratory Hole Log			Hole ID WS40		
Project No. TA8066										
Engineer Mott MacDonald										
Employer Henry Boot								Sheet 1 of 1		
Ground Level +95.47mOD		Coordinates 434632.54E, 406438.29N		Grid OSGB						
Hole Type IP+WLS		Inclination 90° from horizontal								
Description of Strata	Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling		Blow Count and Sample Recovery	In Situ Test Details	Install-ation
						Details	Dia.			
MADE GROUND: Bituminous material			0.20	95.27		B 4 0.20-0.50 ES 1 0.20-0.50				
MADE GROUND: Brown and reddish brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of sandstone, mudstone, as and brick.			(0.60)			B 5 0.50-1.00 ES 2 0.50-1.00				
MADE GROUND: Brown and reddish brown clayey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of sandstone, mudstone, ash and brick.			0.80	94.67						
Firm to stiff brown mottled orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse Gravel is angular to subangular fine to coarse of sandstone and mudstone.			1.20	94.27		B 6 1.00-1.20 ES 3 1.00-1.20 B 11 1.20-2.00 B 8 1.20-2.00 D 7 1.20-1.65 ES 10 1.20-2.00			SPT(S) N=12 (1,1,2,3,3,4) 1.20	
			(1.80)			B 12 2.00-3.00 D 9 2.00				
Stiff brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone.			3.00	92.47		B 15 3.00-4.00 D 13 3.00 ES 14 3.00-3.45			SPT(S) N=19 (4,4,4,5,5,5) 3.00	
			(1.00)							
Extremely weak thinly laminated COAL. Recovered as subangular to subrounded fine to coarse gravel sized fragments. End of borehole at 4.02m			4.00	91.47 91.45		D 16 4.00 D 17 4.00-4.45			SPT(S) 50/10mm (25/10,50/10) 4.00	
DRAFT										
Notes: All depth in metres, all diameters in millimetres. See header sheet for details of boring, progress and water. For details of abbreviations, see key.										
DRAFT		Print date and time 16/01/2018 15:19			Log checked by Jon Duxbury			SOIL engineering		
Form No. SIEXPHOLECPLOG		Issue/Revision No. 2.03		Issue Date 22/06/2016			Part of the Bachy Soletanche Group			



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION A

Exploratory Hole Records and Field Data

DYNAMIC PROBING RECORDS

DRAFT

[illegible]

Project Name Barnsley Glassworks				Dynamic Probing Log		Hole ID	
Project No. TA8066						DP34	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot		Ground Level +97.80mOD		Coordinates 434605.96E, 406440.03N	Grid OSGB		
Hole Type DP		Inclination 90		Name of Operator GE			
Date of Test 29-11-2017		Equipment Type Hand Tools+Premier 110 4					

Depth m	0	5	10	15	20	25	30	35	40	45	50	Torque Nm
1												10
2												
3												
4												
5												
6												
7												
8												
9												
10												

Dynamic Probe Type DPSH-A	Nominal Rod Diameter 32mm	Type Of Anvil Damper None		
Nominal Standard Drop 500mm	Nominal Hammer Mass 64kg	Backfill	Depth Top 0.00	Depth Base 2.80
Nominal Cone Base Diameter 45mm	Cone Depth If Left In Ground 2.70m	Description Bentonite		

	Remarks Refusal	
	For details of abbreviations, see key.	
	DRAFT Print Data and Time 16/01/2018 15:22 Log checked by Jon Duxbury Form No. SI EXP HOLE DP LOG Issue/Revision No. 2.01 Issue Date 22/06/2016	

Part of the Bachy Soletanche group

Project Name Barnsley Glassworks						Hole ID	
Project No. TA8066 Engineer Mott MacDonald Employer Henry Boot						Excavation Log DP35 Sheet 1 of 1	
Ground Level +97.78mOD		Coordinates 434602.51E, 406434.25N		Grid OSGB			
Hole Type IP		Method/Equipment Hand tools/Premier 110		Logged By MPB+GE			
Date Started 29/11/2017		Date Completed 29/11/2017					

Description of Strata	Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling Details	In Situ Test Details	Installation
MADE GROUND: Flagstones			0.20	97.58		B 4 0.20-0.50 ES 1 0.20-0.50 B 5 0.50-1.00 ES 2 0.50-1.00		
MADE GROUND: Brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of sandstone, mudstone and brick			(1.00)			B 6 1.00-1.20 ES 3 1.00-1.20		
Completed by Dynamic Probing to 5.00m			1.20	96.58				
End of excavation at 5.00m			5.00	92.78				

Stability All Faces Stable			Excavation Dimensions and Orientation Length (Sides A and C) m Length (Sides B and D) m Depth 5.00m Bearing of Side A 359.00° WATER STRIKES Date Time Depth Strike Depth Sealed Depth Water Time Elapsed				
Shoring None Used							
DEPTH RELATED REMARKS							
Depth Top	Depth Base	Remarks					
1.20	5.00	Dynamic probing - see DP log for details					
GENERAL NOTES			SOIL engineering Part of the Bachy Soletanche Group				
Remarks							

Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records.
All bearings given relate to magnetic North.
For details of abbreviations, see key.

DRAFT
Print date and time 16/01/2018 15:12
Log checked by Jon Duxbury

Form No. SIEXPHOLETPLOG
Issue Revision No. 2.03
Issue Date 22/06/2016

Project Name Barnsley Glassworks				Dynamic Probing Log		Hole ID	
Project No. TA8066						DP35	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot		Ground Level +97.78mOD		Coordinates 434602.51E, 406434.25N	Grid OSGB		
Hole Type DP		Inclination 90		Name of Operator GE			
Date of Test 29-11-2017		Equipment Type Hand tools+Premier 110					

Depth m	0	5	10	15	20	25	30	35	40	45	50	Torque Nm
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Dynamic Probe Type DPSH-A	Nominal Rod Diameter 32mm	Type Of Anvil Damper None	Depth Top Depth Base 0.00 5.00	Description Bentonite
Nominal Standard Drop 500mm	Nominal Hammer Mass 64kg	Backfill		
Nominal Cone Base Diameter 45mm	Cone Depth If Left In Ground 5.00m			

	Remarks	
	For details of abbreviations, see key.	
	DRAFT Print Data and Time 16/01/2018 15:22 Log checked by Jon Duxbury	
Form No. SI EXP HOLE DP LOG Issue/Revision No. 2.01 Issue Date 22/06/2016		Part of the Bachy Soletanche group

[illegible]

Project Name Barnsley Glassworks				Dynamic Probing Log		Hole ID	
Project No. TA8066						DP36	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot		Ground Level +97.68mOD		Coordinates 434600.63E, 406424.56N	Grid OSGB		
Hole Type DP		Inclination 90		Name of Operator GE			
Date of Test 29-11-2017		Equipment Type Hand tools+Premier 110					

Depth m	0	5	10	15	20	25	30	35	40	45	50	Torque Nm
1												5
2												
3												
4												
5												
6												10
7												
8												
9												
10												

Dynamic Probe Type DPSH-A	Nominal Rod Diameter 32mm	Type Of Anvil Damper None	Depth Top 0.00	Depth Base 5.00	Description Bentonite
Nominal Standard Drop 500mm	Nominal Hammer Mass 64kg	Backfill			
Nominal Cone Base Diameter 45mm	Cone Depth If Left In Ground 4.90m				

	Remarks For details of abbreviations, see key.	
DRAFT Print Data and Time 16/01/2018 15:22 Log checked by Jon Duxbury		
Form No. SI EXP HOLE DP LOG Issue/Revision No. 2.01 Issue Date 22/06/2016		Part of the Bachy Soletanche group



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION A

Exploratory Hole Records and Field Data

EXCAVATION RECORDS

DRAFT

Project Name Barnsley Glassworks				Excavation Log		Hole ID	
Project No. TA8066						BH01	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot							
Ground Level +94.42mOD		Coordinates 434668.01E, 406397.93N		Grid OSGB			
Hole Type IP		Method/Equipment Hand Tools					
Date Started 01/12/2017		Date Completed 01/12/2017		Logged By MPB			

Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling Details	In Situ Test Details	Installation
MADE GROUND: Paving Slab			0.08	94.34				
MADE GROUND: Light brown fine to coarse sand sized fragments			0.20	94.22		B 3 0.20-0.30 D 2 0.20 ES 1 0.20		
MADE GROUND: Brown gravelly clayey fine to coarse sand sized fragments. Gravel sized fragments are subangular to subrounded fine to coarse of brick, bituminous material, concrete and mudstone.			(0.80)					
End of excavation at 1.00m			1.00	93.42				

Stability All Faces Stable			Excavation Dimensions and Orientation Length (Sides A and C) 0.50m Length (Sides B and D) 0.50m Depth 1.00m Bearing of Side A 90.00°																												
Shoring None Used																															
DEPTH RELATED REMARKS																															
Depth Top	Depth Base	Remarks																													
0.65	1.00	Pipe/service/duct encountered	WATER STRIKES <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Date Time</th> <th>Depth Strike</th> <th>Depth Sealed</th> <th>Depth Water</th> <th>Time Elapsed</th> </tr> <tr><td colspan="2"></td><td></td><td></td><td></td><td></td></tr> <tr><td colspan="2"></td><td></td><td></td><td></td><td></td></tr> <tr><td colspan="2"></td><td></td><td></td><td></td><td></td></tr> </table>					Date Time		Depth Strike	Depth Sealed	Depth Water	Time Elapsed																		
Date Time		Depth Strike						Depth Sealed	Depth Water	Time Elapsed																					
GENERAL NOTES																															
Remarks																															
1. Hole terminated on service at 1.00m move over and start again																															

	Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records. All bearings given relate to magnetic North. For details of abbreviations, see key.	
DRAFT Print date and time 16/01/2018 15:17 Log checked by Jon Duxbury Form No. SIEXPHOLETLOG Issue/Revision No. 2.03 Issue Date 22/06/2016		
		Part of the Bachy Soletanche Group

[illegible]

Project Name Barnsley Glassworks				Excavation Log		Hole ID	
Project No. TA8066						BH01B	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot							
Ground Level +94.43mOD		Coordinates 434667.99E, 406398.31N		Grid OSGB			
Hole Type IP		Method/Equipment Hand Tools					
Date Started 01/12/2017		Date Completed 01/12/2017		Logged By JM			

Description of Strata	Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling Details	In Situ Test Details	Install-ation
MADE GROUND: Paving Slab			0.08	94.35				
MADE GROUND: Sand, type 1, clay fill (Drillers description)			(0.77)					
MADE GROUND: Sand gravel fill (drillers description)			0.85	93.58				
End of excavation at 1.00m			1.00	93.43				

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Stability All Faces Stable			Excavation Dimensions and Orientation Length (Sides A and C) 0.50m Length (Sides B and D) 0.50m Depth 1.00m Bearing of Side A 90.00°																						
Shoring None Used																									
DEPTH RELATED REMARKS			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4">WATER STRIKES</th> <th colspan="2">WATER STRIKES DETAIL</th> </tr> <tr> <th colspan="2">Date Time</th> <th>Depth Strike</th> <th>Depth Sealed</th> <th>Depth Water</th> <th>Time Elapsed</th> </tr> <tr><td colspan="6" style="height: 100px;"></td></tr> </table>					WATER STRIKES				WATER STRIKES DETAIL		Date Time		Depth Strike	Depth Sealed	Depth Water	Time Elapsed						
WATER STRIKES								WATER STRIKES DETAIL																	
Date Time		Depth Strike						Depth Sealed	Depth Water	Time Elapsed															
Depth Top	Depth Base	Remarks																							
0.40	0.90	Nest of service ducts encountered																							

GENERAL NOTES		
Remarks		
1. Hole terminated on multiple ducts at 0.40m to 0.90m move over and start again		

	Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records. All bearings given relate to magnetic North. For details of abbreviations, see key.	
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DRAFT	Print date and time 16/01/2018 15:17	Log checked by Jon Duxbury	SOIL engineering
Form No. SIEXPHOLETLOG	Issue/Revision No. 2.03	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

Project Name Barnsley Glassworks				Excavation Log		Hole ID	
Project No. TA8066						BH01C	
Engineer Mott MacDonald						Sheet 1 of 1	
Employer Henry Boot							
Ground Level +94.46mOD		Coordinates 434667.92E, 406398.75N		Grid OSGB			
Hole Type IP		Method/Equipment Hand tools					
Date Started 04/12/2017		Date Completed 04/12/2017		Logged By JM			

Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling Details	In Situ Test Details	Installation
MADE GROUND: Bituminous material / Sand (drillers description)			0.10 (0.30)	94.36				
MADE GROUND: Gravelly Clay (drillers description)			0.40	94.06				
End of excavation at 0.40m								

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Stability All Faces Stable			Excavation Dimensions and Orientation																						
Shoring None Used																									
DEPTH RELATED REMARKS			Length (Sides A and C) 0.50m Length (Sides B and D) 0.50m Depth 0.40m Bearing of Side A 90.00°																						
Depth Top	Depth Base	Remarks																							
0.20	0.40	Cable encountered																							
GENERAL NOTES			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4" style="text-align: center;">WATER STRIKES</th> <th colspan="2" style="text-align: center;">WATER STRIKES DETAIL</th> </tr> <tr> <th style="width: 30%;">Date Time</th> <th style="width: 10%;">Depth Strike</th> <th style="width: 10%;">Depth Sealed</th> <th style="width: 10%;">Depth Water</th> <th style="width: 10%;">Time Elapsed</th> <th style="width: 10%;"></th> </tr> <tr><td colspan="6" style="height: 100px;"></td></tr> </table>					WATER STRIKES				WATER STRIKES DETAIL		Date Time	Depth Strike	Depth Sealed	Depth Water	Time Elapsed							
WATER STRIKES								WATER STRIKES DETAIL																	
Date Time	Depth Strike	Depth Sealed						Depth Water	Time Elapsed																
Remarks																									
1. Hole terminated on cable at 0.20m move and start again																									

	Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records. All bearings given relate to magnetic North. For details of abbreviations, see key.	 SOIL engineering Part of the Bachy Soletanche Group
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DRAFT	Print date and time 16/01/2018 15:17	Log checked by Jon Duxbury	
Form No. SIEXPHOLETLOG	Issue/Revision No. 2.03	Issue Date 22/06/2016	

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Project Name Barnsley Glassworks				Excavation Log		Hole ID TP03	
Project No. TA8066						Sheet 1 of 1	
Engineer Mott MacDonald Employer Henry Boot							
Ground Level +94.73mOD		Coordinates 434746.56E, 406257.81N		Grid OSGB			
Hole Type TP		Method/Equipment 17T 360 wheeled excavator					
Date Started 27/11/2017		Date Completed 27/11/2017		Logged By MPB			

Description of Strata	Weathering	Legend	Depth (Thickness)	Datum Level	Waterstrike	Sampling Details	In Situ Test Details	Installation
MADE GROUND: Block paving.			0.06	94.67				
MADE GROUND: Brown medium to coarse sand sized fragments.			0.96	94.63				
MADE GROUND: Light yellowish brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of limestone.			0.35	94.38		D 1 0.20 ES 2 0.20		
MADE GROUND: Brown fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of ash, brick, concrete and clinker with high cobble content. Cobble sized fragments are angular to subangular of slag, ash, brick and concrete.			(0.45)			D 3 0.50 ES 4 0.50		
MADE GROUND: Bituminous material.			0.80	93.93		LB 5 0.50-0.70 B 8 0.80-1.10		
MADE GROUND: Brown and grey fine to coarse sand sized fragments and subangular to subrounded fine to coarse gravel sized fragments of ash, brick, concrete and clinker with high cobble content. Cobble sized fragments are angular to subangular of slag, ash, brick and concrete.			(0.30)	93.63		D 7 0.80-1.10 ES 6 0.80-1.00		
MADE GROUND: Slightly sandy slightly gravelly clay. Sand sized fragments are fine to coarse. Gravel sized fragments are angular to subrounded of brick, concrete and ash.			1.10					
End of excavation at 2.20m			(1.00)					
			2.10	92.63	▼	B 12 2.10-2.20 D 10 2.10		
			2.20	92.53	▽	ES 9 2.10 W 11 2.20		

Stability Collapse of all faces			Excavation Dimensions and Orientation Length (Sides A and C) 4.00m Length (Sides B and D) 0.50m Depth 2.20m Bearing of Side A 359.00°				
Shoring None used							
DEPTH RELATED REMARKS							
Depth Top	Depth Base	Remarks					
2.20	2.20	Trial pit terminated due to repeated collapse.					
GENERAL NOTES							
Remarks							
1. All sides similar. 2. Trial pit backfilled upon completion. 3. Photographs taken of faces A, B and spoil							

WATER STRIKES					WATER STRIKES DETAIL				
Date Time			Depth Strike	Depth Sealed	Depth Water	Time Elapsed			
27/11/2017 09:25			2.20		2.00	20			

	Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records. All bearings given relate to magnetic North. For details of abbreviations, see key.	
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DRAFT	Print date and time 16/01/2018 15:17	Log checked by Jon Duxbury	SOIL engineering
Form No: SIEXPHOLETLOG	Issue/Revision No: 2.03	Issue Date 22/06/2016	Part of the Bachy Soletanche Group

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Project Name Barnsley Glassworks						Excavation Log				Hole ID WS13 Sheet 1 of 1				
Project No. TA8066														
Engineer Mott MacDonald														
Employer Henry Boot														
Ground Level +91.13mOD		Coordinates 434736.53E, 406334.13N		Grid OSGB										
Hole Type IP		Method/Equipment Concrete Corer/Hand Tools												
Date Started 21/11/2017		Date Completed 21/11/2017		Logged By MPB										
Description of Strata						Weathering	Legend	Depth (Thick-ness)	Datum Level	Waterstrike	Sampling Details		In Situ Test Details	Install-ation
MADE GROUND: Concrete.								(0.40)			D 2 0.20-0.50 ES 1 0.20-0.50			
MADE GROUND: Brown subangular to subrounded fine to coarse gravel sized fragments of sandstone and mudstone. End of excavation at 0.50m								0.40 0.50	90.73 90.63					
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Stability All Faces Stable						Excavation Dimensions and Orientation Length (Sides A and C) m Length (Sides B and D) m Depth 0.50m Bearing of Side A °								
Shoring None Used														
DEPTH RELATED REMARKS														
Depth Top		Depth Base		Remarks		WATER STRIKES								
						Date Time				Depth Strike	Depth Sealed	Depth Water	Time Elapsed	
						GENERAL NOTES								
				Remarks										
				1. 250mm diameter cored hole through concrete. 2. Inspection pit dug through concrete core										
AGS						Notes: All depth in metres, all soil strengths are average in kPa. For in situ test results, see accompanying records. All bearings given relate to magnetic North. For details of abbreviations, see key.						SOIL engineering		
DRAFT						Print date and time 16/01/2018 15:17						Log checked by Jon Duxbury		
Form No. SIEXPHOLETPLOG						Issue Revision No. 2.03						Issue Date 22/06/2016		
												Part of the Bachy Soletanche Group		

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[illegible]



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION A

Exploratory Hole Records and Field Data

**GROUNDWATER / GAS MONITORING
RESULTS**

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[illegible]

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID			
Project No.		TA8066						BH02			
Engineer		Mott MacDonald						Table No.			
Client		Henry Boot						02			
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m	16.80		Monitoring Point ID			01			
Top of response zone		m	11.00		Base of response zone			m	16.80		
Well Type		SP		Initial base depth of installation			m	16.80			
Measured Parameter		Units	Detection Limit								
Monitoring round no.		N/A	N/A	1	2	3	4	5	6	7	8
Date		dd/mm/yyyy	N/A	20/12/2017	04/01/2017						
Time of initial readings		hh:mm:ss	N/A	09:25:00	10:22:00						
Water Level		m	0.01	NR ²	3.00						
Atmospheric pressure		mb	1	1020 ²	978						
Relative pressure		mb	1	NR ²	<1						
Base depth of installation at time of monitoring		m	0.01	16.80 ²	18.80						
Time of 'Peak' readings		hh:mm:ss	N/A	09:26:00	10:23:00						
CH ₄ : (LEL) Peak		%	1	NR ²	2						
CH ₄ : Peak		%v/v	0.1	NR ²	0.1						
CO ₂ : Peak		%v/v	0.1	NR ²	0.1						
O ₂ : Minimum		%v/v	0.1	NR ²	21.2						
CO: Peak		ppm	1	NR ²	<1						
H ₂ S: Peak		ppm	1	NR ²	<1						
Time of Steady readings		hh:mm:ss	N/A	09:27:00	10:24:00						
CH ₄ : (LEL) Steady State		%	1	NR ²	2						
CH ₄ : Steady State		%v/v	0.1	NR ²	<0.1						
CO ₂ : Steady State		%v/v	0.1	NR ²	<0.1						
O ₂ : Steady State		%v/v	0.1	NR ²	21.2						
CO: Steady State		ppm	1	NR ²	<1						
H ₂ S: Steady State		ppm	1	NR ²	<1						
Gas Flow		l/hr	0.1	NR ²	<0.1						
Weather Conditions:				Fine	Rain						
Equipment Type				GA5000	GA5000						
Equipment Serial Number				G504715	G501004						
Equipment Last Calibrated				01/11/2017	30/12/2017						
Monitored By				MPB	MPB						
Comments 2. Flooded.											
						 SOIL engineering Part of the Bachy Soletanche Group					
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID			
Project No.		TA8066						WS03			
Engineer		Mott MacDonald						Table No.			
Client		Henry Boot						02			
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m	3.50		Monitoring Point ID		01				
Top of response zone		m	1.00		Base of response zone		m	3.50			
Well Type		SP		Initial base depth of installation		m	3.50				
Measured Parameter	Units	Detection Limit									
Monitoring round no.	N/A	N/A	1	2	3	4	5	6	7	8	
Date	dd/mm/yyyy	N/A	20/12/2017	04/12/2017							
Time of initial readings	hh:mm:ss	N/A	09:00:00	10:30:00							
Water Level	m	0.01	Dry	Dry							
Atmospheric pressure	mb	1	1020	978							
Relative pressure	mb	1	<1	<1							
Base depth of installation at time of monitoring	m	0.01	3.50	3.50							
Time of 'Peak' readings	hh:mm:ss	N/A	09:01:00	10:31:00							
CH ₄ : (LEL) Peak	%	1	6	2							
CH ₄ : Peak	%v/v	0.1	0.3	0.1							
CO ₂ : Peak	%v/v	0.1	0.5	0.1							
O ₂ : Minimum	%v/v	0.1	20.5	20.9							
CO: Peak	ppm	1	<1	<1							
H ₂ S: Peak	ppm	1	<1	<1							
Time of Steady readings	hh:mm:ss	N/A	09:02:00	10:32:00							
CH ₄ : (LEL) Steady State	%	1	6	2							
CH ₄ : Steady State	%v/v	0.1	0.3	0.1							
CO ₂ : Steady State	%v/v	0.1	0.5	0.1							
O ₂ : Steady State	%v/v	0.1	20.5	20.9							
CO: Steady State	ppm	1	<1	<1							
H ₂ S: Steady State	ppm	1	<1	<1							
Gas Flow	l/hr	0.1	<0.1	<0.1							
Weather Conditions:			Fine	Rain							
Equipment Type			GA5000	GA5000							
Equipment Serial Number			G504715	G501004							
Equipment Last Calibrated				30/12/2017							
Monitored By			MPB	MPB							
Comments											
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	
										Part of the Bachy Soletanche Group	

Project Name		Barnsley Glassworks		Record Of Gas Monitoring		Hole ID		WS04	
Project No.		TA8066				Table No.		02	
Engineer		Mott MacDonald							
Client		Henry Boot							
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID									
Distance to monitoring point		m		3.40		Monitoring Point ID		01	
Top of response zone		m		1.00		Base of response zone		m	
Well Type		SP		Initial base depth of installation		m		3.40	
Measured Parameter		Units		Detection Limit					
Monitoring round no.		N/A		N/A		1		2	
Date		dd/mm/yyyy		N/A		20/12/2017		04/01/2017	
Time of initial readings		hh:mm:ss		N/A		08:51:00		10:05:00	
Water Level		m		0.01		NR ¹		NR ¹	
Atmospheric pressure		mb		1		1020 ¹		978 ¹	
Relative pressure		mb		1		NR ¹		1	
Base depth of installation at time of monitoring		m		0.01		1		1	
Time of 'Peak' readings		hh:mm:ss		N/A		08:52:00		10:06:00	
CH ₄ : (LEL) Peak		%		1		NR ¹		NR ¹	
CH ₄ : Peak		%v/v		0.1		NR ¹		NR ¹	
CO ₂ : Peak		%v/v		0.1		NR ¹		NR ¹	
O ₂ : Minimum		%v/v		0.1		NR ¹		NR ¹	
CO: Peak		ppm		1		NR ¹		NR ¹	
H ₂ S: Peak		ppm		1		NR ¹		NR ¹	
Time of Steady readings		hh:mm:ss		N/A		08:53:00		10:07:00	
CH ₄ : (LEL) Steady State		%		1		NR ¹		NR ¹	
CH ₄ : Steady State		%v/v		0.1		NR ¹		NR ¹	
CO ₂ : Steady State		%v/v		0.1		NR ¹		NR ¹	
O ₂ : Steady State		%v/v		0.1		NR ¹		NR ¹	
CO: Steady State		ppm		1		NR ¹		NR ¹	
H ₂ S: Steady State		ppm		1		NR ¹		NR ¹	
Gas Flow		l/hr		0.1					
Weather Conditions:									
Equipment Type									
Equipment Serial Number									
Equipment Last Calibrated									
Monitored By									
Comments 1. No Access.									
						 SOIL engineering Part of the Bachy Soletanche Group			
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date	
								27/01/2014	

Project Name		Barnsley Glassworks		Record Of Gas Monitoring						Hole ID	
Project No.		TA8066								WS06	
Engineer		Mott MacDonald								Table No.	
Client		Henry Boot								02	
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point			m	4.00		Monitoring Point ID			01		
Top of response zone			m	0.50		Base of response zone			m	4.00	
Well Type			SP			Initial base depth of installation			m	4.00	
Measured Parameter		Units	Detection Limit								
Monitoring round no.		N/A	N/A	1	2	3	4	5	6	7	8
Date		dd/mm/yyyy	N/A	20/12/2017	04/01/2018						
Time of initial readings		hh:mm:ss	N/A	09:35:00	10:10:00						
Water Level		m	0.01	Dry	Dry						
Atmospheric pressure		mb	1	1020	978						
Relative pressure		mb	1	<1	<1						
Base depth of installation at time of monitoring		m	0.01	4.50	4.50						
Time of 'Peak' readings		hh:mm:ss	N/A	09:36:00	10:11:00						
CH ₄ : (LEL) Peak		%	1	<1	2						
CH ₄ : Peak		%v/v	0.1	<0.1	0.1						
CO ₂ : Peak		%v/v	0.1	<0.1	0.1						
O ₂ : Minimum		%v/v	0.1	21.2	21.2						
CO: Peak		ppm	1	<1	<1						
H ₂ S: Peak		ppm	1	<1	<1						
Time of Steady readings		hh:mm:ss	N/A	09:37:00	10:12:00						
CH ₄ : (LEL) Steady State		%	1	<1	2						
CH ₄ : Steady State		%v/v	0.1	<0.1	0.1						
CO ₂ : Steady State		%v/v	0.1	<0.1	0.1						
O ₂ : Steady State		%v/v	0.1	21.2	21.2						
CO: Steady State		ppm	1	<1	<1						
H ₂ S: Steady State		ppm	1	<1	<1						
Gas Flow		l/hr	0.1	<0.1	<0.1						
Weather Conditions:				Fine	Rain						
Equipment Type				GA5000	GA5000						
Equipment Serial Number				G504715	G501004						
Equipment Last Calibrated											
Monitored By				MPB	MPB						
Comments											
soil engineering											
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	
								Part of the Bachy Soletanche Group			

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID			
Project No.		TA8066						WS11A			
Engineer		Mott MacDonald						Table No.			
Client		Henry Boot						02			
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m	3.00		Monitoring Point ID		01				
Top of response zone		m	1.00		Base of response zone		m	3.00			
Well Type		SP		Initial base depth of installation		m	3.00				
Measured Parameter	Units	Detection Limit									
Monitoring round no.	N/A	N/A	1	2	3	4	5	6	7	8	
Date	dd/mm/yyyy	N/A	20/12/2017	04/01/2018							
Time of initial readings	hh:mm:ss	N/A	08:45:00	09:54:00							
Water Level	m	0.01	Dry	Dry							
Atmospheric pressure	mb	1	1020	998							
Relative pressure	mb	1	<1	<1							
Base depth of installation at time of monitoring	m	0.01	3.00	3.00							
Time of 'Peak' readings	hh:mm:ss	N/A	08:46:00	09:55:00							
CH ₄ : (LEL) Peak	%	1	6	2							
CH ₄ : Peak	%v/v	0.1	0.3	0.1							
CO ₂ : Peak	%v/v	0.1	0.2	0.1							
O ₂ : Minimum	%v/v	0.1	20.6	21.4							
CO: Peak	ppm	1	<1	<1							
H ₂ S: Peak	ppm	1	<1	<1							
Time of Steady readings	hh:mm:ss	N/A	08:47:00	09:56:00							
CH ₄ : (LEL) Steady State	%	1	6	2							
CH ₄ : Steady State	%v/v	0.1	0.3	0.1							
CO ₂ : Steady State	%v/v	0.1	0.2	0.1							
O ₂ : Steady State	%v/v	0.1	20.6	21.4							
CO: Steady State	ppm	1	<1	<1							
H ₂ S: Steady State	ppm	1	<1	<1							
Gas Flow	l/hr	0.1	<0.1	<0.1							
Weather Conditions:			Fine	Rain							
Equipment Type			GA5000	GA5000							
Equipment Serial Number			G504715	G501004							
Equipment Last Calibrated				30/12/2017							
Monitored By			MPB	MPB							
Comments											
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	
										Part of the Bachy Soletanche Group	

Project Name		Barnsley Glassworks		Record Of Gas Monitoring					Hole ID		
Project No.		TA8066							WS30		
Engineer		Mott MacDonald							Table No.		
Client		Henry Boot							02		
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m	5.00		Monitoring Point ID			01			
Top of response zone		m	3.50		Base of response zone			m	5.00		
Well Type		SP		Initial base depth of installation			m	5.00			
Measured Parameter	Units	Detection Limit									
Monitoring round no.	N/A	N/A	1	2	3	4	5	6	7	8	
Date	dd/mm/yyyy	N/A	20/12/2017	04/01/2017							
Time of initial readings	hh:mm:ss	N/A	08:15:00	09:40:00							
Water Level	m	0.01	Dry	Dry							
Atmospheric pressure	mb	1	1019	977							
Relative pressure	mb	1	<1	<1							
Base depth of installation at time of monitoring	m	0.01	5.00	5.00							
Time of 'Peak' readings	hh:mm:ss	N/A	08:16:00	09:41:00							
CH ₄ : (LEL) Peak	%	1	8	2							
CH ₄ : Peak	%v/v	0.1	0.4	0.1							
CO ₂ : Peak	%v/v	0.1	0.2	0.1							
O ₂ : Minimum	%v/v	0.1	20.8	20.7							
CO: Peak	ppm	1	<1	<1							
H ₂ S: Peak	ppm	1	<1	<1							
Time of Steady readings	hh:mm:ss	N/A	08:17:00	09:42:00							
CH ₄ : (LEL) Steady State	%	1	8	2							
CH ₄ : Steady State	%v/v	0.1	0.4	0.1							
CO ₂ : Steady State	%v/v	0.1	0.2	0.1							
O ₂ : Steady State	%v/v	0.1	20.8	20.7							
CO: Steady State	ppm	1	<1	<1							
H ₂ S: Steady State	ppm	1	<1	<1							
Gas Flow	l/hr	0.1	<0.1	<0.1							
Weather Conditions:			Fine	Rain							
Equipment Type			GA5000	GA5000							
Equipment Serial Number			G504715	G501004							
Equipment Last Calibrated				30/12/2017							
Monitored By			MPB	MPB							
Comments											
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	
										Part of the Bachy Soletanche Group	

Project Name		Barnsley Glassworks		Record Of Gas Monitoring		Hole ID		WS31C	
Project No.		TA8066				Table No.		02	
Engineer		Mott MacDonald							
Client		Henry Boot							
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID									
Distance to monitoring point		m		3.50		Monitoring Point ID		01	
Top of response zone		m		0.20		Base of response zone		m	
Well Type		SP		Initial base depth of installation		m		3.40	
Measured Parameter		Units		Detection Limit					
Monitoring round no.		N/A		N/A		1		2	
Date		dd/mm/yyyy		N/A		20/12/2017		04/12/2017	
Time of initial readings		hh:mm:ss		N/A		08:21:00		09:45:00	
Water Level		m		0.01		3.35		Dry	
Atmospheric pressure		mb		1		1020		978	
Relative pressure		mb		1		<1		<1	
Base depth of installation at time of monitoring		m		0.01		3.40		3.40	
Time of 'Peak' readings		hh:mm:ss		N/A		08:22:00		09:46:00	
CH ₄ : (LEL) Peak		%		1		8		2	
CH ₄ : Peak		%v/v		0.1		0.4		0.1	
CO ₂ : Peak		%v/v		0.1		0.1		0.1	
O ₂ : Minimum		%v/v		0.1		20.7		20.8	
CO: Peak		ppm		1		<1		<1	
H ₂ S: Peak		ppm		1		<1		<1	
Time of Steady readings		hh:mm:ss		N/A		08:23:00		09:47:00	
CH ₄ : (LEL) Steady State		%		1		8		2	
CH ₄ : Steady State		%v/v		0.1		0.4		0.1	
CO ₂ : Steady State		%v/v		0.1		0.1		0.1	
O ₂ : Steady State		%v/v		0.1		20.7		20.8	
CO: Steady State		ppm		1		<1		<1	
H ₂ S: Steady State		ppm		1		<1		<1	
Gas Flow		l/hr		0.1		<0.1		<0.1	
Weather Conditions:		Fine		Rain					
Equipment Type		GA5000		GA5000					
Equipment Serial Number		G504715		G501004					
Equipment Last Calibrated				30/12/2017					
Monitored By		MPB		MPB					
Comments									
Form No. SE-EMS-F-002 Revision No. 2.06 Issue Date 27/01/2014 Part of the Bachy Soletanche Group									

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID		WS32											
Project No.		TA8066						Table No.		02											
Engineer		Mott MacDonald																			
Client		Henry Boot																			
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID																					
Distance to monitoring point		m		5.25		Monitoring Point ID		01													
Top of response zone		m		4.00		Base of response zone		m		5.25											
Well Type				SP		Initial base depth of installation		m		5.25											
Measured Parameter		Units		Detection Limit																	
Monitoring round no.		N/A		N/A		1		2		3		4		5		6		7		8	
Date		dd/mm/yyyy		N/A		20/12/2017		04/01/2017													
Time of initial readings		hh:mm:ss		N/A		08:30:00		09:50:00													
Water Level		m		0.01		4.21		NR ¹													
Atmospheric pressure		mb		1		1020		NR ¹													
Relative pressure		mb		1		<1		NR ¹													
Base depth of installation at time of monitoring		m		0.01		5.25		NR ¹													
Time of 'Peak' readings		hh:mm:ss		N/A		08:31:00		09:51:00													
CH ₄ : (LEL) Peak		%		1		8		NR ¹													
CH ₄ : Peak		%v/v		0.1		0.4		NR ¹													
CO ₂ : Peak		%v/v		0.1		2.6		NR ¹													
O ₂ : Minimum		%v/v		0.1		18.9		NR ¹													
CO: Peak		ppm		1		<1		NR ¹													
H ₂ S: Peak		ppm		1		<1		NR ¹													
Time of Steady readings		hh:mm:ss		N/A		08:32:00		09:52:00													
CH ₄ : (LEL) Steady State		%		1		8		NR ¹													
CH ₄ : Steady State		%v/v		0.1		0.4		NR ¹													
CO ₂ : Steady State		%v/v		0.1		2.6		NR ¹													
O ₂ : Steady State		%v/v		0.1		18.9		NR ¹													
CO: Steady State		ppm		1		<1		NR ¹													
H ₂ S: Steady State		ppm		1		<1		NR ¹													
Gas Flow		l/hr		0.1		<0.1		NR ¹													
Weather Conditions:				Fine		Rain															
Equipment Type				GA5000		GA5000															
Equipment Serial Number				G504715		G501004															
Equipment Last Calibrated						30/12/2017															
Monitored By				MPB		MPB															
Comments 1. No Access.																					
Form No. SE-EMS-F-002				Revision No. 2.06				Issue Date 27/01/2014				 SOIL engineering Part of the Bachy Soletanche Group									

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID		WS33	
Project No.		TA8066						Table No.		02	
Engineer		Mott MacDonald									
Client		Henry Boot									
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m		2.08		Monitoring Point ID		01			
Top of response zone		m		1.00		Base of response zone		m		2.08	
Well Type				SP		Initial base depth of installation		m		2.00	
Measured Parameter		Units		Detection Limit							
Monitoring round no.		N/A		N/A		1		2		3	
Date		dd/mm/yyyy		N/A		20/12/2017		01/04/2017			
Time of initial readings		hh:mm:ss		N/A		08:50:00		10:00:00			
Water Level		m		0.01		Dry		Dry			
Atmospheric pressure		mb		1		1020		978			
Relative pressure		mb		1		<1		<1			
Base depth of installation at time of monitoring		m		0.01		2.00		2.00			
Time of 'Peak' readings		hh:mm:ss		N/A		08:51:00		10:01:00			
CH ₄ : (LEL) Peak		%		1		8		2			
CH ₄ : Peak		%v/v		0.1		0.4		0.1			
CO ₂ : Peak		%v/v		0.1		0.1		0.1			
O ₂ : Minimum		%v/v		0.1		20.7		21.3			
CO: Peak		ppm		1		<1		<1			
H ₂ S: Peak		ppm		1		<1		<1			
Time of Steady readings		hh:mm:ss		N/A		08:52:00		10:02:00			
CH ₄ : (LEL) Steady State		%		1		8		2			
CH ₄ : Steady State		%v/v		0.1		0.4		0.1			
CO ₂ : Steady State		%v/v		0.1		0.1		0.1			
O ₂ : Steady State		%v/v		0.1		20.7		20.3			
CO: Steady State		ppm		1		<1		<1			
H ₂ S: Steady State		ppm		1		<1		<1			
Gas Flow		l/hr		0.1		<0.1		<0.1			
Weather Conditions:				Fine		Rain					
Equipment Type				GA5000		GA5000					
Equipment Serial Number				G504715		G501004					
Equipment Last Calibrated						30/12/2017					
Monitored By				MPB		MPB					
Comments											
Form No. SE-EMS-F-002 Revision No. 2.06 Issue Date 27/01/2014 Part of the Bachy Soletanche Group											

Project Name		Barnsley Glassworks		Record Of Gas Monitoring				Hole ID			
Project No.		TA8066						WS40			
Engineer		Mott MacDonald						Table No.			
Client		Henry Boot						02			
Notes Type of Sampling Point: GMP = Gas Monitoring Point, GMP+SP = Gas Monitoring Point and Standpipe, GMP+SPIE = Gas Monitoring Point and Standpipe Piezometer, GMP+GWMP = Gas Monitoring Point and Groundwater Monitoring Point For double gas valves, record valves separately, using separate Monitoring Point ID											
Distance to monitoring point		m	3.70		Monitoring Point ID		01				
Top of response zone		m	1.00		Base of response zone		m	3.70			
Well Type		SP		Initial base depth of installation		m	3.70				
Measured Parameter	Units	Detection Limit									
Monitoring round no.	N/A	N/A	1	2	3	4	5	6	7	8	
Date	dd/mm/yyyy	N/A	20/12/2017	04/01/2018							
Time of initial readings	hh:mm:ss	N/A	09:30:00	10:15:00							
Water Level	m	0.01	Dry	dry							
Atmospheric pressure	mb	1	1020	978							
Relative pressure	mb	1	<1	<1							
Base depth of installation at time of monitoring	m	0.01	3.70	3.70							
Time of 'Peak' readings	hh:mm:ss	N/A	09:31:00	10:16:00							
CH ₄ : (LEL) Peak	%	1	8	2							
CH ₄ : Peak	%v/v	0.1	0.4	0.1							
CO ₂ : Peak	%v/v	0.1	0.1	0.1							
O ₂ : Minimum	%v/v	0.1	20.4	20.3							
CO: Peak	ppm	1	<1	<1							
H ₂ S: Peak	ppm	1	<1	<1							
Time of Steady readings	hh:mm:ss	N/A	09:32:00	10:17:00							
CH ₄ : (LEL) Steady State	%	1	8	2							
CH ₄ : Steady State	%v/v	0.1	0.4	0.1							
CO ₂ : Steady State	%v/v	0.1	0.1	0.1							
O ₂ : Steady State	%v/v	0.1	20.4	20.3							
CO: Steady State	ppm	1	<1	<1							
H ₂ S: Steady State	ppm	1	<1	<1							
Gas Flow	l/hr	0.1	<0.1	<0.1							
Weather Conditions:			Fine	Rain							
Equipment Type			GA5000	GA5000							
Equipment Serial Number			G504715	G501004							
Equipment Last Calibrated				30/12/2017							
Monitored By			MPB	MPb							
Comments											
Form No.		SE-EMS-F-002		Revision No.		2.06		Issue Date		27/01/2014	
										Part of the Bachy Soletanche Group	



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION B

Laboratory Testing

**KEY TO LABORATORY TEST RESULTS
AND SUMMARY SHEETS**

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SECTION B: KEY TO LABORATORY TEST RESULTS AND SUMMARY SHEETS

FIELD IDENTIFICATION

Sample Type	U	Undisturbed sample	D	Small disturbed sample
	UT	Thin wall open drive tube sample	B	Bulk disturbed sample
	P	Piston sample	AMAL	Amalgamated sample
	TW	Thin walled sample	BLK	Block sample
	L	Liner sample	C	Core sample
Test status	Any result in italics indicates a test that is not within the scope of the UKAS accreditation for this laboratory.			

SUMMARY OF LABORATORY SOIL TESTS: INDEX / CLASSIFICATION TESTS

Particle density	p	Small pyknometer method	g	Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested		
Particle size (PSD)	1	Following value in silt column denotes combined clay and silt fraction		
	p	Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.		

SUMMARY OF LABORATORY SOIL TESTS: STRENGTH AND PERMEABILITY TESTS

Triaxial	UU	Single stage unconsolidated quick undrained
	UUM	Multi stage unconsolidated quick undrained
	UU3	Set of 3 unconsolidated quick undrained
	CU	Single stage consolidated undrained
	CUM	Multi stage consolidated undrained
	CU3	Set of 3 consolidated undrained
	CD	Single stage consolidated drained
	CDM	Multi stage consolidated drained
	CD3	Set of 3 consolidated drained
Note that single stage tests are reported assuming $\phi = 0$ for total stress		
Consolidation	Oed	One-dimensional oedometer
	mv	Coefficient of compressibility quoted for range p_0 to $p_0 + 100\text{kPa}$, where determined
Permeability	C	Constant head permeability
Shearbox	SSB	Small shear box
	LSB	Large shear box
	p	Peak value
	r	Residual shear strength
	RS	Ring shear

SECTION B: KEY TO LABORATORY TEST RESULTS AND SUMMARY SHEETS

SUMMARY OF LABORATORY SOIL RE-USE TESTS

MCV	s	MCV value at natural or specified moisture content
	int	Intercept of calibration line in MCV calibration

SUMMARY OF LABORATORY ROCK STRENGTH TESTS

Point Load	Type (combination of)	D	Diametral	A	Axial
		I	Irregular lump	B	Block
		L	Test performed parallel to planes of weakness		
		P	Test performed perpendicular to planes of weakness		
		X	Invalid failure of point load (not broken between points of load application)		

SUMMARY OF LABORATORY ROCK MATERIALS TESTS

Ten% fines	w	Soaked test	d	Dry test
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Important note:

Summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.

POINT LOAD INDEX RESULT

Point Load	Type (combination of)	D	Diametral	A	Axial
		I	Irregular lump	B	Block
		L	Test performed parallel to planes of weakness		
		P	Test performed perpendicular to planes of weakness		
		X	Invalid failure of point load (not broken between points of load application)		
Dimensions		W	Diameter of core or average smallest width perpendicular to axis of loading in a block or irregular lump		
		D	Distance between platens when just in contact with specimen		
		D'	Distance between platens at point of failure		
		De	Equivalent core diameter	Is	P/De^2
		Is(50)	$F \times Is$	F	$(De/50)^{0.45}$
Is(50) point load strength index corrected for a diametral test of core diameter 50mm					
For Axial/Lump tests $De^2 = (4/Pi) \times (W \times D')$					
For Diametral tests $De^2 = D \times D'$					



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION B

Laboratory Testing

LABORATORY SOIL TEST SUMMARY SHEETS

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SECTION B

Laboratory Testing

**LABORATORY SOIL TEST
DATA SHEETS**

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SECTION B

Laboratory Testing

LABORATORY ROCK TEST SUMMARY SHEETS

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SECTION B

Laboratory Testing

LABORATORY ROCK TEST DATA SHEETS

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SUPPORTING FACTUAL DATA

SECTION B

Laboratory Testing

**ENVIRONMENTAL AND
CHEMICAL RESULTS**

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Soil Engineering
Parkside Lane
Dewsbury Road
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West Yorkshire
LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 19 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171109-4
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 437521

We received 3 samples on Wednesday November 08, 2017 and 1 of these samples were scheduled for analysis which was completed on Tuesday December 19, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16520657	WS32	ES1	0.20	06/11/2017
16520658	WS32	ES5	0.50	06/11/2017
16520659	WS32	ES7	1.00	06/11/2017

Maximum Sample/Coolbox Temperature (°C) :

6.0

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16520659

Customer Sample Reference

WS32

AGS Reference

EST7

Depth (m)

1.00

Container

1kg TUB
250g Amber Jar (ALE210)
60g VOC (ALE215)
Kone Cup

Sample Type

S S S S

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (soil)

All

NDPs: 0
Tests: 1

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 1

X

CEN Readings

All

NDPs: 0
Tests: 2

X

X

Chromium III

All

NDPs: 0
Tests: 2

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 2

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 1

X

EPH CWG (Aliphatic) GC (S)

All

NDPs: 0
Tests: 1

X

EPH CWG (Aromatic) GC (S)

All

NDPs: 0
Tests: 1

X

Fluoride

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 1

X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 1

X

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16520659

Customer
Sample Reference

W532

AGS Reference

E57

Depth (m)

1.00

Container

1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	Kone Cup
---------	-------------------------	------------------	----------

Sample Type

S	S	S	S
---	---	---	---

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 1

X

PAH by GCMS

All

NDPs: 0
Tests: 1

X

pH

All

NDPs: 0
Tests: 1

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 1

X

Phenols by ms (w)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 1

X

Total Organic Carbon

All

NDPs: 0
Tests: 1

X

Total Sulphur

All

NDPs: 0
Tests: 1

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 1

X

VOC MS (S)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16520659	WS32	1.00	Light Brown	Sandy Clay	Crushed Brick	Stones

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Results Legend		Customer Sample Ref.	WS32				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&+5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	11				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01				
			& M				
Cresols	<0.01 mg/kg	TM062 (S)	<0.01				
			& M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015				
			& M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01				
			& M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015				
			& M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06				
			& M				
Sulphur, Total	<0.02 %	TM132	0.0469				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.00918				
			#				
pH	1 pH Units	TM133	9.15				
			M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6				
			#				
Cyanide, Free	<1 mg/kg	TM153	<1				
			& M				
Chromium, Trivalent	<0.9 mg/kg	TM181	1.37				
Antimony	<0.6 mg/kg	TM181	1.37				
			#				
Arsenic	<0.6 mg/kg	TM181	8.78				
			M				
Barium	<0.6 mg/kg	TM181	70				
			#				
Beryllium	<0.01 mg/kg	TM181	0.494				
			M				
Boron	<0.7 mg/kg	TM181	3.32				
			#				
Cadmium	<0.02 mg/kg	TM181	0.237				
			M				
Copper	<1.4 mg/kg	TM181	27.8				
			M				
Iron	<1000 mg/kg	TM181	18600				
			#				
Lead	<0.7 mg/kg	TM181	34.5				
			M				
Manganese	<0.13 mg/kg	TM181	341				
			M				
Mercury	<0.14 mg/kg	TM181	0.317				
			M				
Molybdenum	<0.1 mg/kg	TM181	0.873				
			#				
Nickel	<0.2 mg/kg	TM181	11.6				
			M				
Selenium	<1 mg/kg	TM181	<1				
			#				
Vanadium	<0.2 mg/kg	TM181	11.2				
			#				
Zinc	<1.9 mg/kg	TM181	58.6				
			M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0421				
			M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS32					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00					
M	mCERTS accredited.		Soil/Solid (S)					
aq	Aqueous / settled sample.		06/11/2017					
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.		08/11/2017					
*	Subcontracted test.		171109-4					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16520659					
(F)	Trigger breach confirmed		ES7					
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	90					
			&					
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44					
			& M					
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5					
			& #					
Benzene	<10 µg/kg	TM089	<10					
			& M					
Toluene	<2 µg/kg	TM089	2.26					
			& M					
Ethylbenzene	<3 µg/kg	TM089	<3					
			& M					
m,p-Xylene	<6 µg/kg	TM089	6.78					
			& M					
o-Xylene	<3 µg/kg	TM089	5.65					
			& M					
sum of detected mpo xylene by GC	<9 µg/kg	TM089	12.4					
			&					
sum of detected BTEX by GC	<24 µg/kg	TM089	<24					
			&					
Aliphatics >C5-C6	<10 µg/kg	TM089	<10					
			&					
Aliphatics >C6-C8	<10 µg/kg	TM089	<10					
			&					
Aliphatics >C8-C10	<10 µg/kg	TM089	<10					
			&					
Aliphatics >C10-C12	<10 µg/kg	TM089	<10					
			&					
Aliphatics >C12-C16	<100 µg/kg	TM173	142					
Aliphatics >C16-C21	<100 µg/kg	TM173	3200					
Aliphatics >C21-C35	<100 µg/kg	TM173	39300					
Aliphatics >C35-C44	<100 µg/kg	TM173	3120					
Total Aliphatics >C12-C44	<100 µg/kg	TM173	45700					
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10					
			&					
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10					
			&					
Aromatics >EC8-EC10	<10 µg/kg	TM089	14.7					
			&					
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10					
			&					
Aromatics >EC12-EC16	<100 µg/kg	TM173	1430					
Aromatics >EC16-EC21	<100 µg/kg	TM173	10700					
Aromatics >EC21-EC35	<100 µg/kg	TM173	52900					
Aromatics >EC35-EC44	<100 µg/kg	TM173	19100					
Aromatics >EC40-EC44	<100 µg/kg	TM173	7520					
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	84100					
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	130000					



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS32				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&*\$@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM116	104				
			&				
Toluene-D8	%	TM116	96.5				
			&				
4-bromofluorobenzene**	%	TM116	83.2				
			&				
Dichlorodifluoromethane	<6 µg/kg	TM116	<6				
			& M				
Chloromethane	<7 µg/kg	TM116	<7				
			& #				
Vinyl Chloride	<6 µg/kg	TM116	<6				
			& M				
Bromomethane	<10 µg/kg	TM116	<10				
			& M				
Chloroethane	<10 µg/kg	TM116	<10				
			& M				
Trichlorofluoromethane	<6 µg/kg	TM116	<6				
			& M				
1,1-Dichloroethene	<10 µg/kg	TM116	<10				
			& #				
Carbon Disulphide	<7 µg/kg	TM116	<7				
			& M				
Dichloromethane	<10 µg/kg	TM116	91.4				
			& #				
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10				
			& M				
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10				
			& M				
1,1-Dichloroethane	<8 µg/kg	TM116	<8				
			& M				
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6				
			& M				
2,2-Dichloropropane	<10 µg/kg	TM116	<10				
			&				
Bromochloromethane	<10 µg/kg	TM116	<10				
			& M				
Chloroform	<8 µg/kg	TM116	<8				
			& M				
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7				
			& M				
1,1-Dichloropropene	<10 µg/kg	TM116	<10				
			& M				
Carbontetrachloride	<10 µg/kg	TM116	<10				
			& M				
1,2-Dichloroethane	<5 µg/kg	TM116	<5				
			& M				
Benzene	<9 µg/kg	TM116	<9				
			& M				
Trichloroethene	<9 µg/kg	TM116	<9				
			& #				
1,2-Dichloropropane	<10 µg/kg	TM116	<10				
			& M				
Dibromomethane	<9 µg/kg	TM116	<9				
			& M				
Bromodichloromethane	<7 µg/kg	TM116	<7				
			& M				
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10				
			& M				
Toluene	<7 µg/kg	TM116	<7				
			& M				
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10				
			&				
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10				
			& M				
1,3-Dichloropropane	<7 µg/kg	TM116	<7				
			& M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS32				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00				
M	mCERTS accredited.		Soil/Solid (S)				
aq	Aqueous / settled sample.		06/11/2017				
diss.filt	Dissolved / filtered sample.		.				
tot.unfilt	Total / unfiltered sample.		08/11/2017				
*	Subcontracted test.		171109-4				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16520659				
(F)	Trigger breach confirmed		ES7				
1-5&*\$@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<5 µg/kg	TM116	<5				
			& M				
Dibromochloromethane	<10 µg/kg	TM116	<10				
			& M				
1,2-Dibromoethane	<10 µg/kg	TM116	<10				
			& M				
Chlorobenzene	<5 µg/kg	TM116	<5				
			& M				
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10				
			& M				
Ethylbenzene	<4 µg/kg	TM116	<4				
			& M				
p/m-Xylene	<10 µg/kg	TM116	<10				
			& #				
o-Xylene	<10 µg/kg	TM116	<10				
			& M				
Styrene	<10 µg/kg	TM116	<10				
			& #				
Bromoform	<10 µg/kg	TM116	<10				
			& M				
Isopropylbenzene	<5 µg/kg	TM116	<5				
			& #				
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10				
			& #				
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16				
			& M				
Bromobenzene	<10 µg/kg	TM116	<10				
			& M				
Propylbenzene	<10 µg/kg	TM116	<10				
			& M				
2-Chlorotoluene	<9 µg/kg	TM116	<9				
			& M				
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8				
			& M				
4-Chlorotoluene	<10 µg/kg	TM116	<10				
			& M				
tert-Butylbenzene	<14 µg/kg	TM116	<14				
			& M				
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9				
			& #				
sec-Butylbenzene	<10 µg/kg	TM116	<10				
			&				
4-Isopropyltoluene	<10 µg/kg	TM116	<10				
			& M				
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8				
			& M				
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5				
			& M				
n-Butylbenzene	<11 µg/kg	TM116	<11				
			&				
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10				
			& M				
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14				
			& M				
Tert-amyl methyl ether	<10 µg/kg	TM116	<10				
			& #				
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20				
			&				
Hexachlorobutadiene	<20 µg/kg	TM116	<20				
			&				
Naphthalene	<13 µg/kg	TM116	<13				
			& M				
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20				
			& #				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Asbestos Identification - Solid Samples

Cust. Sample Ref.	Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
WS32 ES 7	1.00 SOLID 06/11/2017 00:00:00 18/11/2017 11:18:13 171109-4 16520659 TM048	19/12/2017	Marcin Magdziarek	Loose fibres in soil	Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.197

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 12.4

Dry Matter Content (%) 89

Case

SDG 171109-4

Lab Sample Number(s) 16520659

Sampled Date 06-Nov-2017

Customer Sample Ref. WS32 ES7

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) 0.918

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.15

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00905	<0.0005	0.0181	<0.001	0.5	2	25
Barium	0.00907	<0.0002	0.0181	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.00323	<0.0003	0.00646	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.0203	<0.0005	0.0406	<0.001	0.5	10	30
Nickel	<0.0004	<0.0004	<0.0008	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.00199	<0.0005	0.00398	<0.001	0.1	0.5	7
Zinc	<0.001	<0.001	<0.002	<0.002	4	50	200
Chloride	2.9	<2	5.8	<4	800	15000	25000
Fluoride	0.996	<0.5	1.99	<1	10	150	500
Sulphate (soluble)	52.9	<2	106	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	4.13	<3	8.26	<6	500	800	1000

Leach Test Information

Date Prepared 22-Nov-2017

pH (pH Units) 9.51

Conductivity (µS/cm) 199.00

Temperature (°C) 18.30

Volume Leachant (Litres) 0.328

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

19/12/2017 17:16:39

17:16:29 19/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.197

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 12.4

Dry Matter Content (%) 89

Case

SDG 171109-4

Lab Sample Number(s) 16520659

Sampled Date 06-Nov-2017

Customer Sample Ref. WS32 ES7

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) 0.918

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.15

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.6	<0.001	19	<0.002	-	-	-	-
Calcium	21.3	<0.012	42.6	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	2.33	<0.036	4.66	<0.072	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	0.0422	<0.019	0.0844	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.109	<0.005	0.218	<0.01	-	-	-	-
Hardness Total	62.8	<1	126	<2	-	-	-	-
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	<0.00064	<0.00064	<0.00128	<0.00128	-	-	-	-
Manganese	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Vanadium	0.00841	<0.001	0.0168	<0.002	-	-	-	-

Leach Test Information

Date Prepared 22-Nov-2017

pH (pH Units) 9.51

Conductivity (µS/cm) 199.00

Temperature (°C) 18.30

Volume Leachant (Litres) 0.328

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

19/12/2017 17:16:39

17:16:29 19/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4 Client Reference: TA8066 Report Number: 437521
Location: Glassworks Barnsley Order Number: TA8066 Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990/BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16520659
Customer Sample Ref.	WS32
AGS Ref.	ES7
Depth	1.00
Type	Soil/Solid (S)

Ammoniacal Nitrogen	27-Nov-2017
Anions by Kone (soil)	27-Nov-2017
Anions by Kone (w)	25-Nov-2017
Asbestos ID in Solid Samples	19-Dec-2017
CEN 2:1 Leachate (1 Stage)	22-Nov-2017
CEN Readings	24-Nov-2017
Chromium III	29-Nov-2017
Cyanide Comp/Free/Total/Thiocyanate	28-Nov-2017
Dissolved Metals by ICP-MS	27-Nov-2017
Dissolved Organic/Inorganic Carbon	27-Nov-2017
EPH CWG (Aliphatic) GC (S)	24-Nov-2017
EPH CWG (Aromatic) GC (S)	24-Nov-2017
Fluoride	25-Nov-2017
GRO by GC-FID (S)	24-Nov-2017
Hexavalent Chromium (s)	27-Nov-2017
Hexavalent Chromium (w)	27-Nov-2017
Low Level Phenols by HPLC (W)	27-Nov-2017
Mercury Dissolved	27-Nov-2017
Metals by iCap-OES Dissolved (W)	27-Nov-2017
Metals in solid samples by OES	29-Nov-2017
PAH by GCMS	23-Nov-2017
pH	22-Nov-2017
pH Value of Filtered Water	27-Nov-2017
Phenols by HPLC (S)	25-Nov-2017
Phenols by ms (w)	29-Nov-2017
Phenols Spec MS (S)	22-Nov-2017
Sample description	18-Nov-2017
Total Organic Carbon	22-Nov-2017
Total Sulphur	23-Nov-2017
TPH CWG GC (S)	24-Nov-2017
VOC MS (S)	24-Nov-2017

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 437521
Superseded Report:

ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1644
Ammoniacal Nitrogen as N	TM099	105.2 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1640
Chloride (soluble)	TM243	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1600
Chloride	TM184	109.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	106.0 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1667	QC 1661
Free Cyanide	TM153	92.4 84.60 : 110.40	
Free Cyanide (W)	TM227		100.5 93.25 : 112.75
Thiocyanate	TM153	91.62 83.02 : 103.47	
Thiocyanate (W)	TM227		101.75 97.75 : 109.75
Total Cyanide	TM153	105.71 87.53 : 111.13	
Total Cyanide (W)	TM227		102.75 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1686
Aluminium	TM152	109.0 90.09 : 112.69
Antimony	TM152	106.17 81.00 : 119.70
Arsenic	TM152	106.0 92.40 : 113.00



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Location: Glassworks BarnsleyClient Reference: TA8066
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Superseded Report:

Dissolved Metals by ICP-MS

		QC 1686
Barium	TM152	102.67 93.11 : 112.81
Beryllium	TM152	111.33 88.27 : 113.27
Bismuth	TM152	114.0 86.72 : 115.61
Boron	TM152	111.33 86.47 : 111.70
Cadmium	TM152	107.0 90.28 : 114.48
Chromium	TM152	108.67 91.07 : 114.29
Cobalt	TM152	108.5 89.58 : 114.68
Copper	TM152	107.5 88.45 : 117.93
Lead	TM152	111.83 89.25 : 115.12
Lithium	TM152	110.67 88.50 : 116.05
Manganese	TM152	108.33 91.63 : 112.33
Molybdenum	TM152	104.5 91.08 : 111.63
Nickel	TM152	108.83 89.60 : 117.38
Niobium	TM152	108.83 96.38 : 128.85
Phosphorus	TM152	109.67 90.43 : 111.75
Selenium	TM152	102.83 88.13 : 108.33
Silver	TM152	97.67 90.04 : 97.49
Strontium	TM152	100.33 91.27 : 106.32
Tellurium	TM152	106.17 81.16 : 111.23
Thallium	TM152	103.5 81.70 : 117.09
Titanium	TM152	110.33 89.62 : 110.62
Tungsten	TM152	107.83 90.13 : 111.33
Uranium	TM152	114.0 92.30 : 116.90
Vanadium	TM152	107.0 88.22 : 118.55
Zinc	TM152	106.0 89.30 : 115.44
Zirconium	TM152	106.0 85.51 : 109.42

Dissolved Organic/Inorganic Carbon



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 437521
Superseded Report:

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1649
Dissolved Inorganic Carbon	TM090	100.83 91.15 : 111.35
Dissolved Organic Carbon	TM090	102.0 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1676
Total Aliphatics >C12-C35	TM173	84.38 66.17 : 105.28

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1676
Total Aromatics >EC12-EC35	TM173	86.67 65.78 : 102.90

Fluoride

Component	Method Code	QC 1618
Fluoride	TM104	98.0 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1613
Benzene by GC (Moisture Corrected)	TM089	108.0 83.15 : 118.53
Ethylbenzene by GC (Moisture Corrected)	TM089	110.5 81.56 : 117.75
m & p Xylene by GC (Moisture Corrected)	TM089	111.25 80.40 : 118.80
MTBE GC-FID (Moisture Corrected)	TM089	103.5 83.25 : 126.67
o Xylene by GC (Moisture Corrected)	TM089	110.0 80.82 : 119.41
QC	TM089	94.48 66.35 : 110.89
Toluene by GC (Moisture Corrected)	TM089	108.5 83.39 : 118.40

Hexavalent Chromium (s)



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 437521
Superseded Report:

Hexavalent Chromium (s)

Component	Method Code	QC 1612
Hexavalent Chromium	TM151	98.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1674
Hexavalent Chromium	TM241	97.2 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1669
Mercury Dissolved (CVAf)	TM183	97.3 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1612
Calcium	TM228	94.6 86.15 : 110.75
Iron	TM228	88.0 77.20 : 102.80
Magnesium	TM228	93.6 83.80 : 108.64
Potassium	TM228	91.9 85.58 : 109.10
Sodium	TM228	92.6 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1681
Aluminium	TM181	86.67 75.13 : 109.48
Antimony	TM181	96.14 84.48 : 110.90
Arsenic	TM181	93.06 83.14 : 108.73
Barium	TM181	93.75 77.47 : 102.53
Beryllium	TM181	94.18 84.19 : 106.77
Boron	TM181	86.16 76.55 : 106.69



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Metals in solid samples by OES

		QC 1681
Cadmium	TM181	97.34 86.37 : 111.59
Chromium	TM181	94.51 81.29 : 118.71
Cobalt	TM181	94.36 85.45 : 109.14
Copper	TM181	91.99 81.33 : 103.33
Iron	TM181	95.14 82.44 : 111.71
Lead	TM181	92.98 83.33 : 106.95
Manganese	TM181	87.27 80.56 : 102.33
Mercury	TM181	95.29 84.13 : 111.85
Molybdenum	TM181	94.59 84.19 : 110.39
Nickel	TM181	93.94 84.19 : 109.77
Phosphorus	TM181	94.16 73.47 : 116.86
Selenium	TM181	93.18 81.32 : 108.59
Strontium	TM181	89.85 84.70 : 105.87
Thallium	TM181	92.19 81.19 : 105.37
Tin	TM181	94.68 85.92 : 110.00
Titanium	TM181	83.85 73.44 : 113.17
Vanadium	TM181	88.65 81.86 : 105.26
Zinc	TM181	94.59 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1686
Acenaphthene	TM218	91.0 82.97 : 108.44
Acenaphthylene	TM218	91.0 77.27 : 104.05
Anthracene	TM218	89.0 78.18 : 102.20
Benz(a)anthracene	TM218	104.0 80.40 : 121.27
Benzo(a)pyrene	TM218	113.0 86.92 : 120.63
Benzo(b)fluoranthene	TM218	98.5 82.24 : 121.86
Benzo(ghi)perylene	TM218	90.5 83.49 : 115.72



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SDG: 171109-4
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 437521
Superseded Report:

PAH by GCMS

		QC 1686
Benzo(k)fluoranthene	TM218	105.0 86.60 : 115.15
Chrysene	TM218	102.5 86.11 : 112.00
Dibenzo(ah)anthracene	TM218	102.0 83.84 : 116.37
Fluoranthene	TM218	93.0 81.23 : 104.94
Fluorene	TM218	93.5 83.68 : 108.62
Indeno(123cd)pyrene	TM218	103.5 83.72 : 116.90
Naphthalene	TM218	92.5 81.32 : 109.34
Phenanthrene	TM218	90.5 82.06 : 103.85
Pyrene	TM218	91.5 81.04 : 103.65

pH

Component	Method Code	QC 1619
pH	TM133	100.39 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1606
pH Value of Filtered Water	TM256	101.62 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1680
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	93.51 70.10 : 89.90
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	92.4 72.35 : 101.75
Catechol by HPLC (S)	TM062 (S)	111.43 24.84 : 108.44
Cresols by HPLC (S)	TM062 (S)	92.48 72.20 : 110.60
Napthol by HPLC (S)	TM062 (S)	115.71 91.99 : 139.23
Phenol by HPLC (S)	TM062 (S)	107.95 81.25 : 103.65
Resorcinol HPLC (S)	TM062 (S)	130.82 71.50 : 107.20



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Location: Glassworks BarnsleyClient Reference: TA8066
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Superseded Report:

Phenols by HPLC (S)

		QC 1680
Xylenols by HPLC (S)	TM062 (S)	96.98 82.47 : 110.25

Phenols by ms (w)

Component	Method Code	QC 1665
2,3,4,6-tetrachlorophenol	TM205	92.88 61.39 : 121.01
2,4,5-trichlorophenol	TM205	97.0 68.35 : 126.10
2,4,6-trichlorophenol	TM205	95.0 63.79 : 126.64
2,4-dichlorophenol	TM205	95.0 65.30 : 128.60
2,4-dimethylphenol	TM205	101.13 57.50 : 131.00
2,6-dichlorophenol	TM205	95.25 63.93 : 129.85
2-chlorophenol	TM205	92.13 64.51 : 127.89
2-methylphenol	TM205	96.0 61.66 : 132.61
2-nitrophenol	TM205	91.75 58.88 : 126.38
3-methylphenol	TM205	96.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	100.13 73.70 : 129.95
4-methylphenol	TM205	96.38 67.13 : 130.58
4-nitrophenol	TM205	95.13 68.50 : 136.75
Pentachlorophenol	TM205	69.88 47.74 : 105.49
Phenol	TM205	94.0 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1684
Total Organic Carbon	TM132	100.91 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1615
Total Sulphur %	TM132	88.97 81.05 : 118.95



CERTIFICATE OF ANALYSIS

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SDG: 171109-4
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 437521
Superseded Report:

VOC MS (S)

Component	Method Code	QC 1635
1,1,1,2-tetrachloroethane	TM116	99.2 79.10 : 119.66
1,1,1-Trichloroethane	TM116	103.0 80.76 : 117.81
1,1,2-Trichloroethane	TM116	100.8 75.16 : 112.70
1,1-Dichloroethane	TM116	104.2 77.84 : 124.12
1,2-Dichloroethane	TM116	112.0 86.58 : 129.62
1,4-Dichlorobenzene	TM116	92.6 71.61 : 124.63
2-Chlorotoluene	TM116	87.4 66.81 : 118.43
4-Chlorotoluene	TM116	83.4 65.88 : 114.76
Benzene	TM116	110.2 84.42 : 119.78
Carbon Disulphide	TM116	100.8 75.11 : 124.81
Carbontetrachloride	TM116	100.0 82.35 : 126.46
Chlorobenzene	TM116	99.6 82.88 : 122.42
Chloroform	TM116	105.8 82.52 : 123.25
Chloromethane	TM116	83.4 57.48 : 132.44
Cis-1,2-Dichloroethene	TM116	109.6 79.48 : 120.80
Dibromomethane	TM116	88.4 71.69 : 119.43
Dichloromethane	TM116	105.4 81.68 : 125.21
Ethylbenzene	TM116	99.4 80.09 : 119.91
Hexachlorobutadiene	TM116	59.6 9.27 : 160.19
Isopropylbenzene	TM116	83.0 52.15 : 132.52
Naphthalene	TM116	98.6 76.79 : 127.18
o-Xylene	TM116	87.6 71.75 : 103.66
p/m-Xylene	TM116	90.9 77.41 : 112.71
Sec-Butylbenzene	TM116	61.2 44.71 : 117.87
Tetrachloroethene	TM116	100.2 79.68 : 120.25
Toluene	TM116	104.0 82.00 : 116.10
Trichloroethene	TM116	105.0 79.80 : 112.33



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

VOC MS (S)

		QC 1635
Trichlorofluoromethane	TM116	94.8 72.76 : 118.80
Vinyl Chloride	TM116	109.4 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

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CERTIFICATE OF ANALYSIS

SDG: 171109-4
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437521
Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

SDG:	171109-4	Customer:	Soil Engineering
Job:	H_SOILENG_LEE-55	Attention:	Mark Burton
Client Reference:	TA8066	Order No.:	TA8066
Location:	Glassworks Barnsley	Report No:	

Asbestos Identification

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS32 ES 7 1.00 SOLID 06/11/2017 00:00:00 18/11/2017 11:18:13 171109-4 16520659 TM048 15553413	19/12/2017	Marcin Magdziarek	Loose fibres in soil	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS32 ES 7 1.00 SOLID 06/11/2017 00:00:00 18/11/2017 11:18:13 171109-4 16520659 TM048 15749566	19/12/2017	Marcin Magdziarek	Loose fibres in soil	Not Detected	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

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SDG:	171109-126	Customer:	Soil Engineering
Job:	H_SOILENG_LEE-55	Attention:	Mark Burton
Client Reference:	TA8066	Order No.:	TA8066
Location:	Glassworks Barnsley	Report No:	

Asbestos Identification

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS30 ES 2 0.50 SOLID 07/11/2017 00:00:00 22/11/2017 09:34:58 171109-126 16528218 TM048 15553523	20/12/2017	Marcin Magdziarek	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS31B ES 7 1.00 SOLID 07/11/2017 00:00:00 18/11/2017 12:56:12 171109-126 16528226 TM048 15553362	20/12/2017	Marcin Magdziarek	Loose fibres in soil	Not Detected	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS32 ES 16 3.00 SOLID 07/11/2017 00:00:00 18/11/2017 13:38:39 171109-126 16528228 TM048 15553344	20/12/2017	Marcin Magdziarek	Loose fibres in soil	Not Detected	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

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email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Soil Engineering
Parkside Lane
Dewsbury Road
Leeds
West Yorkshire
LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 20 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171109-126
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 437727

We received 11 samples on Thursday November 09, 2017 and 4 of these samples were scheduled for analysis which was completed on Wednesday December 20, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16528216	WS30	ES1	0.20	07/11/2017
16528218	WS30	ES2	0.50	07/11/2017
16528219	WS30	ES6	1.00	07/11/2017
16528221	WS31	ES2	0.30	07/11/2017
16528222	WS31	ES4	0.50	07/11/2017
16528227	WS32	ES12	2.00	07/11/2017
16528228	WS32	ES16	3.00	07/11/2017
16528223	WS31A	ES2	0.20	07/11/2017
16528224	WS31B	ES2	0.20	07/11/2017
16528225	WS31B	ES5	0.50	07/11/2017
16528226	WS31B	ES7	1.00	07/11/2017

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

9.2

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container				Sample Type
				16528218	16528228	16528226	WS31B	
				ES2	ES16	ES7		
				0.50	3.00	1.00		
				60g VOC (ALE215)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	60g VOC (ALE215)	
				1kg TUB	1kg TUB	S	S	
				S	S	S	S	
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1					X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 3		X	X		X	
Anions by Kone (w)	All	NDPs: 0 Tests: 1					X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2		X			X	
CEN Readings	All	NDPs: 0 Tests: 1					X	
Chromium III	All	NDPs: 0 Tests: 4		X	X		X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4		X	X		X	X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1					X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1					X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 3		X	X			X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 3		X	X			X
Fluoride	All	NDPs: 0 Tests: 1					X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 3			X	X		X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3		X	X			X
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 1					X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

Mercury Dissolved

All

NDPs: 0
Tests: 1

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

Metals in solid samples by OES

All

NDPs: 0
Tests: 3

PAH by GCMS

All

NDPs: 0
Tests: 3

pH

All

NDPs: 0
Tests: 3

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

Phenols by HPLC (S)

All

NDPs: 0
Tests: 3

Phenols by ms (w)

All

NDPs: 0
Tests: 1

Phenols Spec MS (S)

All

NDPs: 0
Tests: 3

Sample description

All

NDPs: 0
Tests: 3

Total Organic Carbon

All

NDPs: 0
Tests: 3

Total Sulphur

All

NDPs: 0
Tests: 3

TPH CWG GC (S)

All

NDPs: 0
Tests: 3

VOC MS (S)

All

NDPs: 0
Tests: 3

16528218

WS30

ES2

0.50

60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB

S

16528228

WS32

ES16

3.00

60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB

S

16528226

WS31B

ES7

1.00

60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB

S

DRAFT

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X



CERTIFICATE OF ANALYSIS

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SDG: 171109-126
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Superseded Report:

DRAFT



CERTIFICATE OF ANALYSIS

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SDG: 171109-126
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Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16528218	WS30	0.50	Dark Brown	Sandy Clay	Crushed Brick	N/A
16528228	WS32	3.00	Dark Brown	Clay Loam	None	N/A
16528226	WS31B	1.00	Dark Brown	Sandy Clay	Crushed Brick	Stones

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Results Legend		Customer Sample Ref.	WS30	WS32	WS31B			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50	3.00	1.00			
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
aq	Aqueous / settled sample.		07/11/2017	07/11/2017	07/11/2017			
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		09/11/2017	09/11/2017	09/11/2017			
(F)	Trigger breach confirmed		171109-126	171109-126	171109-126			
1-5&*\$@	Sample deviation (see appendix)		16528218	16528228	16528226			
			ES2	ES16	ES7			
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	10	15	9.2			
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01	<0.01			
			& M	& M	& M			
Cresols	<0.01 mg/kg	TM062 (S)	<0.01	<0.01	<0.01			
			& M	& M	& M			
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015	<0.015	<0.015			
			& M	& M	& M			
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01	<0.01			
			& M	& M	& M			
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015	<0.015	<0.015			
			& M	& M	& M			
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06	<0.06	<0.06			
			& M	& M	& M			
Sulphur, Total	<0.02 %	TM132	0.0915	0.0217	0.125			
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0178	0.00777	0.0193			
			#	#	#			
pH	1 pH Units	TM133	9.1	8.51	11.6			
			M	M	M			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6	<0.6			
			#	#	#			
Cyanide, Free	<1 mg/kg	TM153	<1	<1	<1			
			M	M	M			
Chromium, Trivalent	<0.9 mg/kg	TM181	4.43	<0.9	<0.9			
Antimony	<0.6 mg/kg	TM181	1.52	<0.6	0.836			
			#	#	#			
Arsenic	<0.6 mg/kg	TM181	6.88	6.53	8.67			
			M	M	M			
Barium	<0.6 mg/kg	TM181	129	194	144			
			#	#	#			
Beryllium	<0.01 mg/kg	TM181	0.502	1.47	1.09			
			M	M	M			
Boron	<0.7 mg/kg	TM181	6.26	5.73	9.61			
			#	#	#			
Cadmium	<0.02 mg/kg	TM181	0.321	<0.02	0.357			
			M	M	M			
Copper	<1.4 mg/kg	TM181	19.8	60.7	29.4			
			M	M	M			
Iron	<1000 mg/kg	TM181	14600	62200	46900			
			#	#	#			
Lead	<0.7 mg/kg	TM181	52.2	25.5	65.7			
			M	M	M			
Manganese	<0.13 mg/kg	TM181	497	1010	770			
			M	M	M			
Mercury	<0.14 mg/kg	TM181	0.376	0.976	0.58			
			M	M	M			
Molybdenum	<0.1 mg/kg	TM181	0.851	1.75	1.44			
			#	#	#			
Nickel	<0.2 mg/kg	TM181	9.41	47.4	17.2			
			M	M	M			
Selenium	<1 mg/kg	TM181	<1	1.54	<1			
			#	#	#			
Vanadium	<0.2 mg/kg	TM181	11.9	23.7	25			
			#	#	#			
Zinc	<1.9 mg/kg	TM181	60.5	216	92.5			
			M	M	M			
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0209	0.0637	0.249			
			M	M	M			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS30	WS32	WS31B			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.		0.50	3.00	1.00			
diss.filt	Dissolved / filtered sample.		Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.		07/11/2017	07/11/2017	07/11/2017			
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		09/11/2017	09/11/2017	09/11/2017			
(F)	Trigger breach confirmed		171109-126	171109-126	171109-126			
1-5&*\$@	Sample deviation (see appendix)		16528218	16528228	16528226			
			ES2	ES16	ES7			
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	97	78	65			
			&	&	&			
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	130	586	242			
			& M	& M	& M			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5	<5			
			& #	& #	& #			
Benzene	<10 µg/kg	TM089	<10	<10	<10			
			& M	& M	& M			
Toluene	<2 µg/kg	TM089	6.66	4.68	6.6			
			& M	& M	& M			
Ethylbenzene	<3 µg/kg	TM089	<3	<3	22			
			& M	& M	& M			
m,p-Xylene	<6 µg/kg	TM089	6.66	12.9	92.4			
			& M	& M	& M			
o-Xylene	<3 µg/kg	TM089	<3	4.68	62.7			
			& M	& M	& M			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9	17.6	155			
			&	&	&			
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	<24	184			
			&	&	&			
Aliphatics >C5-C6	<10 µg/kg	TM089	14.4	18.7	<10			
			&	&	&			
Aliphatics >C6-C8	<10 µg/kg	TM089	18.9	32.8	15.4			
			&	&	&			
Aliphatics >C8-C10	<10 µg/kg	TM089	23.3	62	12.1			
			&	&	&			
Aliphatics >C10-C12	<10 µg/kg	TM089	23.3	245	<10			
			&	&	&			
Aliphatics >C12-C16	<100 µg/kg	TM173	1080	2690	3700			
Aliphatics >C16-C21	<100 µg/kg	TM173	5740	4340	45000			
Aliphatics >C21-C35	<100 µg/kg	TM173	57800	82200	466000			
Aliphatics >C35-C44	<100 µg/kg	TM173	6070	12100	77700			
Total Aliphatics >C12-C44	<100 µg/kg	TM173	70700	101000	593000			
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10	<10			
			&	&	&			
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	<10	<10			
			&	&	&			
Aromatics >EC8-EC10	<10 µg/kg	TM089	26.6	60.8	185			
			&	&	&			
Aromatics >EC10-EC12	<10 µg/kg	TM089	15.5	163	<10			
			&	&	&			
Aromatics >EC12-EC16	<100 µg/kg	TM173	7580	197	7250			
Aromatics >EC16-EC21	<100 µg/kg	TM173	42600	531	54400			
Aromatics >EC21-EC35	<100 µg/kg	TM173	144000	27100	227000			
Aromatics >EC35-EC44	<100 µg/kg	TM173	37300	3420	55100			
Aromatics >EC40-EC44	<100 µg/kg	TM173	12000	626	17500			
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	231000	31300	344000			
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	302000	133000	937000			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS30	WS32	WS31B			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	104	99.4	99.6			
			&	&	&			
Toluene-D8	%	TM116	93.1	95.3	87.2			
			&	&	&			
4-bromofluorobenzene**	%	TM116	72.6	76.6	74.1			
			&	&	&			
Dichlorodifluoromethane	<6 µg/kg	TM116	<6	<6	<6			
			& M	& M	& M			
Chloromethane	<7 µg/kg	TM116	<7	<7	<7			
			& #	& #	& #			
Vinyl Chloride	<6 µg/kg	TM116	<6	<6	<6			
			& M	& M	& M			
Bromomethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Chloroethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<6	<6			
			& M	& M	& M			
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<10	<10			
			& #	& #	& #			
Carbon Disulphide	<7 µg/kg	TM116	<7	<7	<7			
			& M	& M	& M			
Dichloromethane	<10 µg/kg	TM116	204	159	152			
			& #	& #	& #			
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<8	<8			
			& M	& M	& M			
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6	<6	<6			
			& M	& M	& M			
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<10	<10			
			&	&	&			
Bromochloromethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Chloroform	<8 µg/kg	TM116	<8	<8	<8			
			& M	& M	& M			
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<7	<7			
			& M	& M	& M			
1,1-Dichloropropene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Carbontetrachloride	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<5	<5			
			& M	& M	& M			
Benzene	<9 µg/kg	TM116	<9	<9	<9			
			& M	& M	& M			
Trichloroethene	<9 µg/kg	TM116	<9	<9	<9			
			& #	& #	& #			
1,2-Dichloropropane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Dibromomethane	<9 µg/kg	TM116	<9	<9	<9			
			& M	& M	& M			
Bromodichloromethane	<7 µg/kg	TM116	<7	<7	<7			
			& M	& M	& M			
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Toluene	<7 µg/kg	TM116	<7	<7	<7			
			& M	& M	& M			
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10	<10			
			&	&	&			
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,3-Dichloropropane	<7 µg/kg	TM116	<7	<7	<7			
			& M	& M	& M			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS30	WS32	WS31B			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50	3.00	1.00			
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
aq	Aqueous / settled sample.		07/11/2017	07/11/2017	07/11/2017			
diss.filt	Dissolved / filtered sample.		-	-	-			
tot.unfilt	Total / unfiltered sample.		09/11/2017	09/11/2017	09/11/2017			
*	Subcontracted test.		171109-126	171109-126	171109-126			
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16528218	16528228	16528226			
(F)	Trigger breach confirmed		ES2	ES16	ES7			
1-5&\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Tetrachloroethene	<5 µg/kg	TM116	<5	<5	<5			
			& M	& M	& M			
Dibromochloromethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Chlorobenzene	<5 µg/kg	TM116	<5	<5	<5			
			& M	& M	& M			
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Ethylbenzene	<4 µg/kg	TM116	<4	<4	12.6			
			& M	& M	& M			
p/m-Xylene	<10 µg/kg	TM116	<10	<10	38.9			
			& #	& #	& #			
o-Xylene	<10 µg/kg	TM116	<10	<10	30.6			
			& M	& M	& M			
Styrene	<10 µg/kg	TM116	<10	<10	<10			
			& #	& #	& #			
Bromoform	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Isopropylbenzene	<5 µg/kg	TM116	<5	<5	<5			
			& #	& #	& #			
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10	<10			
			& #	& #	& #			
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<16	<16			
			& M	& M	& M			
Bromobenzene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
Propylbenzene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
2-Chlorotoluene	<9 µg/kg	TM116	<9	<9	<9			
			& M	& M	& M			
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<8	<8			
			& M	& M	& M			
4-Chlorotoluene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
tert-Butylbenzene	<14 µg/kg	TM116	<14	<14	<14			
			& M	& M	& M			
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<9	<9			
			& #	& #	& #			
sec-Butylbenzene	<10 µg/kg	TM116	<10	<10	<10			
			&	&	&			
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<8	<8			
			& M	& M	& M			
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<5	<5			
			& M	& M	& M			
n-Butylbenzene	<11 µg/kg	TM116	<11	<11	<11			
			&	&	&			
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<10	<10			
			& M	& M	& M			
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<14	<14			
			& M	& M	& M			
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<10	<10			
			& #	& #	& #			
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<20	<20			
			&	&	&			
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<20	<20			
			&	&	&			
Naphthalene	<13 µg/kg	TM116	<13	<13	52.8			
			& M	& M	& M			
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<20	<20			
			& #	& #	& #			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS30 ES 2 0.50 SOLID 07/11/2017 00:00:00 22/11/2017 09:34:58 171109-126 16528218 TM048	20/12/2017	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS30 ES 16 3.00 SOLID 07/11/2017 00:00:00 18/11/2017 13:38:39 171109-126 16528228 TM048	20/12/2017	Marcin Magdziarek	Loose fibres in soil	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS31B ES 7 1.00 SOLID 07/11/2017 00:00:00 18/11/2017 12:56:12 171109-126 16528226 TM048	20/12/2017	Marcin Magdziarek	Loose fibres in soil	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

DRAFT



CERTIFICATE OF ANALYSIS

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SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.192

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 10.1

Dry Matter Content (%) 90.8

Case

SDG 171109-126

Lab Sample Number(s) 16528226

Sampled Date 07-Nov-2017

Customer Sample Ref. WS31B ES7

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) 1.93

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.184

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.6

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00111	<0.0005	0.00222	<0.001	0.5	2	25
Barium	1.64	<0.000699	3.28	<0.0014	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.026	<0.0003	0.052	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.00188	<0.0005	0.00376	<0.001	0.5	10	30
Nickel	0.00997	<0.0004	0.0199	<0.0008	0.4	10	40
Lead	0.00879	<0.0002	0.0176	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.000645	<0.0005	0.00129	<0.001	0.1	0.5	7
Zinc	0.00217	<0.001	0.00434	<0.002	4	50	200
Chloride	3.6	<2	7.2	<4	800	15000	25000
Fluoride	0.728	<0.5	1.46	<1	10	150	500
Sulphate (soluble)	<2	<2	<4	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	17.9	<3	35.8	<6	500	800	1000

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 12.42

Conductivity (µS/cm) 8,040.00

Temperature (°C) 18.60

Volume Leachant (Litres) 0.332

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

20/12/2017 17:21:43

17:21:32 20/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.192

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 10.1

Dry Matter Content (%) 90.8

Case

SDG 171109-126

Lab Sample Number(s) 16528226

Sampled Date 07-Nov-2017

Customer Sample Ref. WS31B ES7

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) 1.93

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.184

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.6

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	0.263	<0.2	0.526	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	13	<0.001	26	<0.002	-	-	-	-
Calcium	763	<0.12	1530	<0.24	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	0.0114	<0.0005	0.0228	<0.001	-	-	-	-
Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	0.00164	<0.0005	0.00328	<0.001	-	-	-	-
Magnesium	<0.036	<0.036	<0.072	<0.072	-	-	-	-
3-methylphenol	<0.0015	<0.0015	<0.003	<0.003	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	0.0008	<0.0005	0.0016	<0.001	-	-	-	-
4-methylphenol	<0.0015	<0.0015	<0.003	<0.003	-	-	-	-
Iron	<0.019	<0.019	<0.038	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	<0.005	<0.005	<0.01	<0.01	-	-	-	-
Hardness Total	1910	<1	3820	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 12.42

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SDG: 171109-126
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Site Location

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Natural Moisture Content (%) 10.1

Dry Matter Content (%) 90.8

Case

SDG 171109-126

Lab Sample Number(s) 16528226

Sampled Date 07-Nov-2017

Customer Sample Ref. WS31B ES7

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) 1.93

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.184

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.6

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
2-Isopropyl Phenol by HPLC (W)	0.00058	<0.0005	0.00116	<0.001	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,6-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	0.00302	<0.00064	0.00604	<0.00128	-	-	-
4-chlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
2,4-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,6-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,5-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,3,5,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Manganese	<0.001	<0.001	<0.002	<0.002	-	-	-
2,3,4,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-Dinitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-
DNOC	<0.006	<0.006	<0.012	<0.012	-	-	-
Pentachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-
Vanadium	<0.001	<0.001	<0.002	<0.002	-	-	-

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 12.42

Conductivity (µS/cm) 8,040.00

Temperature (°C) 18.60

Volume Leachant (Litres) 0.332

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Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990/BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

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SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16528218	16528228	16528226
Customer Sample Ref.	WS30	WS32	WS31B
AGS Ref.	ES2	ES16	ES7
Depth	0.50	3.00	1.00
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen			27-Nov-2017
Anions by Kone (soil)	27-Nov-2017	28-Nov-2017	27-Nov-2017
Anions by Kone (w)			25-Nov-2017
Asbestos ID in Solid Samples	20-Dec-2017	20-Dec-2017	20-Dec-2017
CEN 2:1 Leachate (1 Stage)			23-Nov-2017
CEN Readings			24-Nov-2017
Chromium III	28-Nov-2017	29-Nov-2017	28-Nov-2017
Cyanide Comp/Free/Total/Thiocyanate	21-Nov-2017	21-Nov-2017	28-Nov-2017
Dissolved Metals by ICP-MS			27-Nov-2017
Dissolved Organic/Inorganic Carbon			27-Nov-2017
EPH CWG (Aliphatic) GC (S)	23-Nov-2017	23-Nov-2017	23-Nov-2017
EPH CWG (Aromatic) GC (S)	23-Nov-2017	23-Nov-2017	23-Nov-2017
Fluoride			25-Nov-2017
GRO by GC-FID (S)	24-Nov-2017	24-Nov-2017	24-Nov-2017
Hexavalent Chromium (s)	27-Nov-2017	27-Nov-2017	27-Nov-2017
Hexavalent Chromium (w)			27-Nov-2017
Low Level Phenols by HPLC (W)			27-Nov-2017
Mercury Dissolved			27-Nov-2017
Metals by iCap-OES Dissolved (W)			30-Nov-2017
Metals in solid samples by OES	28-Nov-2017	29-Nov-2017	28-Nov-2017
PAH by GCMS	23-Nov-2017	23-Nov-2017	23-Nov-2017
pH	20-Nov-2017	20-Nov-2017	20-Nov-2017
pH Value of Filtered Water			27-Nov-2017
Phenols by HPLC (S)	24-Nov-2017	25-Nov-2017	24-Nov-2017
Phenols by ms (w)			29-Nov-2017
Phenols Spec MS (S)	22-Nov-2017	22-Nov-2017	22-Nov-2017
Sample description	18-Nov-2017	18-Nov-2017	18-Nov-2017
Total Organic Carbon	23-Nov-2017	21-Nov-2017	23-Nov-2017
Total Sulphur	24-Nov-2017	23-Nov-2017	24-Nov-2017
TPH CWG GC (S)	24-Nov-2017	24-Nov-2017	24-Nov-2017
VOC MS (S)	24-Nov-2017	24-Nov-2017	24-Nov-2017



CERTIFICATE OF ANALYSIS

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ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1644
Ammoniacal Nitrogen as N	TM099	105.2 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1608	QC 1669
Chloride (soluble)	TM243	89.30 : 110.70	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 : 129.55	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1600
Chloride	TM184	109.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	106.0 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1651	QC 1634	QC 1661
Free Cyanide	TM153	91.7 84.60 : 110.40	94.0 84.60 : 110.40	
Free Cyanide (W)	TM227			100.5 93.25 : 112.75
Thiocyanate	TM153	90.42 83.02 : 103.47	88.62 83.02 : 103.47	
Thiocyanate (W)	TM227			101.75 97.75 : 109.75
Total Cyanide	TM153	96.43 87.53 : 111.13	95.71 87.53 : 111.13	
Total Cyanide (W)	TM227			102.75 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1686
Aluminium	TM152	109.0 90.09 : 112.69
Antimony	TM152	106.17 81.00 : 119.70
Arsenic	TM152	106.0 92.40 : 113.00



CERTIFICATE OF ANALYSIS

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SDG: 171109-126
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Superseded Report:

Dissolved Metals by ICP-MS

		QC 1686
Barium	TM152	102.67 93.11 : 112.81
Beryllium	TM152	111.33 88.27 : 113.27
Bismuth	TM152	114.0 86.72 : 115.61
Boron	TM152	111.33 86.47 : 111.70
Cadmium	TM152	107.0 90.28 : 114.48
Chromium	TM152	108.67 91.07 : 114.29
Cobalt	TM152	108.5 89.58 : 114.68
Copper	TM152	107.5 88.45 : 117.93
Lead	TM152	111.83 89.25 : 115.12
Lithium	TM152	110.67 88.50 : 116.05
Manganese	TM152	108.33 91.63 : 112.33
Molybdenum	TM152	104.5 91.08 : 111.63
Nickel	TM152	108.83 89.60 : 117.38
Niobium	TM152	108.83 96.38 : 128.85
Phosphorus	TM152	109.67 90.43 : 111.75
Selenium	TM152	102.83 88.13 : 108.33
Silver	TM152	97.67 90.04 : 97.49
Strontium	TM152	100.33 91.27 : 106.32
Tellurium	TM152	106.17 81.16 : 111.23
Thallium	TM152	103.5 81.70 : 117.09
Titanium	TM152	110.33 89.62 : 110.62
Tungsten	TM152	107.83 90.13 : 111.33
Uranium	TM152	114.0 92.30 : 116.90
Vanadium	TM152	107.0 88.22 : 118.55
Zinc	TM152	106.0 89.30 : 115.44
Zirconium	TM152	106.0 85.51 : 109.42

Dissolved Organic/Inorganic Carbon



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Client Reference: TA8066
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Superseded Report:

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1649
Dissolved Inorganic Carbon	TM090	100.83 91.15 : 111.35
Dissolved Organic Carbon	TM090	102.0 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1613	QC 1673
Total Aliphatics >C12-C35	TM173	86.88 70.71 : 106.26	87.92 70.71 : 106.26

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1613	QC 1673
Total Aromatics >EC12-EC35	TM173	88.0 65.82 : 105.00	88.67 65.82 : 105.00

Fluoride

Component	Method Code	QC 1618
Fluoride	TM104	98.0 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1615
Benzene by GC (Moisture Corrected)	TM089	108.5 85.00 : 115.00
Ethylbenzene by GC (Moisture Corrected)	TM089	110.0 76.83 : 115.31
m & p Xylene by GC (Moisture Corrected)	TM089	110.5 75.84 : 115.49
MTBE GC-FID (Moisture Corrected)	TM089	105.0 82.45 : 114.44
o Xylene by GC (Moisture Corrected)	TM089	110.0 80.90 : 117.77
QC	TM089	96.94 75.00 : 125.00
Toluene by GC (Moisture Corrected)	TM089	108.5 81.82 : 117.25

Hexavalent Chromium (s)



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Superseded Report:

Hexavalent Chromium (s)

Component	Method Code	QC 1685
Hexavalent Chromium	TM151	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1674
Hexavalent Chromium	TM241	97.2 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1669
Mercury Dissolved (CVAf)	TM183	97.3 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1612
Calcium	TM228	94.6 86.15 : 110.75
Iron	TM228	88.0 77.20 : 102.80
Magnesium	TM228	93.6 83.80 : 108.64
Potassium	TM228	91.9 85.58 : 109.10
Sodium	TM228	92.6 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1624	QC 1681	QC 1685
Aluminium	TM181	88.15 75.13 : 109.48	86.67 75.13 : 109.48	85.19 75.13 : 109.48
Antimony	TM181	99.61 84.48 : 110.90	96.14 84.48 : 110.90	88.8 84.48 : 110.90
Arsenic	TM181	91.77 83.14 : 108.73	93.06 83.14 : 108.73	91.26 83.14 : 108.73
Barium	TM181	97.66 77.47 : 102.53	93.75 77.47 : 102.53	89.84 77.47 : 102.53
Beryllium	TM181	95.55 84.19 : 106.77	94.18 84.19 : 106.77	91.78 84.19 : 106.77
Boron	TM181	86.16 76.55 : 106.69	86.16 76.55 : 106.69	87.85 76.55 : 106.69



CERTIFICATE OF ANALYSIS

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Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Metals in solid samples by OES

		QC 1624	QC 1681	QC 1685
Cadmium	TM181	96.28 86.37 : 111.59	97.34 86.37 : 111.59	94.15 86.37 : 111.59
Chromium	TM181	94.3 81.29 : 118.71	94.51 81.29 : 118.71	93.25 81.29 : 118.71
Cobalt	TM181	94.04 85.45 : 109.14	94.36 85.45 : 109.14	93.73 85.45 : 109.14
Copper	TM181	92.87 81.33 : 103.33	91.99 81.33 : 103.33	89.23 81.33 : 103.33
Iron	TM181	95.83 82.44 : 111.71	95.14 82.44 : 111.71	92.36 82.44 : 111.71
Lead	TM181	90.0 83.33 : 106.95	92.98 83.33 : 106.95	89.15 83.33 : 106.95
Manganese	TM181	92.93 80.56 : 102.33	87.27 80.56 : 102.33	87.47 80.56 : 102.33
Mercury	TM181	92.16 84.13 : 111.85	95.29 84.13 : 111.85	91.37 84.13 : 111.85
Molybdenum	TM181	94.21 84.19 : 110.39	94.59 84.19 : 110.39	89.96 84.19 : 110.39
Nickel	TM181	94.41 84.19 : 109.77	93.94 84.19 : 109.77	92.54 84.19 : 109.77
Phosphorus	TM181	89.67 73.47 : 116.86	94.16 73.47 : 116.86	88.62 73.47 : 116.86
Selenium	TM181	93.77 81.32 : 108.59	93.18 81.32 : 108.59	90.8 81.32 : 108.59
Strontium	TM181	94.29 84.70 : 105.87	89.85 84.70 : 105.87	90.06 84.70 : 105.87
Thallium	TM181	96.48 81.19 : 105.37	92.19 81.19 : 105.37	91.02 81.19 : 105.37
Tin	TM181	94.68 85.92 : 110.00	94.68 85.92 : 110.00	92.2 85.92 : 110.00
Titanium	TM181	82.31 73.44 : 113.17	83.85 73.44 : 113.17	86.15 73.44 : 113.17
Vanadium	TM181	89.88 81.86 : 105.26	88.65 81.86 : 105.26	87.12 81.86 : 105.26
Zinc	TM181	96.34 85.64 : 110.14	94.59 85.64 : 110.14	92.67 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1686	QC 1616
Acenaphthene	TM218	91.0 82.97 : 108.44	91.5 82.97 : 108.44
Acenaphthylene	TM218	91.0 77.27 : 104.05	91.0 77.27 : 104.05
Anthracene	TM218	89.0 78.18 : 102.20	89.5 78.18 : 102.20
Benz(a)anthracene	TM218	104.0 80.40 : 121.27	105.0 80.40 : 121.27
Benzo(a)pyrene	TM218	113.0 86.92 : 120.63	113.0 86.92 : 120.63
Benzo(b)fluoranthene	TM218	98.5 82.24 : 121.86	98.5 82.24 : 121.86
Benzo(ghi)perylene	TM218	90.5 83.49 : 115.72	90.0 83.49 : 115.72



CERTIFICATE OF ANALYSIS

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Client Reference: TA8066
Order Number: TA8066

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Superseded Report:

PAH by GCMS

		QC 1686	QC 1616
Benzo(k)fluoranthene	TM218	105.0 86.60 : 115.15	104.5 86.60 : 115.15
Chrysene	TM218	102.5 86.11 : 112.00	101.5 86.11 : 112.00
Dibenzo(ah)anthracene	TM218	102.0 83.84 : 116.37	102.0 83.84 : 116.37
Fluoranthene	TM218	93.0 81.23 : 104.94	93.5 81.23 : 104.94
Fluorene	TM218	93.5 83.68 : 108.62	93.5 83.68 : 108.62
Indeno(123cd)pyrene	TM218	103.5 83.72 : 116.90	103.0 83.72 : 116.90
Naphthalene	TM218	92.5 81.32 : 109.34	92.0 81.32 : 109.34
Phenanthrene	TM218	90.5 82.06 : 103.85	90.5 82.06 : 103.85
Pyrene	TM218	91.5 81.04 : 103.65	92.0 81.04 : 103.65

pH

Component	Method Code	QC 1619	QC 1697
pH	TM133	100.13 99.61 : 101.95	100.0 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1606
pH Value of Filtered Water	TM256	101.62 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1611	QC 1680
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	101.95 70.10 : 89.90	93.51 70.10 : 89.90
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	94.74 72.35 : 101.75	92.4 72.35 : 101.75
Catechol by HPLC (S)	TM062 (S)	99.05 24.84 : 108.44	111.43 24.84 : 108.44
Cresols by HPLC (S)	TM062 (S)	96.03 72.20 : 110.60	92.48 72.20 : 110.60
Napthol by HPLC (S)	TM062 (S)	110.71 91.99 : 139.23	115.71 91.99 : 139.23
Phenol by HPLC (S)	TM062 (S)	103.97 81.25 : 103.65	107.95 81.25 : 103.65
Resorcinol HPLC (S)	TM062 (S)	123.9 71.50 : 107.20	130.82 71.50 : 107.20



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Superseded Report:

Phenols by HPLC (S)

		QC 1611	QC 1680
Xylenols by HPLC (S)	TM062 (S)	98.75 82.47 : 110.25	96.98 82.47 : 110.25

Phenols by ms (w)

Component	Method Code	QC 1665
2,3,4,6-tetrachlorophenol	TM205	92.88 61.39 : 121.01
2,4,5-trichlorophenol	TM205	97.0 68.35 : 126.10
2,4,6-trichlorophenol	TM205	95.0 63.79 : 126.64
2,4-dichlorophenol	TM205	95.0 65.30 : 128.60
2,4-dimethylphenol	TM205	101.13 57.50 : 131.00
2,6-dichlorophenol	TM205	95.25 63.93 : 129.85
2-chlorophenol	TM205	92.13 64.51 : 127.89
2-methylphenol	TM205	96.0 61.66 : 132.61
2-nitrophenol	TM205	91.75 58.88 : 126.38
3-methylphenol	TM205	96.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	100.13 73.70 : 129.95
4-methylphenol	TM205	96.38 67.13 : 130.58
4-nitrophenol	TM205	95.13 68.50 : 136.75
Pentachlorophenol	TM205	69.88 47.74 : 105.49
Phenol	TM205	94.0 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1637	QC 1684
Total Organic Carbon	TM132	99.09 75.74 : 101.50	99.54 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1615	QC 1677	QC 1624
Total Sulphur %	TM132	88.97 81.05 : 118.95	92.93 81.05 : 118.95	95.33 81.05 : 118.95



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VOC MS (S)

Component	Method Code	QC 1635
1,1,1,2-tetrachloroethane	TM116	99.2 79.10 : 119.66
1,1,1-Trichloroethane	TM116	103.0 80.76 : 117.81
1,1,2-Trichloroethane	TM116	100.8 75.16 : 112.70
1,1-Dichloroethane	TM116	104.2 77.84 : 124.12
1,2-Dichloroethane	TM116	112.0 86.58 : 129.62
1,4-Dichlorobenzene	TM116	92.6 71.61 : 124.63
2-Chlorotoluene	TM116	87.4 66.81 : 118.43
4-Chlorotoluene	TM116	83.4 65.88 : 114.76
Benzene	TM116	110.2 84.42 : 119.78
Carbon Disulphide	TM116	100.8 75.11 : 124.81
Carbontetrachloride	TM116	100.0 82.35 : 126.46
Chlorobenzene	TM116	99.6 82.88 : 122.42
Chloroform	TM116	105.8 82.52 : 123.25
Chloromethane	TM116	83.4 57.48 : 132.44
Cis-1,2-Dichloroethene	TM116	109.6 79.48 : 120.80
Dibromomethane	TM116	88.4 71.69 : 119.43
Dichloromethane	TM116	105.4 81.68 : 125.21
Ethylbenzene	TM116	99.4 80.09 : 119.91
Hexachlorobutadiene	TM116	59.6 9.27 : 160.19
Isopropylbenzene	TM116	83.0 52.15 : 132.52
Naphthalene	TM116	98.6 76.79 : 127.18
o-Xylene	TM116	87.6 71.75 : 103.66
p/m-Xylene	TM116	90.9 77.41 : 112.71
Sec-Butylbenzene	TM116	61.2 44.71 : 117.87
Tetrachloroethene	TM116	100.2 79.68 : 120.25
Toluene	TM116	104.0 82.00 : 116.10
Trichloroethene	TM116	105.0 79.80 : 112.33



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Client Reference: TA8066
Order Number: TA8066

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Superseded Report:

VOC MS (S)

		QC 1635
Trichlorofluoromethane	TM116	94.8 72.76 : 118.80
Vinyl Chloride	TM116	109.4 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

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CERTIFICATE OF ANALYSIS

SDG: 171109-126
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 437727
Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Soil Engineering
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Leeds
West Yorkshire
LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 28 November 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171114-100
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 434432

We received 4 samples on Tuesday November 14, 2017 and 1 of these samples were scheduled for analysis which was completed on Tuesday November 28, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16556008	WS30	ES9	2.00	13/11/2017
16556009	WS30	ES15	3.00	13/11/2017
16556007	WS31C	ES10	2.00	13/11/2017
16556006	WS31C	ES14	3.00	13/11/2017

Maximum Sample/Coolbox Temperature (°C) :

9.0

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16556008

Customer Sample Reference

WS30

AGS Reference

ES9

Depth (m)

2.00

Container

1kg TUB

250g Amber Jar (ALE210)

60g VOC (ALE215)

Sample Type

S

S

S

Anions by Kone (soil)

All

NDPs: 0
Tests: 1

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 1

X

Chromium III

All

NDPs: 0
Tests: 1

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 1

X

EPH CWG (Aliphatic) GC (S)

All

NDPs: 0
Tests: 1

X

EPH CWG (Aromatic) GC (S)

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 1

X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 1

X

PAH by GCMS

All

NDPs: 0
Tests: 1

X

pH

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 1

X

Total Organic Carbon

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16556008

Customer
Sample Reference

WCS30

AGS Reference

ES9

Depth (m)

2.00

Container

60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB

Sample Type

S S S

Total Sulphur

All

NDPs: 0
Tests: 1

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 1

X

VOC MS (S)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16556008	WS30	2.00	Grey	Loamy Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Results Legend		Customer Sample Ref.	WS30					
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	17					
Phenol	<0.01 mg/kg	TM062 (S)	<0.01					
			M					
Cresols	<0.01 mg/kg	TM062 (S)	<0.01					
			M					
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015					
			M					
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01					
			M					
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015					
			M					
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06					
			M					
Sulphur, Total	<0.02 %	TM132	0.0463					
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0204					
			#					
pH	1 pH Units	TM133	9.7					
			M					
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6					
			#					
Cyanide, Free	<1 mg/kg	TM153	<1					
			M					
Chromium, Trivalent	<0.9 mg/kg	TM181	<0.9					
			#					
Antimony	<0.6 mg/kg	TM181	<0.6					
			#					
Arsenic	<0.6 mg/kg	TM181	9.45					
			M					
Barium	<0.6 mg/kg	TM181	91					
			#					
Beryllium	<0.01 mg/kg	TM181	0.762					
			M					
Boron	<0.7 mg/kg	TM181	13.9					
			#					
Cadmium	<0.02 mg/kg	TM181	0.0381					
			M					
Copper	<1.4 mg/kg	TM181	24.2					
			M					
Iron	<1000 mg/kg	TM181	24400					
			#					
Lead	<0.7 mg/kg	TM181	25.3					
			M					
Manganese	<0.13 mg/kg	TM181	585					
			M					
Mercury	<0.14 mg/kg	TM181	0.459					
			M					
Molybdenum	<0.1 mg/kg	TM181	1.26					
			#					
Nickel	<0.2 mg/kg	TM181	11.7					
			M					
Selenium	<1 mg/kg	TM181	<1					
			#					
Vanadium	<0.2 mg/kg	TM181	16.6					
			#					
Zinc	<1.9 mg/kg	TM181	46.7					
			M					
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0761					
			M					



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.		WS30					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	2.00 Soil/Solid (S) 13/11/2017 . 14/11/2017 171114-100 16556008 ES9						
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
diss.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted test.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery								
(F)	Trigger breach confirmed								
1-5&*\$@	Sample deviation (see appendix)								
Component	LOD/Units								
Naphthalene-d8 % recovery**	%	TM218	112						
Acenaphthene-d10 % recovery**	%	TM218	110						
Phenanthrene-d10 % recovery**	%	TM218	108						
Chrysene-d12 % recovery**	%	TM218	111						
Perylene-d12 % recovery**	%	TM218	119						
Naphthalene	<9 µg/kg	TM218	216						
Acenaphthylene	<12 µg/kg	TM218	179						
Acenaphthene	<8 µg/kg	TM218	70						
Fluorene	<10 µg/kg	TM218	145						
Phenanthrene	<15 µg/kg	TM218	1700						
Anthracene	<16 µg/kg	TM218	506						
Fluoranthene	<17 µg/kg	TM218	3030						
Pyrene	<15 µg/kg	TM218	2530						
Benz(a)anthracene	<14 µg/kg	TM218	2570						
Chrysene	<10 µg/kg	TM218	1990						
Benzo(b)fluoranthene	<15 µg/kg	TM218	3390						
Benzo(k)fluoranthene	<14 µg/kg	TM218	1320						
Benzo(a)pyrene	<15 µg/kg	TM218	3160						
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	1480						
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	460						
Benzo(g,h,i)perylene	<24 µg/kg	TM218	1500						
Polynuclear aromatic hydrocarbons (Total)	<118 µg/kg	TM218	24300						



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS30					
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	2.00 Soil/Solid (S) 13/11/2017 . 14/11/2017 171114-100 16556008 ES9					
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	60					
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	173					
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	10.9	M				
Benzene	<10 µg/kg	TM089	<10	#				
Toluene	<2 µg/kg	TM089	3.63	M				
Ethylbenzene	<3 µg/kg	TM089	<3	M				
m,p-Xylene	<6 µg/kg	TM089	<6	M				
o-Xylene	<3 µg/kg	TM089	<3	M				
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9					
sum of detected BTEX by GC	<24 µg/kg	TM089	<24					
Aliphatics >C5-C6	<10 µg/kg	TM089	<10					
Aliphatics >C6-C8	<10 µg/kg	TM089	56.9					
Aliphatics >C8-C10	<10 µg/kg	TM089	35.1					
Aliphatics >C10-C12	<10 µg/kg	TM089	15.7					
Aliphatics >C12-C16	<100 µg/kg	TM173	685					
Aliphatics >C16-C21	<100 µg/kg	TM173	4250					
Aliphatics >C21-C35	<100 µg/kg	TM173	86300					
Aliphatics >C35-C44	<100 µg/kg	TM173	15900					
Total Aliphatics >C12-C44	<100 µg/kg	TM173	107000					
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10					
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10					
Aromatics >EC8-EC10	<10 µg/kg	TM089	26.6					
Aromatics >EC10-EC12	<10 µg/kg	TM089	10.9					
Aromatics >EC12-EC16	<100 µg/kg	TM173	9550					
Aromatics >EC16-EC21	<100 µg/kg	TM173	77000					
Aromatics >EC21-EC35	<100 µg/kg	TM173	229000					
Aromatics >EC35-EC44	<100 µg/kg	TM173	48300					
Aromatics >EC40-EC44	<100 µg/kg	TM173	14300					
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	364000					
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	471000					



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS30				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&*\$@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM116	116				
Toluene-D8	%	TM116	99.8				
4-bromofluorobenzene**	%	TM116	94.4				
Dichlorodifluoromethane	<6 µg/kg	TM116	<60				
Chloromethane	<7 µg/kg	TM116	<70				
Vinyl Chloride	<6 µg/kg	TM116	<60				
Bromomethane	<10 µg/kg	TM116	<100				
Chloroethane	<10 µg/kg	TM116	<100				
Trichlorofluoromethane	<6 µg/kg	TM116	<60				
1,1-Dichloroethene	<10 µg/kg	TM116	<100				
Carbon Disulphide	<7 µg/kg	TM116	<70				
Dichloromethane	<10 µg/kg	TM116	<100				
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<100				
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<100				
1,1-Dichloroethane	<8 µg/kg	TM116	<80				
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<60				
2,2-Dichloropropane	<10 µg/kg	TM116	<100				
Bromochloromethane	<10 µg/kg	TM116	<100				
Chloroform	<8 µg/kg	TM116	<80				
1,1,1-Trichloroethane	<7 µg/kg	TM116	<70				
1,1-Dichloropropene	<10 µg/kg	TM116	<100				
Carbontetrachloride	<10 µg/kg	TM116	<100				
1,2-Dichloroethane	<5 µg/kg	TM116	<50				
Benzene	<9 µg/kg	TM116	<90				
Trichloroethene	<9 µg/kg	TM116	<90				
1,2-Dichloropropane	<10 µg/kg	TM116	<100				
Dibromomethane	<9 µg/kg	TM116	<90				
Bromodichloromethane	<7 µg/kg	TM116	<70				
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<100				
Toluene	<7 µg/kg	TM116	90				
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<100				
1,1,2-Trichloroethane	<10 µg/kg	TM116	<100				
1,3-Dichloropropane	<7 µg/kg	TM116	<70				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS30				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<5 µg/kg	TM116	<50				
			M				
Dibromochloromethane	<10 µg/kg	TM116	<100				
			M				
1,2-Dibromoethane	<10 µg/kg	TM116	<100				
			M				
Chlorobenzene	<5 µg/kg	TM116	<50				
			M				
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<100				
			M				
Ethylbenzene	<4 µg/kg	TM116	<40				
			M				
p/m-Xylene	<10 µg/kg	TM116	<100				
			#				
o-Xylene	<10 µg/kg	TM116	<100				
			M				
Styrene	<10 µg/kg	TM116	<100				
			#				
Bromoform	<10 µg/kg	TM116	<100				
			M				
Isopropylbenzene	<5 µg/kg	TM116	<50				
			#				
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<100				
			#				
1,2,3-Trichloropropane	<16 µg/kg	TM116	<160				
			M				
Bromobenzene	<10 µg/kg	TM116	<100				
			M				
Propylbenzene	<10 µg/kg	TM116	<100				
			M				
2-Chlorotoluene	<9 µg/kg	TM116	<90				
			M				
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<80				
			M				
4-Chlorotoluene	<10 µg/kg	TM116	<100				
			M				
tert-Butylbenzene	<14 µg/kg	TM116	<140				
			M				
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<90				
			#				
sec-Butylbenzene	<10 µg/kg	TM116	<100				
4-Isopropyltoluene	<10 µg/kg	TM116	<100				
			M				
1,3-Dichlorobenzene	<8 µg/kg	TM116	<80				
			M				
1,4-Dichlorobenzene	<5 µg/kg	TM116	<50				
			M				
n-Butylbenzene	<11 µg/kg	TM116	<110				
1,2-Dichlorobenzene	<10 µg/kg	TM116	<100				
			M				
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<140				
			M				
Tert-amyl methyl ether	<10 µg/kg	TM116	<100				
			#				
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<200				
Hexachlorobutadiene	<20 µg/kg	TM116	<200				
Naphthalene	<13 µg/kg	TM116	<130				
			M				
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<200				
			#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS30 ES 9 2.00 SOLID 13/11/2017 00:00:00 22/11/2017 09:32:28 171114-100 16556008 TM048	27/11/2017	Eva Guerra	n	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM243		Mixed Anions In Soils By Kone

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16556008
Customer Sample Ref.	WS30
AGS Ref.	ES9
Depth	2.00
Type	Soil/Solid (S)

Anions by Kone (soil)	27-Nov-2017
Asbestos ID in Solid Samples	27-Nov-2017
Chromium III	28-Nov-2017
Cyanide Comp/Free/Total/Thiocyanate	23-Nov-2017
EPH CWG (Aliphatic) GC (S)	23-Nov-2017
EPH CWG (Aromatic) GC (S)	23-Nov-2017
GRO by GC-FID (S)	24-Nov-2017
Hexavalent Chromium (s)	27-Nov-2017
Metals in solid samples by OES	28-Nov-2017
PAH by GCMS	23-Nov-2017
pH	21-Nov-2017
Phenols by HPLC (S)	23-Nov-2017
Phenols Spec MS (S)	22-Nov-2017
Sample description	20-Nov-2017
Total Organic Carbon	23-Nov-2017
Total Sulphur	24-Nov-2017
TPH CWG GC (S)	24-Nov-2017
VOC MS (S)	27-Nov-2017

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 434432
Superseded Report:

ASSOCIATED AQC DATA

Anions by Kone (soil)

Component	Method Code	QC 1608
Chloride (soluble)	TM243	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 : 129.55

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1644
Free Cyanide	TM153	94.5 84.60 : 110.40
Thiocyanate	TM153	93.41 83.02 : 103.47
Total Cyanide	TM153	100.0 87.53 : 111.13

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1673
Total Aliphatics >C12-C35	TM173	87.92 70.71 : 106.26

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1673
Total Aromatics >EC12-EC35	TM173	88.67 65.82 : 105.00

GRO by GC-FID (S)

Component	Method Code	QC 1615
Benzene by GC (Moisture Corrected)	TM089	108.5 85.00 : 115.00
Ethylbenzene by GC (Moisture Corrected)	TM089	110.0 76.83 : 115.31
m & p Xylene by GC (Moisture Corrected)	TM089	110.5 75.84 : 115.49
MTBE GC-FID (Moisture Corrected)	TM089	105.0 82.45 : 114.44
o Xylene by GC (Moisture Corrected)	TM089	110.0 80.90 : 117.77
QC	TM089	96.94 75.00 : 125.00
Toluene by GC (Moisture Corrected)	TM089	108.5 81.82 : 117.25



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 434432
Superseded Report:

Hexavalent Chromium (s)

Component	Method Code	QC 1685
Hexavalent Chromium	TM151	94.0 90.20 : 107.00

Metals in solid samples by OES

Component	Method Code	QC 1651
Aluminium	TM181	87.41 75.13 : 109.48
Antimony	TM181	93.82 84.48 : 110.90
Arsenic	TM181	93.57 83.14 : 108.73
Barium	TM181	90.63 77.47 : 102.53
Beryllium	TM181	91.44 84.19 : 106.77
Boron	TM181	84.75 76.55 : 106.69
Cadmium	TM181	96.81 86.37 : 111.59
Chromium	TM181	89.45 81.29 : 118.71
Cobalt	TM181	91.22 85.45 : 109.14
Copper	TM181	88.06 81.33 : 103.33
Iron	TM181	95.14 82.44 : 111.71
Lead	TM181	88.09 83.33 : 106.95
Manganese	TM181	85.86 80.56 : 102.33
Mercury	TM181	94.51 84.13 : 111.85
Molybdenum	TM181	92.28 84.19 : 110.39
Nickel	TM181	92.54 84.19 : 109.77
Phosphorus	TM181	93.11 73.47 : 116.86
Selenium	TM181	91.69 81.32 : 108.59
Strontium	TM181	90.06 84.70 : 105.87
Thallium	TM181	89.06 81.19 : 105.37
Tin	TM181	93.97 85.92 : 110.00
Titanium	TM181	79.23 73.44 : 113.17



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 434432
Superseded Report:

Metals in solid samples by OES

		QC 1651
Vanadium	TM181	84.66 81.86 : 105.26
Zinc	TM181	93.19 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1686
Acenaphthene	TM218	91.0 82.97 : 108.44
Acenaphthylene	TM218	91.0 77.27 : 104.05
Anthracene	TM218	89.0 78.18 : 102.20
Benz(a)anthracene	TM218	104.0 80.40 : 121.27
Benzo(a)pyrene	TM218	113.0 86.92 : 120.63
Benzo(b)fluoranthene	TM218	98.5 82.24 : 121.86
Benzo(ghi)perylene	TM218	90.5 83.49 : 115.72
Benzo(k)fluoranthene	TM218	105.0 86.60 : 115.15
Chrysene	TM218	102.5 86.11 : 112.00
Dibenzo(ah)anthracene	TM218	102.0 83.84 : 116.37
Fluoranthene	TM218	93.0 81.23 : 104.94
Fluorene	TM218	93.5 83.68 : 108.62
Indeno(123cd)pyrene	TM218	103.5 83.72 : 116.90
Naphthalene	TM218	92.5 81.32 : 109.34
Phenanthrene	TM218	90.5 82.06 : 103.85
Pyrene	TM218	91.5 81.04 : 103.65

pH

Component	Method Code	QC 1666
pH	TM133	100.52 99.61 : 101.95

Phenols by HPLC (S)



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

Phenols by HPLC (S)

Component	Method Code	QC 1640
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	101.95 85.25 : 114.75
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	90.64 75.71 : 124.29
Catechol by HPLC (S)	TM062 (S)	0.95 64.10 : 135.90
Cresols by HPLC (S)	TM062 (S)	91.65 78.85 : 107.41
Napthol by HPLC (S)	TM062 (S)	82.86 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	105.3 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	142.77 86.85 : 145.65
Xylenols by HPLC (S)	TM062 (S)	99.58 84.65 : 109.70

Total Organic Carbon

Component	Method Code	QC 1684
Total Organic Carbon	TM132	99.54 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1624
Total Sulphur %	TM132	95.33 81.05 : 118.95

VOC MS (S)

Component	Method Code	QC 1678
1,1,1,2-tetrachloroethane	TM116	97.8 77.56 : 115.55
1,1,1-Trichloroethane	TM116	93.4 74.97 : 113.76
1,1,2-Trichloroethane	TM116	93.2 77.12 : 116.04
1,1-Dichloroethane	TM116	101.4 74.46 : 129.15
1,2-Dichloroethane	TM116	105.0 82.41 : 125.49
1,4-Dichlorobenzene	TM116	98.8 72.76 : 126.34
2-Chlorotoluene	TM116	88.8 68.08 : 113.44
4-Chlorotoluene	TM116	85.8 63.64 : 113.30



CERTIFICATE OF ANALYSIS

Validated

SDG: 171114-100
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 434432
Superseded Report:

VOC MS (S)

		QC 1678
Benzene	TM116	101.6 81.05 : 117.28
Carbon Disulphide	TM116	85.0 74.91 : 122.14
Carbontetrachloride	TM116	99.2 77.80 : 119.23
Chlorobenzene	TM116	95.4 75.00 : 115.53
Chloroform	TM116	98.6 77.34 : 121.84
Chloromethane	TM116	92.8 52.63 : 138.74
Cis-1,2-Dichloroethene	TM116	107.4 74.69 : 124.27
Dibromomethane	TM116	94.6 67.80 : 121.75
Dichloromethane	TM116	106.2 81.11 : 133.25
Ethylbenzene	TM116	92.4 72.53 : 109.84
Hexachlorobutadiene	TM116	61.8 23.60 : 154.69
Isopropylbenzene	TM116	79.2 54.46 : 125.44
Naphthalene	TM116	102.6 74.47 : 129.31
o-Xylene	TM116	82.8 67.46 : 102.22
p/m-Xylene	TM116	87.0 68.32 : 108.91
Sec-Butylbenzene	TM116	73.8 50.86 : 134.07
Tetrachloroethene	TM116	96.6 76.95 : 121.02
Toluene	TM116	92.0 74.24 : 107.42
Trichloroethene	TM116	95.2 77.61 : 111.54
Trichlorofluoromethane	TM116	92.2 70.00 : 130.00
Vinyl Chloride	TM116	100.6 68.05 : 125.93

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



CERTIFICATE OF ANALYSIS

SDG:	171114-100	Client Reference:	TA8066	Report Number:	434432
Location:	Glassworks Barnsley	Order Number:	TA8066	Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

SDG:	171119-11	Customer:	Soil Engineering
Job:	H_SOILENG_LEE-55	Attention:	Mark Burton
Client Reference:	TÅ8066	Order No.:	
Location:	Glassworks Barnsley	Report No:	

Asbestos Identification

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 2 0.50 SOLID 14/11/2017 00:00:00 23/11/2017 15:31:11 171119-11 16591364 TM048 15575706	19/12/2017	Neville Mann	Loose fibres in soil	Not Detected	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 8 2.00 SOLID 14/11/2017 00:00:00 23/11/2017 15:28:56 171119-11 16591365 TM048 15575756	19/12/2017	Neville Mann	-	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

DRAFT



ALS Environmental Analytical Services

Asbestos Report

SDGnumber : 171119-11
Client Reference: TA8066
Attention : Mark Burton

Location : Glassworks Barnsley
Order No. :
Date Received : 16/11/2017 07:00:00

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 2 0.50 SOLID 14/11/2017 00:00:00 23/11/2017 15:31:11 171119-11 16591364 TM048	19/12/2017	Neville Mann	Loose fibres in soil	Not Detected	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

DRAFT



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Soil Engineering
Parkside Lane
Dewsbury Road
Leeds
West Yorkshire
LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 20 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171119-11
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 437725

We received 3 samples on Thursday November 16, 2017 and 2 of these samples were scheduled for analysis which was completed on Tuesday December 19, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16591363	BH03	ES1	0.20	14/11/2017
16591364	BH03	ES2	0.50	14/11/2017
16591365	BH03	ES8	2.00	14/11/2017

Maximum Sample/Coolbox Temperature (°C) :

8.6

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16591364

16591365

Customer Sample Reference

BH03

BH03

AGS Reference

ES2

ES8

Depth (m)

0.50

2.00

Container

1kg TUB

250g Amber Jar (ALE210)

60g VOC (ALE215)

1kg TUB

250g Amber Jar (ALE210)

60g VOC (ALE215)

Sample Type

S

S

S

S

S

S

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (soil)

All

NDPs: 0
Tests: 2

X

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 2

X

X

CEN Readings

All

NDPs: 0
Tests: 1

X

Chromium III

All

NDPs: 0
Tests: 3

X

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 3

X

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 1

X

EPH CWG (Aliphatic) GC (S)

All

NDPs: 0
Tests: 2

X

X

EPH CWG (Aromatic) GC (S)

All

NDPs: 0
Tests: 2

X

X

Fluoride

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 2

X

X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 2

X

X

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X

X

PAH by GCMS

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Phenols by ms (w)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 2

X

X

Sample description

All

NDPs: 0
Tests: 2

X

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

Total Sulphur

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 2

X

X

VOC MS (S)

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16591364	BH03	0.50	Dark Brown	Loamy Sand	Stones	Crushed Brick
16591365	BH03	2.00	Light Brown	Sandy Clay	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Results Legend		Customer Sample Ref.	BH03	BH03				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	8.1	18				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Cresols	<0.01 mg/kg	TM062 (S)	0.0218	<0.01				
			M	M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06	<0.06				
			M	M				
Sulphur, Total	<0.02 %	TM132	0.124	0.0507				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0132	0.00361				
			#	#				
pH	1 pH Units	TM133	11.5	11.5				
			M	M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6				
			#	#				
Cyanide, Free	<1 mg/kg	TM153	<1	<1				
			M	M				
Chromium, Trivalent	<0.9 mg/kg	TM181	8.45	1.71				
Antimony	<0.6 mg/kg	TM181	0.912	<0.6				
			#	#				
Arsenic	<0.6 mg/kg	TM181	5.98	6.5				
			M	M				
Barium	<0.6 mg/kg	TM181	113	83.7				
			#	#				
Beryllium	<0.01 mg/kg	TM181	0.673	0.766				
			M	M				
Boron	<0.7 mg/kg	TM181	8.04	2.53				
			#	#				
Cadmium	<0.02 mg/kg	TM181	1.81	0.0909				
			M	M				
Copper	<1.4 mg/kg	TM181	21.8	15.1				
			M	M				
Iron	<1000 mg/kg	TM181	18200	33300				
			#	#				
Lead	<0.7 mg/kg	TM181	64.8	15.9				
			M	M				
Manganese	<0.13 mg/kg	TM181	650	626				
			M	M				
Mercury	<0.14 mg/kg	TM181	0.409	0.402				
			M	M				
Molybdenum	<0.1 mg/kg	TM181	1.2	1.01				
			#	#				
Nickel	<0.2 mg/kg	TM181	13.3	11				
			M	M				
Selenium	<1 mg/kg	TM181	<1	<1				
			#	#				
Vanadium	<0.2 mg/kg	TM181	15.5	20.8				
			#	#				
Zinc	<1.9 mg/kg	TM181	254	38				
			M	M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.198	0.104				
			M	M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number:Report Number: 437725
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	BH03	BH03			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.50	2.00			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2017	14/11/2017			
*	Subcontracted test.	Sample Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	16/11/2017	16/11/2017			
(F)	Trigger breach confirmed	SDG Ref	171119-11	171119-11			
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16591364	16591365			
		AGS Reference	ES2	ES8			
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	76	97			
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	198	438			
			M	M			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5			
			#	#			
Benzene	<10 µg/kg	TM089	<10	<10			
			M	M			
Toluene	<2 µg/kg	TM089	5.44	13.4			
			M	M			
Ethylbenzene	<3 µg/kg	TM089	3.26	<3			
			M	M			
m,p-Xylene	<6 µg/kg	TM089	13.1	7.32			
			M	M			
o-Xylene	<3 µg/kg	TM089	6.53	4.88			
			M	M			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	19.6	12.2			
sum of detected BTEX by GC	<24 µg/kg	TM089	28.3	25.6			
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	36.6			
Aliphatics >C6-C8	<10 µg/kg	TM089	15.2	182			
Aliphatics >C8-C10	<10 µg/kg	TM089	31.6	63.4			
Aliphatics >C10-C12	<10 µg/kg	TM089	55.5	50			
Aliphatics >C12-C16	<100 µg/kg	TM173	2420	919			
Aliphatics >C16-C21	<100 µg/kg	TM173	8490	2240			
Aliphatics >C21-C35	<100 µg/kg	TM173	55700	9750			
Aliphatics >C35-C44	<100 µg/kg	TM173	21600	1240			
Total Aliphatics >C12-C44	<100 µg/kg	TM173	88200	14100			
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10			
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	13.4			
Aromatics >EC8-EC10	<10 µg/kg	TM089	43.5	58.6			
Aromatics >EC10-EC12	<10 µg/kg	TM089	37	34.2			
Aromatics >EC12-EC16	<100 µg/kg	TM173	8320	970			
Aromatics >EC16-EC21	<100 µg/kg	TM173	44500	6460			
Aromatics >EC21-EC35	<100 µg/kg	TM173	123000	17000			
Aromatics >EC35-EC44	<100 µg/kg	TM173	46300	3580			
Aromatics >EC40-EC44	<100 µg/kg	TM173	17400	1020			
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	222000	28000			
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	311000	42500			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	BH03	BH03			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.50	2.00			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2017	14/11/2017			
*	Subcontracted test.	Sample Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	16/11/2017	16/11/2017			
(F)	Trigger breach confirmed	SDG Ref	171119-11	171119-11			
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16591364	16591365			
		AGS Reference	ES2	ES8			
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM116	111	104			
Toluene-D8	%	TM116	85.3	102			
4-bromofluorobenzene**	%	TM116	70.7	96.2			
Dichlorodifluoromethane	<6 µg/kg	TM116	<6	<60			
			M	M			
Chloromethane	<7 µg/kg	TM116	<7	<70			
			#	#			
Vinyl Chloride	<6 µg/kg	TM116	<6	<60			
			M	M			
Bromomethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Chloroethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<60			
			M	M			
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<100			
			#	#			
Carbon Disulphide	<7 µg/kg	TM116	<7	<70			
			M	M			
Dichloromethane	<10 µg/kg	TM116	<10	<100			
			#	#			
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10	<100			
			M	M			
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10	<100			
			M	M			
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<80			
			M	M			
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6	<60			
			M	M			
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<100			
Bromochloromethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Chloroform	<8 µg/kg	TM116	<8	<80			
			M	M			
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<70			
			M	M			
1,1-Dichloropropene	<10 µg/kg	TM116	<10	<100			
			M	M			
Carbontetrachloride	<10 µg/kg	TM116	<10	<100			
			M	M			
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<50			
			M	M			
Benzene	<9 µg/kg	TM116	<9	<90			
			M	M			
Trichloroethene	<9 µg/kg	TM116	<9	<90			
			#	#			
1,2-Dichloropropane	<10 µg/kg	TM116	<10	<100			
			M	M			
Dibromomethane	<9 µg/kg	TM116	<9	<90			
			M	M			
Bromodichloromethane	<7 µg/kg	TM116	<7	<70			
			M	M			
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<100			
			M	M			
Toluene	<7 µg/kg	TM116	<7	<70			
			M	M			
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<100			
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<100			
			M	M			
1,3-Dichloropropane	<7 µg/kg	TM116	<7	<70			
			M	M			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	BH03	BH03			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference					
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&\$@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<5 µg/kg	TM116	<5	<50			
			M	M			
Dibromochloromethane	<10 µg/kg	TM116	<10	<100			
			M	M			
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Chlorobenzene	<5 µg/kg	TM116	<5	<50			
			M	M			
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Ethylbenzene	<4 µg/kg	TM116	<4	<40			
			M	M			
p/m-Xylene	<10 µg/kg	TM116	<10	<100			
			#	#			
o-Xylene	<10 µg/kg	TM116	<10	<100			
			M	M			
Styrene	<10 µg/kg	TM116	<10	<100			
			#	#			
Bromoform	<10 µg/kg	TM116	<10	<100			
			M	M			
Isopropylbenzene	<5 µg/kg	TM116	<5	<50			
			#	#			
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<100			
			#	#			
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<160			
			M	M			
Bromobenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
Propylbenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
2-Chlorotoluene	<9 µg/kg	TM116	<9	<90			
			M	M			
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<80			
			M	M			
4-Chlorotoluene	<10 µg/kg	TM116	<10	<100			
			M	M			
tert-Butylbenzene	<14 µg/kg	TM116	<14	<140			
			M	M			
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<90			
			#	#			
sec-Butylbenzene	<10 µg/kg	TM116	<10	<100			
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<100			
			M	M			
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<80			
			M	M			
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<50			
			M	M			
n-Butylbenzene	<11 µg/kg	TM116	<11	<110			
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<140			
			M	M			
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<100			
			#	#			
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<200			
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<200			
Naphthalene	<13 µg/kg	TM116	337	<130			
			M	M			
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<200			
			#	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 2 0.50 SOLID 14/11/2017 00:00:00 23/11/2017 15:31:11 171119-11 16591364 TM048	19/12/2017	Neville Mann	Loose fibres in soil	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 8 2.00 SOLID 14/11/2017 00:00:00 23/11/2017 15:28:56 171119-11 16591365 TM048	19/12/2017	Neville Mann	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.234

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 33.9

Dry Matter Content (%) 74.7

Case

SDG 171119-11

Lab Sample Number(s) 16591365

Sampled Date 14-Nov-2017

Customer Sample Ref. BH03 ES8

Depth (m) 2.00

Solid Waste Analysis

Total Organic Carbon (%) 0.361

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0256

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.5

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00494	<0.0005	0.00988	<0.001	0.5	2	25
Barium	0.0168	<0.0002	0.0336	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.0135	<0.0003	0.027	<0.0006	2	50	100
Mercury Dissolved (CVAf)	0.0000104	<0.00001	0.0000208	<0.00002	0.01	0.2	2
Molybdenum	0.0788	<0.0005	0.158	<0.001	0.5	10	30
Nickel	0.00169	<0.0004	0.00338	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.0101	<0.0005	0.0202	<0.001	0.1	0.5	7
Zinc	<0.001	<0.001	<0.002	<0.002	4	50	200
Chloride	15.3	<2	30.6	<4	800	15000	25000
Fluoride	1.34	<0.5	2.68	<1	10	150	500
Sulphate (soluble)	154	<2	308	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	44.8	<3	89.6	<6	500	800	1000

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 9.14

Conductivity (µS/cm) 437.00

Temperature (°C) 19.70

Volume Leachant (Litres) 0.291

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

20/12/2017 17:16:45

17:16:33 20/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.234

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 33.9

Dry Matter Content (%) 74.7

Case

SDG 171119-11

Lab Sample Number(s) 16591365

Sampled Date 14-Nov-2017

Customer Sample Ref. BH03 ES8

Depth (m) 2.00

Solid Waste Analysis

Total Organic Carbon (%) 0.361

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0256

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.5

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.3	<0.001	19	<0.002	-	-	-	-
Calcium	75.6	<0.012	151	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
Phenol by HPLC (W)	0.00197	<0.0005	0.00394	<0.001	-	-	-	-
2-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	0.0601	<0.036	0.12	<0.072	-	-	-	-
3-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	0.135	<0.019	0.27	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.026	<0.005	0.052	<0.01	-	-	-	-
Hardness Total	189	<1	378	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 9.14

Conductivity (µS/cm) 437.00

Temperature (°C) 19.70

Volume Leachant (Litres) 0.291

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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20/12/2017 17:16:45

17:16:33 20/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 437725
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.234
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 33.9
Dry Matter Content (%) 74.7

Case

SDG 171119-11
Lab Sample Number(s) 16591365
Sampled Date 14-Nov-2017
Customer Sample Ref. BH03 ES8
Depth (m) 2.00

Solid Waste Analysis

Total Organic Carbon (%) 0.361
Loss on Ignition (%) -
Sum of BTEX (mg/kg) 0.0256
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) 11.5
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,6-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	0.00197	<0.00064	0.00394	<0.00128	-	-	-
4-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,6-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,5-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,3,5,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Manganese	0.001	<0.001	0.002	<0.002	-	-	-
2,3,4,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-Dinitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-
DNOC	<0.006	<0.006	<0.012	<0.012	-	-	-
Pentachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-
Vanadium	<0.001	<0.001	<0.002	<0.002	-	-	-

Leach Test Information

Date Prepared 23-Nov-2017
pH (pH Units) 9.14
Conductivity (µS/cm) 437.00
Temperature (°C) 19.70
Volume Leachant (Litres) 0.291
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

20/12/2017 17:16:45

17:16:33 20/12/2017



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Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



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Test Completion Dates

Lab Sample No(s)
Customer Sample Ref.

AGS Ref.
Depth
Type

	16591364	16591365
	BH03	BH03
	ES2	ES8
	0.50	2.00
	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen		27-Nov-2017
Anions by Kone (soil)	27-Nov-2017	27-Nov-2017
Anions by Kone (w)		25-Nov-2017
Asbestos ID in Solid Samples	19-Dec-2017	19-Dec-2017
CEN 2:1 Leachate (1 Stage)		23-Nov-2017
CEN Readings		25-Nov-2017
Chromium III	28-Nov-2017	28-Nov-2017
Cyanide Comp/Free/Total/Thiocyanate	27-Nov-2017	28-Nov-2017
Dissolved Metals by ICP-MS		27-Nov-2017
Dissolved Organic/Inorganic Carbon		27-Nov-2017
EPH CWG (Aliphatic) GC (S)	27-Nov-2017	24-Nov-2017
EPH CWG (Aromatic) GC (S)	27-Nov-2017	24-Nov-2017
Fluoride		25-Nov-2017
GRO by GC-FID (S)	24-Nov-2017	24-Nov-2017
Hexavalent Chromium (s)	27-Nov-2017	27-Nov-2017
Hexavalent Chromium (w)		27-Nov-2017
Low Level Phenols by HPLC (W)		27-Nov-2017
Mercury Dissolved		27-Nov-2017
Metals by iCap-OES Dissolved (W)		27-Nov-2017
Metals in solid samples by OES	29-Nov-2017	29-Nov-2017
PAH by GCMS	27-Nov-2017	24-Nov-2017
pH	24-Nov-2017	24-Nov-2017
pH Value of Filtered Water		27-Nov-2017
Phenols by HPLC (S)	27-Nov-2017	27-Nov-2017
Phenols by ms (w)		29-Nov-2017
Phenols Spec MS (S)	27-Nov-2017	27-Nov-2017
Sample description	23-Nov-2017	23-Nov-2017
Total Organic Carbon	27-Nov-2017	27-Nov-2017
Total Sulphur	27-Nov-2017	24-Nov-2017
TPH CWG GC (S)	27-Nov-2017	24-Nov-2017
VOC MS (S)	24-Nov-2017	27-Nov-2017



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ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1644
Ammoniacal Nitrogen as N	TM099	105.2 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1620	QC 1624
Chloride (soluble)	TM243	62.86 89.30 : 110.70	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	55.68 70.45 : 129.55	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1600
Chloride	TM184	109.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	106.0 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1678	QC 1629	QC 1661
Free Cyanide	TM153	95.6 84.60 : 110.40	93.9 84.60 : 110.40	
Free Cyanide (W)	TM227			100.5 93.25 : 112.75
Thiocyanate	TM153	92.22 83.02 : 103.47	92.22 83.02 : 103.47	
Thiocyanate (W)	TM227			101.75 97.75 : 109.75
Total Cyanide	TM153	101.43 87.53 : 111.13	98.57 87.53 : 111.13	
Total Cyanide (W)	TM227			102.75 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1686
Aluminium	TM152	109.0 90.09 : 112.69
Antimony	TM152	106.17 81.00 : 119.70
Arsenic	TM152	106.0 92.40 : 113.00



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Dissolved Metals by ICP-MS

		QC 1686
Barium	TM152	102.67 93.11 : 112.81
Beryllium	TM152	111.33 88.27 : 113.27
Bismuth	TM152	114.0 86.72 : 115.61
Boron	TM152	111.33 86.47 : 111.70
Cadmium	TM152	107.0 90.28 : 114.48
Chromium	TM152	108.67 91.07 : 114.29
Cobalt	TM152	108.5 89.58 : 114.68
Copper	TM152	107.5 88.45 : 117.93
Lead	TM152	111.83 89.25 : 115.12
Lithium	TM152	110.67 88.50 : 116.05
Manganese	TM152	108.33 91.63 : 112.33
Molybdenum	TM152	104.5 91.08 : 111.63
Nickel	TM152	108.83 89.60 : 117.38
Niobium	TM152	96.38 : 128.85
Phosphorus	TM152	109.67 90.43 : 111.75
Selenium	TM152	102.83 88.13 : 108.33
Silver	TM152	97.67 90.04 : 97.49
Strontium	TM152	100.33 91.27 : 106.32
Tellurium	TM152	106.17 81.16 : 111.23
Thallium	TM152	103.5 81.70 : 117.09
Titanium	TM152	110.33 89.62 : 110.62
Tungsten	TM152	107.83 90.13 : 111.33
Uranium	TM152	114.0 92.30 : 116.90
Vanadium	TM152	107.0 88.22 : 118.55
Zinc	TM152	106.0 89.30 : 115.44
Zirconium	TM152	85.51 : 109.42

Dissolved Organic/Inorganic Carbon



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Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1649
Dissolved Inorganic Carbon	TM090	100.83 91.15 : 111.35
Dissolved Organic Carbon	TM090	102.0 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1606	QC 1638
Total Aliphatics >C12-C35	TM173	85.83 71.82 : 103.92	84.58 70.61 : 106.16

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1606	QC 1638
Total Aromatics >EC12-EC35	TM173	90.67 68.32 : 103.07	84.0 67.75 : 104.04

Fluoride

Component	Method Code	QC 1618
Fluoride	TM104	98.0 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1691
Benzene by GC (Moisture Corrected)	TM089	102.0 79.14 : 118.69
Ethylbenzene by GC (Moisture Corrected)	TM089	105.0 76.65 : 121.92
m & p Xylene by GC (Moisture Corrected)	TM089	105.25 76.25 : 122.54
MTBE GC-FID (Moisture Corrected)	TM089	103.0 77.67 : 125.50
o Xylene by GC (Moisture Corrected)	TM089	105.0 76.37 : 122.94
QC	TM089	86.66 70.17 : 114.42
Toluene by GC (Moisture Corrected)	TM089	102.5 75.95 : 122.88

Hexavalent Chromium (s)



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Hexavalent Chromium (s)

Component	Method Code	QC 1666	QC 1685
Hexavalent Chromium	TM151	98.0 90.20 : 107.00	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1674
Hexavalent Chromium	TM241	97.2 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1669
Mercury Dissolved (CVAf)	TM183	97.3 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1612
Calcium	TM228	94.6 86.15 : 110.75
Iron	TM228	88.0 77.20 : 102.80
Magnesium	TM228	93.6 83.80 : 108.64
Potassium	TM228	91.9 85.58 : 109.10
Sodium	TM228	92.6 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1668
Aluminium	TM181	89.63 75.13 : 109.48
Antimony	TM181	100.77 84.48 : 110.90
Arsenic	TM181	96.92 83.14 : 108.73
Barium	TM181	92.97 77.47 : 102.53
Beryllium	TM181	95.89 84.19 : 106.77
Boron	TM181	89.27 76.55 : 106.69



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Metals in solid samples by OES

		QC 1668
Cadmium	TM181	98.94 86.37 : 111.59
Chromium	TM181	94.3 81.29 : 118.71
Cobalt	TM181	99.06 85.45 : 109.14
Copper	TM181	91.41 81.33 : 103.33
Iron	TM181	95.83 82.44 : 111.71
Lead	TM181	97.23 83.33 : 106.95
Manganese	TM181	92.73 80.56 : 102.33
Mercury	TM181	96.47 84.13 : 111.85
Molybdenum	TM181	96.53 84.19 : 110.39
Nickel	TM181	96.97 84.19 : 109.77
Phosphorus	TM181	93.71 73.47 : 116.86
Selenium	TM181	94.96 81.32 : 108.59
Strontium	TM181	95.35 84.70 : 105.87
Thallium	TM181	94.14 81.19 : 105.37
Tin	TM181	97.52 85.92 : 110.00
Titanium	TM181	86.92 73.44 : 113.17
Vanadium	TM181	89.88 81.86 : 105.26
Zinc	TM181	97.73 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1694	QC 1646
Acenaphthene	TM218	101.0 82.97 : 108.44	97.5 82.60 : 105.38
Acenaphthylene	TM218	98.5 77.27 : 104.05	95.5 73.64 : 111.66
Anthracene	TM218	96.5 78.18 : 102.20	92.5 80.33 : 100.35
Benz(a)anthracene	TM218	111.5 80.40 : 121.27	107.0 82.35 : 116.46
Benzo(a)pyrene	TM218	118.0 86.92 : 120.63	105.0 83.39 : 123.49
Benzo(b)fluoranthene	TM218	106.5 82.24 : 121.86	97.5 83.86 : 122.20
Benzo(ghi)perylene	TM218	100.5 83.49 : 115.72	94.0 83.13 : 118.94



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PAH by GCMS

		QC 1694	QC 1646
Benzo(k)fluoranthene	TM218	111.5 86.60 : 115.15	100.0 87.91 : 119.03
Chrysene	TM218	110.0 86.11 : 112.00	103.5 85.34 : 115.46
Dibenzo(ah)anthracene	TM218	112.5 83.84 : 116.37	104.5 82.98 : 121.47
Fluoranthene	TM218	100.5 81.23 : 104.94	94.5 82.03 : 107.26
Fluorene	TM218	104.5 83.68 : 108.62	101.0 81.48 : 108.26
Indeno(123cd)pyrene	TM218	113.0 83.72 : 116.90	104.5 84.02 : 120.55
Naphthalene	TM218	105.5 81.32 : 109.34	96.5 84.06 : 108.38
Phenanthrene	TM218	99.5 82.06 : 103.85	96.0 78.68 : 107.87
Pyrene	TM218	99.5 81.04 : 103.65	94.5 79.66 : 106.32

pH

Component	Method Code	QC 1617
pH	TM133	100.39 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1606
pH Value of Filtered Water	TM256	101.62 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1652
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	100.65 85.25 : 114.75
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	91.81 75.71 : 124.29
Catechol by HPLC (S)	TM062 (S)	54.29 64.10 : 135.90
Cresols by HPLC (S)	TM062 (S)	95.62 78.85 : 107.41
Napthol by HPLC (S)	TM062 (S)	110.0 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	105.96 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	145.91 86.85 : 145.65



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Phenols by HPLC (S)

		QC 1652
Xylenols by HPLC (S)	TM062 (S)	101.98 84.65 : 109.70

Phenols by ms (w)

Component	Method Code	QC 1665
2,3,4,6-tetrachlorophenol	TM205	92.88 61.39 : 121.01
2,4,5-trichlorophenol	TM205	97.0 68.35 : 126.10
2,4,6-trichlorophenol	TM205	95.0 63.79 : 126.64
2,4-dichlorophenol	TM205	95.0 65.30 : 128.60
2,4-dimethylphenol	TM205	101.13 57.50 : 131.00
2,6-dichlorophenol	TM205	95.25 63.93 : 129.85
2-chlorophenol	TM205	92.13 64.51 : 127.89
2-methylphenol	TM205	96.0 61.66 : 132.61
2-nitrophenol	TM205	91.75 58.88 : 126.38
3-methylphenol	TM205	96.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	100.13 73.70 : 129.95
4-methylphenol	TM205	96.38 67.13 : 130.58
4-nitrophenol	TM205	95.13 68.50 : 136.75
Pentachlorophenol	TM205	69.88 47.74 : 105.49
Phenol	TM205	94.0 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1605
Total Organic Carbon	TM132	103.2 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1624	QC 1666
Total Sulphur %	TM132	95.33 81.05 : 118.95	93.07 81.05 : 118.95



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VOC MS (S)

Component	Method Code	QC 1647	QC 1669
1,1,1,2-tetrachloroethane	TM116	105.6 77.56 : 115.55	100.6 79.10 : 119.66
1,1,1-Trichloroethane	TM116	105.4 74.97 : 113.76	101.8 80.76 : 117.81
1,1,2-Trichloroethane	TM116	99.4 77.12 : 116.04	97.4 75.16 : 112.70
1,1-Dichloroethane	TM116	111.2 74.46 : 129.15	107.6 77.84 : 124.12
1,2-Dichloroethane	TM116	115.6 82.41 : 125.49	105.0 86.58 : 129.62
1,4-Dichlorobenzene	TM116	111.0 72.76 : 126.34	113.0 71.61 : 124.63
2-Chlorotoluene	TM116	99.4 68.08 : 113.44	92.8 66.81 : 118.43
4-Chlorotoluene	TM116	96.2 63.64 : 113.30	90.6 65.88 : 114.76
Benzene	TM116	109.6 81.05 : 117.28	103.2 84.42 : 119.78
Carbon Disulphide	TM116	98.8 74.91 : 122.14	97.6 75.11 : 124.81
Carbontetrachloride	TM116	111.0 77.80 : 119.23	95.6 82.35 : 126.46
Chlorobenzene	TM116	106.6 75.00 : 115.53	101.8 82.88 : 122.42
Chloroform	TM116	111.2 77.34 : 121.84	103.6 82.52 : 123.25
Chloromethane	TM116	120.8 52.63 : 138.74	78.6 57.48 : 132.44
Cis-1,2-Dichloroethene	TM116	110.8 74.69 : 124.27	109.0 79.48 : 120.80
Dibromomethane	TM116	103.8 67.80 : 121.75	87.0 71.69 : 119.43
Dichloromethane	TM116	114.8 81.11 : 133.25	108.8 81.68 : 125.21
Ethylbenzene	TM116	101.0 72.53 : 109.84	104.2 80.09 : 119.91
Hexachlorobutadiene	TM116	106.0 23.60 : 154.69	130.0 9.27 : 160.19
Isopropylbenzene	TM116	96.6 54.46 : 125.44	97.2 52.15 : 132.52
Naphthalene	TM116	113.8 74.47 : 129.31	122.4 76.79 : 127.18
o-Xylene	TM116	94.4 67.46 : 102.22	91.2 71.75 : 103.66
p/m-Xylene	TM116	96.0 68.32 : 108.91	98.1 77.41 : 112.71
Sec-Butylbenzene	TM116	101.8 50.86 : 134.07	92.8 44.71 : 117.87
Tetrachloroethene	TM116	110.8 76.95 : 121.02	105.2 79.68 : 120.25
Toluene	TM116	99.4 74.24 : 107.42	99.0 82.00 : 116.10
Trichloroethene	TM116	106.6 77.61 : 111.54	96.6 79.80 : 112.33



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VOC MS (S)

		QC 1647	QC 1669
Trichlorofluoromethane	TM116	113.2 70.00 : 130.00	91.8 72.76 : 118.80
Vinyl Chloride	TM116	116.8 68.05 : 125.93	99.4 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

DRAFT



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Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Website: www.alsenvironmental.co.uk

Soil Engineering
Parkside Lane
Dewsbury Road
Leeds
West Yorkshire
LS11 5SX

Attention: Jon Duxbury

CERTIFICATE OF ANALYSIS

Date: 03 January 2018
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171119-11
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 438829

This report has been revised and directly supersedes 437725 in its entirety.

We received 3 samples on Thursday November 16, 2017 and 2 of these samples were scheduled for analysis which was completed on Wednesday January 03, 2018. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16591363	BH03	ES1	0.20	14/11/2017
16591364	BH03	ES2	0.50	14/11/2017
16591365	BH03	ES8	2.00	14/11/2017

Maximum Sample/Coolbox Temperature (°C) :

8.6

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		16591364		16591365	
	Customer Sample Reference		BH03		BH03	
	AGS Reference		ES2		ES8	
	Depth (m)		0.50		2.00	
	Container		1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	250g Amber Jar (ALE210)
	Sample Type		S	S	S	S
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1			X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X			X
Anions by Kone (w)	All	NDPs: 0 Tests: 1			X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2	X		X	
Asbestos Quantification - Full	All	NDPs: 0 Tests: 1	X			
CEN Readings	All	NDPs: 0 Tests: 1			X	
Chromium III	All	NDPs: 0 Tests: 3		X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3		X	X	X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1			X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1			X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 2		X		X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 2		X		X
Fluoride	All	NDPs: 0 Tests: 1			X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2		X		X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2	X			X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

16591364

16591365

BH03

BH03

ES2

ES8

0.50

2.00

60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB
60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB
60g VOC (ALE215)
250g Amber Jar
(ALE210)
1kg TUB

S S S S S S

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 1

X

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X

X

PAH by GCMS

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Phenols by ms (w)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 2

X

X

Sample description

All

NDPs: 0
Tests: 2

X

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

Total Sulphur

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16591364

16591365

Customer
Sample Reference

BH03

BH03

AGS Reference

ES2

ES8

Depth (m)

0.50

2.00

Container

1kg TUB

250g Amber Jar
(ALE210)

60g VOC (ALE215)

1kg TUB

250g Amber Jar
(ALE210)

60g VOC (ALE215)

60g VOC (ALE215)

Sample Type

S

S

S

S

S

S

S

VOC MS (S)

All

NDPs: 0
Tests: 2

X

X

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16591364	BH03	0.50	Dark Brown	Loamy Sand	Stones	Crushed Brick
16591365	BH03	2.00	Light Brown	Sandy Clay	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Results Legend		Customer Sample Ref.	BH03	BH03				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	8.1	18				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Cresols	<0.01 mg/kg	TM062 (S)	0.0218	<0.01				
			M	M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06	<0.06				
			M	M				
Sulphur, Total	<0.02 %	TM132	0.124	0.0507				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0132	0.00361				
			#	#				
pH	1 pH Units	TM133	11.5	11.5				
			M	M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6				
			#	#				
Cyanide, Free	<1 mg/kg	TM153	<1	<1				
			M	M				
Chromium, Trivalent	<0.9 mg/kg	TM181	8.45	1.71				
Antimony	<0.6 mg/kg	TM181	0.912	<0.6				
			#	#				
Arsenic	<0.6 mg/kg	TM181	5.98	6.5				
			M	M				
Barium	<0.6 mg/kg	TM181	113	83.7				
			#	#				
Beryllium	<0.01 mg/kg	TM181	0.673	0.766				
			M	M				
Boron	<0.7 mg/kg	TM181	8.04	2.53				
			#	#				
Cadmium	<0.02 mg/kg	TM181	1.81	0.0909				
			M	M				
Copper	<1.4 mg/kg	TM181	21.8	15.1				
			M	M				
Iron	<1000 mg/kg	TM181	18200	33300				
			#	#				
Lead	<0.7 mg/kg	TM181	64.8	15.9				
			M	M				
Manganese	<0.13 mg/kg	TM181	650	626				
			M	M				
Mercury	<0.14 mg/kg	TM181	0.409	0.402				
			M	M				
Molybdenum	<0.1 mg/kg	TM181	1.2	1.01				
			#	#				
Nickel	<0.2 mg/kg	TM181	13.3	11				
			M	M				
Selenium	<1 mg/kg	TM181	<1	<1				
			#	#				
Vanadium	<0.2 mg/kg	TM181	15.5	20.8				
			#	#				
Zinc	<1.9 mg/kg	TM181	254	38				
			M	M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.198	0.104				
			M	M				
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304	<0.001					
			#					
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304	<0.001					
			#					
Additional Asbestos Components (Using TM048)	-	TM304	None					
			#					



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA0866Report Number: 438829
Superseded Report: 437725

TPH CWG (S)

Results Legend		Customer Sample Ref.	BH03	BH03			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	0.50	2.00			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2017	14/11/2017			
*	Subcontracted test.	Sample Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	16/11/2017	16/11/2017			
(F)	Trigger breach confirmed	SDG Ref	171119-11	171119-11			
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16591364	16591365			
		AGS Reference	ES2	ES8			
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	76	97			
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	198	438			
			M	M			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5			
			#	#			
Benzene	<10 µg/kg	TM089	<10	<10			
			M	M			
Toluene	<2 µg/kg	TM089	5.44	13.4			
			M	M			
Ethylbenzene	<3 µg/kg	TM089	3.26	<3			
			M	M			
m,p-Xylene	<6 µg/kg	TM089	13.1	7.32			
			M	M			
o-Xylene	<3 µg/kg	TM089	6.53	4.88			
			M	M			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	19.6	12.2			
sum of detected BTEX by GC	<24 µg/kg	TM089	28.3	25.6			
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	36.6			
Aliphatics >C6-C8	<10 µg/kg	TM089	15.2	182			
Aliphatics >C8-C10	<10 µg/kg	TM089	31.6	63.4			
Aliphatics >C10-C12	<10 µg/kg	TM089	55.5	50			
Aliphatics >C12-C16	<100 µg/kg	TM173	2420	919			
Aliphatics >C16-C21	<100 µg/kg	TM173	8490	2240			
Aliphatics >C21-C35	<100 µg/kg	TM173	55700	9750			
Aliphatics >C35-C44	<100 µg/kg	TM173	21600	1240			
Total Aliphatics >C12-C44	<100 µg/kg	TM173	88200	14100			
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10			
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	13.4			
Aromatics >EC8-EC10	<10 µg/kg	TM089	43.5	58.6			
Aromatics >EC10-EC12	<10 µg/kg	TM089	37	34.2			
Aromatics >EC12-EC16	<100 µg/kg	TM173	8320	970			
Aromatics >EC16-EC21	<100 µg/kg	TM173	44500	6460			
Aromatics >EC21-EC35	<100 µg/kg	TM173	123000	17000			
Aromatics >EC35-EC44	<100 µg/kg	TM173	46300	3580			
Aromatics >EC40-EC44	<100 µg/kg	TM173	17400	1020			
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	222000	28000			
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	311000	42500			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

VOC MS (S)

Results Legend		Customer Sample Ref.	BH03	BH03				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.	Depth (m)	0.50	2.00				
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2017	14/11/2017				
*	Subcontracted test.	Sample Time						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	16/11/2017	16/11/2017				
(F)	Trigger breach confirmed	SDG Ref	171119-11	171119-11				
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16591364	16591365				
		AGS Reference	ES2	ES8				
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	111	104				
Toluene-D8	%	TM116	85.3	102				
4-bromofluorobenzene**	%	TM116	70.7	96.2				
Dichlorodifluoromethane	<6 µg/kg	TM116	<6	<60				
Chloromethane	<7 µg/kg	TM116	<7	<70				
Vinyl Chloride	<6 µg/kg	TM116	<6	<60				
Bromomethane	<10 µg/kg	TM116	<10	<100				
Chloroethane	<10 µg/kg	TM116	<10	<100				
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<60				
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<100				
Carbon Disulphide	<7 µg/kg	TM116	<7	<70				
Dichloromethane	<10 µg/kg	TM116	<10	<100				
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10	<100				
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10	<100				
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<80				
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6	<60				
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<100				
Bromochloromethane	<10 µg/kg	TM116	<10	<100				
Chloroform	<8 µg/kg	TM116	<8	<80				
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<70				
1,1-Dichloropropene	<10 µg/kg	TM116	<10	<100				
Carbontetrachloride	<10 µg/kg	TM116	<10	<100				
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<50				
Benzene	<9 µg/kg	TM116	<9	<90				
Trichloroethene	<9 µg/kg	TM116	<9	<90				
1,2-Dichloropropane	<10 µg/kg	TM116	<10	<100				
Dibromomethane	<9 µg/kg	TM116	<9	<90				
Bromodichloromethane	<7 µg/kg	TM116	<7	<70				
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<100				
Toluene	<7 µg/kg	TM116	<7	<70				
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<100				
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<100				
1,3-Dichloropropane	<7 µg/kg	TM116	<7	<70				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

VOC MS (S)

Results Legend		Customer Sample Ref.	BH03	BH03			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-5&*\$@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<5 µg/kg	TM116	<5	<50			
			M	M			
Dibromochloromethane	<10 µg/kg	TM116	<10	<100			
			M	M			
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Chlorobenzene	<5 µg/kg	TM116	<5	<50			
			M	M			
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<100			
			M	M			
Ethylbenzene	<4 µg/kg	TM116	<4	<40			
			M	M			
p/m-Xylene	<10 µg/kg	TM116	<10	<100			
			#	#			
o-Xylene	<10 µg/kg	TM116	<10	<100			
			M	M			
Styrene	<10 µg/kg	TM116	<10	<100			
			#	#			
Bromoform	<10 µg/kg	TM116	<10	<100			
			M	M			
Isopropylbenzene	<5 µg/kg	TM116	<5	<50			
			#	#			
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<100			
			#	#			
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<160			
			M	M			
Bromobenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
Propylbenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
2-Chlorotoluene	<9 µg/kg	TM116	<9	<90			
			M	M			
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<80			
			M	M			
4-Chlorotoluene	<10 µg/kg	TM116	<10	<100			
			M	M			
tert-Butylbenzene	<14 µg/kg	TM116	<14	<140			
			M	M			
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<90			
			#	#			
sec-Butylbenzene	<10 µg/kg	TM116	<10	<100			
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<100			
			M	M			
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<80			
			M	M			
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<50			
			M	M			
n-Butylbenzene	<11 µg/kg	TM116	<11	<110			
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<100			
			M	M			
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<140			
			M	M			
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<100			
			#	#			
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<200			
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<200			
Naphthalene	<13 µg/kg	TM116	337	<130			
			M	M			
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<200			
			#	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 2 0.50 SOLID 14/11/2017 00:00:00 23/11/2017 15:31:11 171119-11 16591364 TM048	19/12/2017	Neville Mann	Loose fibres in soil	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 8 2.00 SOLID 14/11/2017 00:00:00 23/11/2017 15:28:56 171119-11 16591365 TM048	19/12/2017	Neville Mann	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG:	171119-11	Client Reference:	TA8066	Report Number:	438829
Location:	Glassworks Barnsley	Order Number:	TA0866	Superseded Report:	437725

Asbestos Quantification - Full

		Additional Asbestos Components (Using TM048)	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM Evaluation - %	Asbestos Quantification - Total - %
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH03 ES 2 0.50 SOLID 14/11/2017 00:00:00 27/12/2017 08:48:25 171119-11 16591364 TM304	None (#)	N/A	<0.001 (#)	<0.001 (#)	<0.001 (#)

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.234

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 33.9

Dry Matter Content (%) 74.7

Case

SDG 171119-11

Lab Sample Number(s) 16591365

Sampled Date 14-Nov-2017

Customer Sample Ref. BH03 ES8

Depth (m) 2.00

Solid Waste Analysis

Total Organic Carbon (%) 0.361

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0256

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.5

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00494	<0.0005	0.00988	<0.001	0.5	2	25
Barium	0.0168	<0.0002	0.0336	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.0135	<0.0003	0.027	<0.0006	2	50	100
Mercury Dissolved (CVAf)	0.0000104	<0.00001	0.0000208	<0.00002	0.01	0.2	2
Molybdenum	0.0788	<0.0005	0.158	<0.001	0.5	10	30
Nickel	0.00169	<0.0004	0.00338	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.0101	<0.0005	0.0202	<0.001	0.1	0.5	7
Zinc	<0.001	<0.001	<0.002	<0.002	4	50	200
Chloride	15.3	<2	30.6	<4	800	15000	25000
Fluoride	1.34	<0.5	2.68	<1	10	150	500
Sulphate (soluble)	154	<2	308	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	44.8	<3	89.6	<6	500	800	1000

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 9.14

Conductivity (µS/cm) 437.00

Temperature (°C) 19.70

Volume Leachant (Litres) 0.291

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

03/01/2018 16:43:05

16:42:56 03/01/2018



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.234

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 33.9

Dry Matter Content (%) 74.7

Case

SDG 171119-11

Lab Sample Number(s) 16591365

Sampled Date 14-Nov-2017

Customer Sample Ref. BH03 ES8

Depth (m) 2.00

Solid Waste Analysis

Total Organic Carbon (%) 0.361

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0256

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 11.5

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.3	<0.001	19	<0.002	-	-	-	-
Calcium	75.6	<0.012	151	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
Phenol by HPLC (W)	0.00197	<0.0005	0.00394	<0.001	-	-	-	-
2-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	0.0601	<0.036	0.12	<0.072	-	-	-	-
3-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	0.135	<0.019	0.27	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.026	<0.005	0.052	<0.01	-	-	-	-
Hardness Total	189	<1	378	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 23-Nov-2017

pH (pH Units) 9.14

Conductivity (µS/cm) 437.00

Temperature (°C) 19.70

Volume Leachant (Litres) 0.291

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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16:42:56 03/01/2018



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	Glassworks Barnsley
Mass Sample taken (kg)	0.234	Natural Moisture Content (%)	33.9
Mass of dry sample (kg)	0.175	Dry Matter Content (%)	74.7
Particle Size <4mm	>95%		

Case

SDG	171119-11
Lab Sample Number(s)	16591365
Sampled Date	14-Nov-2017
Customer Sample Ref.	BH03 ES8
Depth (m)	2.00

Solid Waste Analysis

Total Organic Carbon (%)	0.361
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	0.0256
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	11.5
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,6-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	0.00197	<0.00064	0.00394	<0.00128	-	-	-
4-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,6-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,5-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,3,5,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Manganese	0.001	<0.001	0.002	<0.002	-	-	-
2,3,4,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-Dinitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-
DNOC	<0.006	<0.006	<0.012	<0.012	-	-	-
Pentachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-
Vanadium	<0.001	<0.001	<0.002	<0.002	-	-	-

Leach Test Information

Date Prepared	23-Nov-2017
pH (pH Units)	9.14
Conductivity (µS/cm)	437.00
Temperature (°C)	19.70
Volume Leachant (Litres)	0.291
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
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03/01/2018 16:43:05

16:42:56 03/01/2018



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11 Client Reference: TA8066 Report Number: 438829
Location: Glassworks Barnsley Order Number: TA0866 Superseded Report: 437725

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

Test Completion Dates

Lab Sample No(s)	16591364	16591365
Customer Sample Ref.	BH03	BH03
AGS Ref.	ES2	ES8
Depth	0.50	2.00
Type	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen		27-Nov-2017
Anions by Kone (soil)	27-Nov-2017	27-Nov-2017
Anions by Kone (w)		25-Nov-2017
Asbestos ID in Solid Samples	19-Dec-2017	19-Dec-2017
Asbestos Quantification - Full	03-Jan-2018	
CEN 2:1 Leachate (1 Stage)		23-Nov-2017
CEN Readings		25-Nov-2017
Chromium III	28-Nov-2017	28-Nov-2017
Cyanide Comp/Free/Total/Thiocyanate	27-Nov-2017	28-Nov-2017
Dissolved Metals by ICP-MS		27-Nov-2017
Dissolved Organic/Inorganic Carbon		27-Nov-2017
EPH CWG (Aliphatic) GC (S)	27-Nov-2017	24-Nov-2017
EPH CWG (Aromatic) GC (S)	27-Nov-2017	24-Nov-2017
Fluoride		25-Nov-2017
GRO by GC-FID (S)	24-Nov-2017	24-Nov-2017
Hexavalent Chromium (s)	27-Nov-2017	27-Nov-2017
Hexavalent Chromium (w)		27-Nov-2017
Low Level Phenols by HPLC (W)		27-Nov-2017
Mercury Dissolved		27-Nov-2017
Metals by iCap-OES Dissolved (W)		27-Nov-2017
Metals in solid samples by OES	29-Nov-2017	29-Nov-2017
PAH by GCMS	27-Nov-2017	24-Nov-2017
pH	24-Nov-2017	24-Nov-2017
pH Value of Filtered Water		27-Nov-2017
Phenols by HPLC (S)	27-Nov-2017	27-Nov-2017
Phenols by ms (w)		29-Nov-2017
Phenols Spec MS (S)	27-Nov-2017	27-Nov-2017
Sample description	23-Nov-2017	23-Nov-2017
Total Organic Carbon	27-Nov-2017	27-Nov-2017
Total Sulphur	27-Nov-2017	24-Nov-2017
TPH CWG GC (S)	27-Nov-2017	24-Nov-2017
VOC MS (S)	24-Nov-2017	27-Nov-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA0866

Report Number: 438829
Superseded Report: 437725

ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1644
Ammoniacal Nitrogen as N	TM099	105.2 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1620	QC 1624
Chloride (soluble)	TM243	62.86 89.30 : 110.70	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	55.68 70.45 : 129.55	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1600
Chloride	TM184	109.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	106.0 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1678	QC 1629	QC 1661
Free Cyanide	TM153	95.6 84.60 : 110.40	93.9 84.60 : 110.40	
Free Cyanide (W)	TM227			100.5 93.25 : 112.75
Thiocyanate	TM153	92.22 83.02 : 103.47	92.22 83.02 : 103.47	
Thiocyanate (W)	TM227			101.75 97.75 : 109.75
Total Cyanide	TM153	101.43 87.53 : 111.13	98.57 87.53 : 111.13	
Total Cyanide (W)	TM227			102.75 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1686
Aluminium	TM152	109.0 90.09 : 112.69
Antimony	TM152	106.17 81.00 : 119.70
Arsenic	TM152	106.0 92.40 : 113.00



CERTIFICATE OF ANALYSIS

Validated

SDG: 171119-11
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA0866Report Number: 438829
Superseded Report: 437725

Dissolved Metals by ICP-MS

		QC 1686
Barium	TM152	102.67 93.11 : 112.81
Beryllium	TM152	111.33 88.27 : 113.27
Bismuth	TM152	114.0 86.72 : 115.61
Boron	TM152	111.33 86.47 : 111.70
Cadmium	TM152	107.0 90.28 : 114.48
Chromium	TM152	108.67 91.07 : 114.29
Cobalt	TM152	108.5 89.58 : 114.68
Copper	TM152	107.5 88.45 : 117.93
Lead	TM152	111.83 89.25 : 115.12
Lithium	TM152	110.67 88.50 : 116.05
Manganese	TM152	108.33 91.63 : 112.33
Molybdenum	TM152	104.5 91.08 : 111.63
Nickel	TM152	108.83 89.60 : 117.38
Niobium	TM152	108.83 96.38 : 128.85
Phosphorus	TM152	109.67 90.43 : 111.75
Selenium	TM152	102.83 88.13 : 108.33
Silver	TM152	97.67 90.04 : 97.49
Strontium	TM152	100.33 91.27 : 106.32
Tellurium	TM152	106.17 81.16 : 111.23
Thallium	TM152	103.5 81.70 : 117.09
Titanium	TM152	110.33 89.62 : 110.62
Tungsten	TM152	107.83 90.13 : 111.33
Uranium	TM152	114.0 92.30 : 116.90
Vanadium	TM152	107.0 88.22 : 118.55
Zinc	TM152	106.0 89.30 : 115.44
Zirconium	TM152	106.0 85.51 : 109.42

Dissolved Organic/Inorganic Carbon



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Client Reference: TA8066
Order Number: TA0866

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Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1649
Dissolved Inorganic Carbon	TM090	100.83 91.15 : 111.35
Dissolved Organic Carbon	TM090	102.0 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1606	QC 1638
Total Aliphatics >C12-C35	TM173	85.83 71.82 : 103.92	84.58 70.61 : 106.16

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1606	QC 1638
Total Aromatics >EC12-EC35	TM173	90.67 68.32 : 103.07	84.0 67.75 : 104.04

Fluoride

Component	Method Code	QC 1618
Fluoride	TM104	98.0 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1691
Benzene by GC (Moisture Corrected)	TM089	102.0 79.14 : 118.69
Ethylbenzene by GC (Moisture Corrected)	TM089	105.0 76.65 : 121.92
m & p Xylene by GC (Moisture Corrected)	TM089	105.25 76.25 : 122.54
MTBE GC-FID (Moisture Corrected)	TM089	103.0 77.67 : 125.50
o Xylene by GC (Moisture Corrected)	TM089	105.0 76.37 : 122.94
QC	TM089	86.66 70.17 : 114.42
Toluene by GC (Moisture Corrected)	TM089	102.5 75.95 : 122.88

Hexavalent Chromium (s)



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Hexavalent Chromium (s)

Component	Method Code	QC 1666	QC 1685
Hexavalent Chromium	TM151	98.0 90.20 : 107.00	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1674
Hexavalent Chromium	TM241	97.2 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1669
Mercury Dissolved (CVAf)	TM183	97.3 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1612
Calcium	TM228	94.6 86.15 : 110.75
Iron	TM228	88.0 77.20 : 102.80
Magnesium	TM228	93.6 83.80 : 108.64
Potassium	TM228	91.9 85.58 : 109.10
Sodium	TM228	92.6 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1668
Aluminium	TM181	89.63 75.13 : 109.48
Antimony	TM181	100.77 84.48 : 110.90
Arsenic	TM181	96.92 83.14 : 108.73
Barium	TM181	92.97 77.47 : 102.53
Beryllium	TM181	95.89 84.19 : 106.77
Boron	TM181	89.27 76.55 : 106.69



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Metals in solid samples by OES

		QC 1668
Cadmium	TM181	98.94 86.37 : 111.59
Chromium	TM181	94.3 81.29 : 118.71
Cobalt	TM181	99.06 85.45 : 109.14
Copper	TM181	91.41 81.33 : 103.33
Iron	TM181	95.83 82.44 : 111.71
Lead	TM181	97.23 83.33 : 106.95
Manganese	TM181	92.73 80.56 : 102.33
Mercury	TM181	96.47 84.13 : 111.85
Molybdenum	TM181	96.53 84.19 : 110.39
Nickel	TM181	96.97 84.19 : 109.77
Phosphorus	TM181	93.71 73.47 : 116.86
Selenium	TM181	94.96 81.32 : 108.59
Strontium	TM181	95.35 84.70 : 105.87
Thallium	TM181	94.14 81.19 : 105.37
Tin	TM181	97.52 85.92 : 110.00
Titanium	TM181	86.92 73.44 : 113.17
Vanadium	TM181	89.88 81.86 : 105.26
Zinc	TM181	97.73 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1694	QC 1646
Acenaphthene	TM218	101.0 82.97 : 108.44	97.5 82.60 : 105.38
Acenaphthylene	TM218	98.5 77.27 : 104.05	95.5 73.64 : 111.66
Anthracene	TM218	96.5 78.18 : 102.20	92.5 80.33 : 100.35
Benz(a)anthracene	TM218	111.5 80.40 : 121.27	107.0 82.35 : 116.46
Benzo(a)pyrene	TM218	118.0 86.92 : 120.63	105.0 83.39 : 123.49
Benzo(b)fluoranthene	TM218	106.5 82.24 : 121.86	97.5 83.86 : 122.20
Benzo(ghi)perylene	TM218	100.5 83.49 : 115.72	94.0 83.13 : 118.94



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PAH by GCMS

		QC 1694	QC 1646
Benzo(k)fluoranthene	TM218	111.5 86.60 : 115.15	100.0 87.91 : 119.03
Chrysene	TM218	110.0 86.11 : 112.00	103.5 85.34 : 115.46
Dibenzo(ah)anthracene	TM218	112.5 83.84 : 116.37	104.5 82.98 : 121.47
Fluoranthene	TM218	100.5 81.23 : 104.94	94.5 82.03 : 107.26
Fluorene	TM218	104.5 83.68 : 108.62	101.0 81.48 : 108.26
Indeno(123cd)pyrene	TM218	113.0 83.72 : 116.90	104.5 84.02 : 120.55
Naphthalene	TM218	105.5 81.32 : 109.34	96.5 84.06 : 108.38
Phenanthrene	TM218	99.5 82.06 : 103.85	96.0 78.68 : 107.87
Pyrene	TM218	99.5 81.04 : 103.65	94.5 79.66 : 106.32

pH

Component	Method Code	QC 1617
pH	TM133	100.39 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1606
pH Value of Filtered Water	TM256	101.62 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1652
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	100.65 85.25 : 114.75
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	91.81 75.71 : 124.29
Catechol by HPLC (S)	TM062 (S)	54.29 64.10 : 135.90
Cresols by HPLC (S)	TM062 (S)	95.62 78.85 : 107.41
Napthol by HPLC (S)	TM062 (S)	110.0 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	105.96 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	145.91 86.85 : 145.65



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Phenols by HPLC (S)

		QC 1652
Xylenols by HPLC (S)	TM062 (S)	101.98 84.65 : 109.70

Phenols by ms (w)

Component	Method Code	QC 1665
2,3,4,6-tetrachlorophenol	TM205	92.88 61.39 : 121.01
2,4,5-trichlorophenol	TM205	97.0 68.35 : 126.10
2,4,6-trichlorophenol	TM205	95.0 63.79 : 126.64
2,4-dichlorophenol	TM205	95.0 65.30 : 128.60
2,4-dimethylphenol	TM205	101.13 57.50 : 131.00
2,6-dichlorophenol	TM205	95.25 63.93 : 129.85
2-chlorophenol	TM205	92.13 64.51 : 127.89
2-methylphenol	TM205	96.0 61.66 : 132.61
2-nitrophenol	TM205	91.75 58.88 : 126.38
3-methylphenol	TM205	96.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	100.13 73.70 : 129.95
4-methylphenol	TM205	96.38 67.13 : 130.58
4-nitrophenol	TM205	95.13 68.50 : 136.75
Pentachlorophenol	TM205	69.88 47.74 : 105.49
Phenol	TM205	94.0 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1605
Total Organic Carbon	TM132	103.2 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1624	QC 1666
Total Sulphur %	TM132	95.33 81.05 : 118.95	93.07 81.05 : 118.95



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VOC MS (S)

Component	Method Code	QC 1647	QC 1669
1,1,1,2-tetrachloroethane	TM116	105.6 77.56 : 115.55	100.6 79.10 : 119.66
1,1,1-Trichloroethane	TM116	105.4 74.97 : 113.76	101.8 80.76 : 117.81
1,1,2-Trichloroethane	TM116	99.4 77.12 : 116.04	97.4 75.16 : 112.70
1,1-Dichloroethane	TM116	111.2 74.46 : 129.15	107.6 77.84 : 124.12
1,2-Dichloroethane	TM116	115.6 82.41 : 125.49	105.0 86.58 : 129.62
1,4-Dichlorobenzene	TM116	111.0 72.76 : 126.34	113.0 71.61 : 124.63
2-Chlorotoluene	TM116	99.4 68.08 : 113.44	92.8 66.81 : 118.43
4-Chlorotoluene	TM116	96.2 63.64 : 113.30	90.6 65.88 : 114.76
Benzene	TM116	109.6 81.05 : 117.28	103.2 84.42 : 119.78
Carbon Disulphide	TM116	98.8 74.91 : 122.14	97.6 75.11 : 124.81
Carbontetrachloride	TM116	111.0 77.80 : 119.23	95.6 82.35 : 126.46
Chlorobenzene	TM116	106.6 75.00 : 115.53	101.8 82.88 : 122.42
Chloroform	TM116	111.2 77.34 : 121.84	103.6 82.52 : 123.25
Chloromethane	TM116	120.8 52.63 : 138.74	78.6 57.48 : 132.44
Cis-1,2-Dichloroethene	TM116	110.8 74.69 : 124.27	109.0 79.48 : 120.80
Dibromomethane	TM116	103.8 67.80 : 121.75	87.0 71.69 : 119.43
Dichloromethane	TM116	114.8 81.11 : 133.25	108.8 81.68 : 125.21
Ethylbenzene	TM116	101.0 72.53 : 109.84	104.2 80.09 : 119.91
Hexachlorobutadiene	TM116	106.0 23.60 : 154.69	130.0 9.27 : 160.19
Isopropylbenzene	TM116	96.6 54.46 : 125.44	97.2 52.15 : 132.52
Naphthalene	TM116	113.8 74.47 : 129.31	122.4 76.79 : 127.18
o-Xylene	TM116	94.4 67.46 : 102.22	91.2 71.75 : 103.66
p/m-Xylene	TM116	96.0 68.32 : 108.91	98.1 77.41 : 112.71
Sec-Butylbenzene	TM116	101.8 50.86 : 134.07	92.8 44.71 : 117.87
Tetrachloroethene	TM116	110.8 76.95 : 121.02	105.2 79.68 : 120.25
Toluene	TM116	99.4 74.24 : 107.42	99.0 82.00 : 116.10
Trichloroethene	TM116	106.6 77.61 : 111.54	96.6 79.80 : 112.33



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Client Reference: TA8066
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VOC MS (S)

		QC 1647	QC 1669
Trichlorofluoromethane	TM116	113.2 70.00 : 130.00	91.8 72.76 : 118.80
Vinyl Chloride	TM116	116.8 68.05 : 125.93	99.4 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

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CERTIFICATE OF ANALYSIS

SDG:	171119-11	Client Reference:	TA8066	Report Number:	438829
Location:	Glassworks Barnsley	Order Number:	TA0866	Superseded Report:	437725

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Soil Engineering
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LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 07 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171121-122
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 435826

We received 6 samples on Saturday November 18, 2017 and 2 of these samples were scheduled for analysis which was completed on Thursday December 07, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16601547	WS03	ES1	0.20	16/11/2017
16601548	WS03	ES2	0.50	16/11/2017
16601549	WS03	ES5	1.00	16/11/2017
16601544	WS12	ES1	0.20	16/11/2017
16601545	WS12	ES2	0.50	16/11/2017
16601546	WS12	ES3	1.00	16/11/2017

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

5.4

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		16601549	16601545
	Customer Sample Reference		WS03	WS12
	AGS Reference		ES5	ES2
	Depth (m)		1.00	0.50
	Container		250g Amber Jar (ALE210)	60g VOC (ALE215)
	Sample Type		S	S
			S	S
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1		X
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 1		X
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2	X	X
CEN Readings	All	NDPs: 0 Tests: 1		X
Chromium III	All	NDPs: 0 Tests: 3	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3	X	X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		X
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 1		X
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 2	X	X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 2	X	X
Fluoride	All	NDPs: 0 Tests: 1		X
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2	X	X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2	X	X
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 1		X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X

X

PAH by GCMS

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Phenols by ms (w)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 2

X

X

Sample description

All

NDPs: 0
Tests: 2

X

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

Total Sulphur

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 2

X

X

VOC MS (S)

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16601549	WS03	1.00	Dark Brown	Sand	Stones	None
16601545	WS12	0.50	Light Brown	Sand	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Results Legend		Customer Sample Ref.	WS03	WS12				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	3.6	5.1				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M				
Cresols	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015 M	<0.015 M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01 M	<0.01 M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015 M	<0.015 M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06 M	<0.06 M				
Sulphur, Total	<0.02 %	TM132	0.0499	0.0444				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	<0.002 #	0.00568 #				
pH	1 pH Units	TM133	11.8 M	9.74 M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #	<0.6 #				
Cyanide, Free	<1 mg/kg	TM153	<1 & M	<1 & M				
Chromium, Trivalent	<0.9 mg/kg	TM181	2.54	1.79				
Antimony	<0.6 mg/kg	TM181	<0.6 #	<0.6 #				
Arsenic	<0.6 mg/kg	TM181	1.46 M	<0.6 M				
Barium	<0.6 mg/kg	TM181	53.4 #	10.1 #				
Beryllium	<0.01 mg/kg	TM181	0.327 M	0.0568 M				
Boron	<0.7 mg/kg	TM181	7.84 #	5.27 #				
Cadmium	<0.02 mg/kg	TM181	0.193 M	0.568 M				
Copper	<1.4 mg/kg	TM181	6.47 M	6.32 M				
Iron	<1000 mg/kg	TM181	8980 #	2490 #				
Lead	<0.7 mg/kg	TM181	5.67 M	11.4 M				
Manganese	<0.13 mg/kg	TM181	248 M	491 M				
Mercury	<0.14 mg/kg	TM181	0.32 M	0.294 M				
Molybdenum	<0.1 mg/kg	TM181	0.645 #	0.147 #				
Nickel	<0.2 mg/kg	TM181	8.28 M	1.75 M				
Selenium	<1 mg/kg	TM181	<1 #	<1 #				
Vanadium	<0.2 mg/kg	TM181	8.17 #	2.43 #				
Zinc	<1.9 mg/kg	TM181	24.6 M	82 M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0371 M	0.0136 M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS03	WS12				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.		1.00	0.50				
diss.filt	Dissolved / filtered sample.		Soil/Solid (S)	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.		16/11/2017	16/11/2017				
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		18/11/2017	18/11/2017				
(F)	Trigger breach confirmed		171121-122	171121-122				
1-5&*\$@	Sample deviation (see appendix)		16601549	16601545				
			ES5	ES2				
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	80	45				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44	<44				
			M	M				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5				
			#	#				
Benzene	<10 µg/kg	TM089	<10	<10				
			M	M				
Toluene	<2 µg/kg	TM089	<2	<2				
			M	M				
Ethylbenzene	<3 µg/kg	TM089	<3	<3				
			M	M				
m,p-Xylene	<6 µg/kg	TM089	<6	<6				
			M	M				
o-Xylene	<3 µg/kg	TM089	<3	<3				
			M	M				
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9	<9				
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	<24				
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	<10				
Aliphatics >C6-C8	<10 µg/kg	TM089	<10	<10				
Aliphatics >C8-C10	<10 µg/kg	TM089	<10	<10				
Aliphatics >C10-C12	<10 µg/kg	TM089	<10	<10				
Aliphatics >C12-C16	<100 µg/kg	TM173	982	<100				
Aliphatics >C16-C21	<100 µg/kg	TM173	5000	907				
Aliphatics >C21-C35	<100 µg/kg	TM173	9650	23300				
Aliphatics >C35-C44	<100 µg/kg	TM173	10500	75800				
Total Aliphatics >C12-C44	<100 µg/kg	TM173	26200	100000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	<10	<10				
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10	<10				
Aromatics >EC12-EC16	<100 µg/kg	TM173	127	<100				
Aromatics >EC16-EC21	<100 µg/kg	TM173	1390	2790				
Aromatics >EC21-EC35	<100 µg/kg	TM173	7720	46500				
Aromatics >EC35-EC44	<100 µg/kg	TM173	21800	133000				
Aromatics >EC40-EC44	<100 µg/kg	TM173	12500	66900				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	31100	182000				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	57200	282000				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS03	WS12				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	101	109				
Toluene-D8	%	TM116	100	85.8				
4-bromofluorobenzene**	%	TM116	100	75				
Dichlorodifluoromethane	<6 µg/kg	TM116	<6	<6				
Chloromethane	<7 µg/kg	TM116	<7	<7				
Vinyl Chloride	<6 µg/kg	TM116	<6	<6				
Bromomethane	<10 µg/kg	TM116	<10	<10				
Chloroethane	<10 µg/kg	TM116	<10	<10				
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<6				
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<10				
Carbon Disulphide	<7 µg/kg	TM116	<7	<7				
Dichloromethane	<10 µg/kg	TM116	20.4	16.1				
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10	<10				
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10	<10				
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<8				
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6	<6				
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<10				
Bromochloromethane	<10 µg/kg	TM116	<10	<10				
Chloroform	<8 µg/kg	TM116	<8	<8				
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<7				
1,1-Dichloropropene	<10 µg/kg	TM116	<10	<10				
Carbontetrachloride	<10 µg/kg	TM116	<10	<10				
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<5				
Benzene	<9 µg/kg	TM116	<9	<9				
Trichloroethene	<9 µg/kg	TM116	<9	<9				
1,2-Dichloropropane	<10 µg/kg	TM116	<10	<10				
Dibromomethane	<9 µg/kg	TM116	<9	<9				
Bromodichloromethane	<7 µg/kg	TM116	<7	<7				
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10				
Toluene	<7 µg/kg	TM116	<7	<7				
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10				
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<10				
1,3-Dichloropropane	<7 µg/kg	TM116	<7	<7				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS03	WS12				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00	0.50				
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)				
aq	Aqueous / settled sample.		16/11/2017	16/11/2017				
diss.filt	Dissolved / filtered sample.		.	.				
tot.unfilt	Total / unfiltered sample.		18/11/2017	18/11/2017				
*	Subcontracted test.		171121-122	171121-122				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16601549	16601545				
(F)	Trigger breach confirmed		ES5	ES2				
1-5&5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Tetrachloroethene	<5 µg/kg	TM116	<5	<5				
			M	M				
Dibromochloromethane	<10 µg/kg	TM116	<10	<10				
			M	M				
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<10				
			M	M				
Chlorobenzene	<5 µg/kg	TM116	<5	<5				
			M	M				
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10				
			M	M				
Ethylbenzene	<4 µg/kg	TM116	<4	<4				
			M	M				
p/m-Xylene	<10 µg/kg	TM116	<10	<10				
			#	#				
o-Xylene	<10 µg/kg	TM116	<10	<10				
			M	M				
Styrene	<10 µg/kg	TM116	<10	<10				
			#	#				
Bromoform	<10 µg/kg	TM116	<10	<10				
			M	M				
Isopropylbenzene	<5 µg/kg	TM116	<5	<5				
			#	#				
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10				
			#	#				
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<16				
			M	M				
Bromobenzene	<10 µg/kg	TM116	<10	<10				
			M	M				
Propylbenzene	<10 µg/kg	TM116	<10	<10				
			M	M				
2-Chlorotoluene	<9 µg/kg	TM116	<9	<9				
			M	M				
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<8				
			M	M				
4-Chlorotoluene	<10 µg/kg	TM116	<10	<10				
			M	M				
tert-Butylbenzene	<14 µg/kg	TM116	<14	<14				
			M	M				
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<9				
			#	#				
sec-Butylbenzene	<10 µg/kg	TM116	<10	<10				
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<10				
			M	M				
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<8				
			M	M				
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<5				
			M	M				
n-Butylbenzene	<11 µg/kg	TM116	<11	<11				
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<10				
			M	M				
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<14				
			M	M				
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<10				
			#	#				
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<20				
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<20				
Naphthalene	<13 µg/kg	TM116	<13	<13				
			M	M				
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<20				
			#	#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS03 ES 5 1.00 SOLID 16/11/2017 00:00:00 25/11/2017 10:57:31 171121-122 16601549 TM048	04/12/2017	Eva Guerra	n	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS12 ES 2 0.50 SOLID 16/11/2017 00:00:00 26/11/2017 15:20:27 171121-122 16601545 TM048	04/12/2017	Eva Guerra	n	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.184

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 5.37

Dry Matter Content (%) 94.9

Case

SDG 171121-122

Lab Sample Number(s) 16601545

Sampled Date 16-Nov-2017

Customer Sample Ref. WS12 ES2

Depth (m) 0.50

Solid Waste Analysis

Total Organic Carbon (%) 0.568

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.74

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00439	<0.0005	0.00878	<0.001	0.5	2	25
Barium	0.0141	<0.0002	0.0282	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.0035	<0.0003	0.007	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.006	<0.0005	0.012	<0.001	0.5	10	30
Nickel	0.00045	<0.0004	0.0009	<0.0008	0.4	10	40
Lead	0.000313	<0.0002	0.000626	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.000615	<0.0005	0.00123	<0.001	0.1	0.5	7
Zinc	0.00232	<0.001	0.00464	<0.002	4	50	200
Chloride	33.6	<2	67.2	<4	800	15000	25000
Fluoride	0.611	<0.5	1.22	<1	10	150	500
Sulphate (soluble)	22.2	<2	44.4	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	8.45	<3	16.9	<6	500	800	1000

Leach Test Information

Date Prepared 30-Nov-2017

pH (pH Units) 9.62

Conductivity (µS/cm) 278.00

Temperature (°C) 19.50

Volume Leachant (Litres) 0.341

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

07/12/2017 10:02:00

10:01:29 07/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.184

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 5.37

Dry Matter Content (%) 94.9

Case

SDG 171121-122

Lab Sample Number(s) 16601545

Sampled Date 16-Nov-2017

Customer Sample Ref. WS12 ES2

Depth (m) 0.50

Solid Waste Analysis

Total Organic Carbon (%) 0.568

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.74

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.9	<0.001	20	<0.002	-	-	-	-
Calcium	4.23	<0.012	8.46	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.0055	<0.0055	<0.011	<0.011	-	-	-	-
Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	3.67	<0.036	7.34	<0.072	-	-	-	-
3-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	0.0288	<0.019	0.0576	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.0681	<0.005	0.136	<0.01	-	-	-	-
Hardness Total	25.7	<1	51.4	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 30-Nov-2017

pH (pH Units) 9.62

Conductivity (µS/cm) 278.00

Temperature (°C) 19.50

Volume Leachant (Litres) 0.341

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

07/12/2017 10:02:00

10:01:29 07/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.184

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 5.37

Dry Matter Content (%) 94.9

Case

SDG 171121-122

Lab Sample Number(s) 16601545

Sampled Date 16-Nov-2017

Customer Sample Ref. WS12 ES2

Depth (m) 0.50

Solid Waste Analysis

Total Organic Carbon (%) 0.568

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.74

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,6-dichlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	<0.00064	<0.00064	<0.00128	<0.00128	-	-	-
4-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-dichlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
2-nitrophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
2,4,6-trichlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
2,4,5-trichlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
4-nitrophenol	<0.0015	<0.0015	<0.003	<0.003	-	-	-
2,3,5,6-tetrachlorophenol	<0.003	<0.003	<0.006	<0.006	-	-	-
Manganese	0.0034	<0.001	0.0068	<0.002	-	-	-
2,3,4,6-tetrachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-
2,4-Dinitrophenol	<0.01	<0.01	<0.02	<0.02	-	-	-
DNOC	<0.009	<0.009	<0.018	<0.018	-	-	-
Pentachlorophenol	<0.004	<0.004	<0.008	<0.008	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-
Vanadium	0.0141	<0.001	0.0282	<0.002	-	-	-

Leach Test Information

Date Prepared 30-Nov-2017

pH (pH Units) 9.62

Conductivity (µS/cm) 278.00

Temperature (°C) 19.50

Volume Leachant (Litres) 0.341

Volume of Eluate VE1 (Litres)

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Order Number: TA8066

Report Number: 435826
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990/BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16601549	16601545
Customer Sample Ref.	WS03	WS12
AGS Ref.	ES5	ES2
Depth	1.00	0.50
Type	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen		02-Dec-2017
Anions by Kone (soil)	02-Dec-2017	02-Dec-2017
Anions by Kone (w)		04-Dec-2017
Asbestos ID in Solid Samples	04-Dec-2017	04-Dec-2017
CEN 2:1 Leachate (1 Stage)		30-Nov-2017
CEN Readings		01-Dec-2017
Chromium III	04-Dec-2017	04-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate		04-Dec-2017
Dissolved Metals by ICP-MS		04-Dec-2017
Dissolved Organic/Inorganic Carbon		04-Dec-2017
EPH CWG (Aliphatic) GC (S)	30-Nov-2017	30-Nov-2017
EPH CWG (Aromatic) GC (S)	30-Nov-2017	30-Nov-2017
Fluoride		02-Dec-2017
GRO by GC-FID (S)	01-Dec-2017	01-Dec-2017
Hexavalent Chromium (s)	04-Dec-2017	04-Dec-2017
Hexavalent Chromium (w)		04-Dec-2017
Low Level Phenols by HPLC (W)		05-Dec-2017
Mercury Dissolved		04-Dec-2017
Metals by iCap-OES Dissolved (W)		06-Dec-2017
Metals in solid samples by OES	04-Dec-2017	04-Dec-2017
PAH by GCMS	01-Dec-2017	01-Dec-2017
pH	04-Dec-2017	04-Dec-2017
pH Value of Filtered Water		04-Dec-2017
Phenols by HPLC (S)	30-Nov-2017	30-Nov-2017
Phenols by ms (w)		07-Dec-2017
Phenols Spec MS (S)	06-Dec-2017	06-Dec-2017
Sample description	25-Nov-2017	25-Nov-2017
Total Organic Carbon	29-Nov-2017	29-Nov-2017
Total Sulphur	27-Nov-2017	30-Nov-2017
TPH CWG GC (S)	01-Dec-2017	01-Dec-2017
VOC MS (S)	01-Dec-2017	01-Dec-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1694
Ammoniacal Nitrogen as N	TM099	97.6 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1657
Chloride (soluble)	TM243	89.30 89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1688
Chloride	TM184	107.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 96.40 : 108.40
Sulphate (soluble)	TM184	105.2 90.53 : 113.03
TON as NO3	TM184	96.26 96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1612	QC 1632
Free Cyanide	TM153	93.4 84.60 : 110.40	
Free Cyanide (W)	TM227		103.0 93.25 : 112.75
Thiocyanate	TM153	91.62 83.02 : 103.47	
Thiocyanate (W)	TM227		105.25 97.75 : 109.75
Total Cyanide	TM153	95.0 87.53 : 111.13	
Total Cyanide (W)	TM227		102.25 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1654
Aluminium	TM152	99.33 90.09 : 112.69
Antimony	TM152	98.83 81.00 : 119.70
Arsenic	TM152	97.67 92.40 : 113.00



CERTIFICATE OF ANALYSIS

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SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Dissolved Metals by ICP-MS

		QC 1654
Barium	TM152	100.33 93.11 : 112.81
Beryllium	TM152	98.67 88.27 : 113.27
Bismuth	TM152	104.33 86.72 : 115.61
Boron	TM152	100.33 86.47 : 111.70
Cadmium	TM152	98.17 90.28 : 114.48
Chromium	TM152	98.0 91.07 : 114.29
Cobalt	TM152	98.67 89.58 : 114.68
Copper	TM152	97.83 88.45 : 117.93
Lead	TM152	103.17 89.25 : 115.12
Lithium	TM152	100.0 88.50 : 116.05
Manganese	TM152	99.0 91.63 : 112.33
Molybdenum	TM152	96.67 91.08 : 111.63
Nickel	TM152	96.5 89.60 : 117.38
Niobium	TM152	96.38 : 128.85
Phosphorus	TM152	99.33 90.43 : 111.75
Selenium	TM152	99.5 88.13 : 108.33
Silver	TM152	91.83 90.04 : 97.49
Strontium	TM152	99.0 91.27 : 106.32
Tellurium	TM152	84.83 81.16 : 111.23
Thallium	TM152	93.67 81.70 : 117.09
Titanium	TM152	96.5 89.62 : 110.62
Tungsten	TM152	96.5 90.13 : 111.33
Uranium	TM152	100.83 92.30 : 116.90
Vanadium	TM152	90.33 88.22 : 118.55
Zinc	TM152	97.33 89.30 : 115.44
Zirconium	TM152	85.51 : 109.42

Dissolved Organic/Inorganic Carbon



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435826
Superseded Report:

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1684
Dissolved Inorganic Carbon	TM090	108.5 91.15 : 111.35
Dissolved Organic Carbon	TM090	103.5 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1695
Total Aliphatics >C12-C35	TM173	92.71 71.82 : 103.92

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1695
Total Aromatics >EC12-EC35	TM173	97.33 68.32 : 103.07

Fluoride

Component	Method Code	QC 1695
Fluoride	TM104	98.67 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1616
Benzene by GC (Moisture Corrected)	TM089	106.5 83.15 : 118.53
Ethylbenzene by GC (Moisture Corrected)	TM089	105.5 81.56 : 117.75
m & p Xylene by GC (Moisture Corrected)	TM089	106.5 80.40 : 118.80
MTBE GC-FID (Moisture Corrected)	TM089	110.5 83.25 : 126.67
o Xylene by GC (Moisture Corrected)	TM089	105.5 80.82 : 119.41
QC	TM089	85.42 66.35 : 110.89
Toluene by GC (Moisture Corrected)	TM089	104.5 83.39 : 118.40

Hexavalent Chromium (s)



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Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435826
Superseded Report:

Hexavalent Chromium (s)

Component	Method Code	QC 1618
Hexavalent Chromium	TM151	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1672
Hexavalent Chromium	TM241	95.0 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1685
Mercury Dissolved (CVAf)	TM183	103.0 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1659
Calcium	TM228	97.8 86.15 : 110.75
Iron	TM228	90.0 77.20 : 102.80
Magnesium	TM228	95.2 83.80 : 108.64
Potassium	TM228	98.0 85.58 : 109.10
Sodium	TM228	97.9 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1637	QC 1630
Aluminium	TM181	93.33 75.13 : 109.48	93.33 75.13 : 109.48
Antimony	TM181	93.82 84.48 : 110.90	100.77 84.48 : 110.90
Arsenic	TM181	95.89 83.14 : 108.73	97.69 83.14 : 108.73
Barium	TM181	92.97 77.47 : 102.53	95.31 77.47 : 102.53
Beryllium	TM181	95.55 84.19 : 106.77	96.92 84.19 : 106.77
Boron	TM181	94.35 76.55 : 106.69	92.94 76.55 : 106.69



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Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

Metals in solid samples by OES

		QC 1637	QC 1630
Cadmium	TM181	98.94 86.37 : 111.59	99.47 86.37 : 111.59
Chromium	TM181	98.31 81.29 : 118.71	98.73 81.29 : 118.71
Cobalt	TM181	97.49 85.45 : 109.14	98.43 85.45 : 109.14
Copper	TM181	93.16 81.33 : 103.33	93.6 81.33 : 103.33
Iron	TM181	98.61 82.44 : 111.71	99.31 82.44 : 111.71
Lead	TM181	94.04 83.33 : 106.95	95.32 83.33 : 106.95
Manganese	TM181	93.33 80.56 : 102.33	93.33 80.56 : 102.33
Mercury	TM181	100.0 84.13 : 111.85	101.96 84.13 : 111.85
Molybdenum	TM181	96.53 84.19 : 110.39	97.3 84.19 : 110.39
Nickel	TM181	96.97 84.19 : 109.77	97.2 84.19 : 109.77
Phosphorus	TM181	94.01 73.47 : 116.86	95.06 73.47 : 116.86
Selenium	TM181	96.74 81.32 : 108.59	97.33 81.32 : 108.59
Strontium	TM181	97.89 84.70 : 105.87	94.29 84.70 : 105.87
Thallium	TM181	63.67 81.19 : 105.37	94.92 81.19 : 105.37
Tin	TM181	97.52 85.92 : 110.00	101.06 85.92 : 110.00
Titanium	TM181	96.15 73.44 : 113.17	90.77 73.44 : 113.17
Vanadium	TM181	92.33 81.86 : 105.26	94.17 81.86 : 105.26
Zinc	TM181	99.48 85.64 : 110.14	99.3 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1674
Acenaphthene	TM218	94.0 82.97 : 108.44
Acenaphthylene	TM218	90.0 77.27 : 104.05
Anthracene	TM218	92.0 78.18 : 102.20
Benz(a)anthracene	TM218	104.5 80.40 : 121.27
Benzo(a)pyrene	TM218	113.5 86.92 : 120.63
Benzo(b)fluoranthene	TM218	105.5 82.24 : 121.86
Benzo(ghi)perylene	TM218	100.0 83.49 : 115.72



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Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435826
Superseded Report:

PAH by GCMS

		QC 1674
Benzo(k)fluoranthene	TM218	108.0 86.60 : 115.15
Chrysene	TM218	107.0 86.11 : 112.00
Dibenzo(ah)anthracene	TM218	110.0 83.84 : 116.37
Fluoranthene	TM218	96.0 81.23 : 104.94
Fluorene	TM218	96.5 83.68 : 108.62
Indeno(123cd)pyrene	TM218	108.0 83.72 : 116.90
Naphthalene	TM218	97.5 81.32 : 109.34
Phenanthrene	TM218	95.0 82.06 : 103.85
Pyrene	TM218	94.0 81.04 : 103.65

pH

Component	Method Code	QC 1639
pH	TM133	100.65 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1601
pH Value of Filtered Water	TM256	100.94 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1669
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	100.0 85.25 : 114.75
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	94.15 75.71 : 124.29
Catechol by HPLC (S)	TM062 (S)	83.81 64.10 : 135.90
Cresols by HPLC (S)	TM062 (S)	94.15 78.85 : 107.41
Napthol by HPLC (S)	TM062 (S)	117.14 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	118.54 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	157.86 86.85 : 145.65



CERTIFICATE OF ANALYSIS

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SDG: 171121-122
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435826
Superseded Report:

Phenols by HPLC (S)

		QC 1669
Xylenols by HPLC (S)	TM062 (S)	101.46 84.65 : 109.70

Phenols by ms (w)

Component	Method Code	QC 1658
2,3,4,6-tetrachlorophenol	TM205	101.63 61.39 : 121.01
2,4,5-trichlorophenol	TM205	105.5 68.35 : 126.10
2,4,6-trichlorophenol	TM205	106.88 63.79 : 126.64
2,4-dichlorophenol	TM205	106.63 65.30 : 128.60
2,4-dimethylphenol	TM205	108.38 57.50 : 131.00
2,6-dichlorophenol	TM205	106.88 63.93 : 129.85
2-chlorophenol	TM205	106.13 64.51 : 127.89
2-methylphenol	TM205	108.62 61.66 : 132.61
2-nitrophenol	TM205	101.13 58.88 : 126.38
3-methylphenol	TM205	108.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	108.12 73.70 : 129.95
4-methylphenol	TM205	107.75 67.13 : 130.58
4-nitrophenol	TM205	107.0 68.50 : 136.75
Pentachlorophenol	TM205	85.88 47.74 : 105.49
Phenol	TM205	110.38 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1684
Total Organic Carbon	TM132	101.37 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1674	QC 1618
Total Sulphur %	TM132	99.72 81.05 : 118.95	99.72 81.05 : 118.95



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435826
Superseded Report:

VOC MS (S)

Component	Method Code	QC 1606
1,1,1,2-tetrachloroethane	TM116	98.6 79.10 : 119.66
1,1,1-Trichloroethane	TM116	100.8 80.76 : 117.81
1,1,2-Trichloroethane	TM116	98.8 75.16 : 112.70
1,1-Dichloroethane	TM116	105.2 77.84 : 124.12
1,2-Dichloroethane	TM116	108.8 86.58 : 129.62
1,4-Dichlorobenzene	TM116	92.4 71.61 : 124.63
2-Chlorotoluene	TM116	91.8 66.81 : 118.43
4-Chlorotoluene	TM116	86.4 65.88 : 114.76
Benzene	TM116	105.2 84.42 : 119.78
Carbon Disulphide	TM116	97.0 75.11 : 124.81
Carbontetrachloride	TM116	98.0 82.35 : 126.46
Chlorobenzene	TM116	96.2 82.88 : 122.42
Chloroform	TM116	103.8 82.52 : 123.25
Chloromethane	TM116	78.8 57.48 : 132.44
Cis-1,2-Dichloroethene	TM116	106.0 79.48 : 120.80
Dibromomethane	TM116	91.0 71.69 : 119.43
Dichloromethane	TM116	104.6 81.68 : 125.21
Ethylbenzene	TM116	101.2 80.09 : 119.91
Hexachlorobutadiene	TM116	82.4 9.27 : 160.19
Isopropylbenzene	TM116	96.2 52.15 : 132.52
Naphthalene	TM116	98.0 76.79 : 127.18
o-Xylene	TM116	90.0 71.75 : 103.66
p/m-Xylene	TM116	95.4 77.41 : 112.71
Sec-Butylbenzene	TM116	87.2 44.71 : 117.87
Tetrachloroethene	TM116	102.2 79.68 : 120.25
Toluene	TM116	101.8 82.00 : 116.10
Trichloroethene	TM116	101.4 79.80 : 112.33



CERTIFICATE OF ANALYSIS

Validated

SDG: 171121-122
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435826
Superseded Report:

VOC MS (S)

		QC 1606
Trichlorofluoromethane	TM116	92.4 72.76 : 118.80
Vinyl Chloride	TM116	102.2 64.90 : 133.10

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

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CERTIFICATE OF ANALYSIS

SDG:	171121-122	Client Reference:	TA8066	Report Number:	435826
Location:	Glassworks Barnsley	Order Number:	TA8066	Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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Soil Engineering
Parkside Lane
Dewsbury Road
Leeds
West Yorkshire
LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 07 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171122-90
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 435827

We received 6 samples on Tuesday November 21, 2017 and 3 of these samples were scheduled for analysis which was completed on Thursday December 07, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16608695	BH02	ES1	0.20	17/11/2017
16608693	BH02	ES4	0.50	17/11/2017
16608694	BH02	ES6	1.00	17/11/2017
16608583	WS06	ES2	0.50 - 1.00	17/11/2017
16608582	WS06.	ES1	0.20	17/11/2017
16608584	WS06.	ES3	1.00 - 1.20	17/11/2017

Maximum Sample/Coolbox Temperature (°C) :

12

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16608694

16608683

Customer Sample Reference

BH02

WS06

AGS Reference

ES6

ES2

Depth (m)

1.00

0.50 - 1.00

Container

1kg TUB

250g Amber Jar (ALE210)

60g VOC (ALE215)

1kg TUB

250g Amber Jar (ALE210)

60g VOC (ALE215)

Sample Type

S

S

S

S

S

S

Ammoniacal Nitrogen

All

NDPs: 0
Tests: 1

X

Anions by Kone (soil)

All

NDPs: 0
Tests: 2

X

X

Anions by Kone (w)

All

NDPs: 0
Tests: 1

X

Asbestos ID in Solid Samples

All

NDPs: 0
Tests: 2

X

X

CEN Readings

All

NDPs: 0
Tests: 1

X

Chromium III

All

NDPs: 0
Tests: 3

X

X

X

Cyanide Comp/Free/Total/Thiocyanate

All

NDPs: 0
Tests: 3

X

X

X

Dissolved Metals by ICP-MS

All

NDPs: 0
Tests: 1

X

Dissolved Organic/Inorganic Carbon

All

NDPs: 0
Tests: 1

X

EPH CWG (Aliphatic) GC (S)

All

NDPs: 0
Tests: 2

X

X

EPH CWG (Aromatic) GC (S)

All

NDPs: 0
Tests: 2

X

X

Fluoride

All

NDPs: 0
Tests: 1

X

GRO by GC-FID (S)

All

NDPs: 0
Tests: 2

X

X

Hexavalent Chromium (s)

All

NDPs: 0
Tests: 2

X

X

Hexavalent Chromium (w)

All

NDPs: 0
Tests: 1

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

16608694

16608583

Customer
Sample Reference

BH02

WS06

AGS Reference

ES6

ES2

Depth (m)

1.00

0.50 - 1.00

Container

1kg TUB

250g Amber Jar
(ALE210)

60g VOC (ALE215)

1kg TUB

250g Amber Jar
(ALE210)

60g VOC (ALE215)

60g VOC (ALE215)

Sample Type

S

S

S

S

S

S

Low Level Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Mercury Dissolved

All

NDPs: 0
Tests: 1

X

Metals by iCap-OES Dissolved (W)

All

NDPs: 0
Tests: 1

X

Metals in solid samples by OES

All

NDPs: 0
Tests: 2

X

X

PAH by GCMS

All

NDPs: 0
Tests: 2

X

X

pH

All

NDPs: 0
Tests: 2

X

X

pH Value of Filtered Water

All

NDPs: 0
Tests: 1

X

Phenols by HPLC (S)

All

NDPs: 0
Tests: 2

X

X

Phenols by ms (w)

All

NDPs: 0
Tests: 1

X

Phenols Spec MS (S)

All

NDPs: 0
Tests: 2

X

X

Sample description

All

NDPs: 0
Tests: 2

X

X

Total Organic Carbon

All

NDPs: 0
Tests: 2

X

X

Total Sulphur

All

NDPs: 0
Tests: 2

X

X

TPH CWG GC (S)

All

NDPs: 0
Tests: 2

X

X

VOC MS (S)

All

NDPs: 0
Tests: 2

X

X



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16608694	BH02	1.00	Dark Brown	Sandy Clay Loam	Stones	None
16608583	WS06	0.50 - 1.00	Light Brown	Sandy Clay	Crushed Brick	Stones

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

SDG: 171122-90
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435827
Superseded Report:

Results Legend		Customer Sample Ref.	BH02	WS06				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.	Depth (m)	1.00	0.50 - 1.00				
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	17/11/2017	17/11/2017				
*	Subcontracted test.	Sample Time						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	21/11/2017	21/11/2017				
(F)	Trigger breach confirmed	SDG Ref	171122-90	171122-90				
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16608694	16608583				
		AGS Reference	ES6	ES2				
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	15	10				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Cresols	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06	<0.06				
			M	M				
Sulphur, Total	<0.02 %	TM132	0.0461	0.0258				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0105	0.00241				
			#	#				
pH	1 pH Units	TM133	8.86	9.32				
			M	M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6				
			#	#				
Cyanide, Free	<1 mg/kg	TM153	<1	<1				
			M	M				
Chromium, Trivalent	<0.9 mg/kg	TM181	8.84	<0.9				
Antimony	<0.6 mg/kg	TM181	<0.6	<0.6				
			#	#				
Arsenic	<0.6 mg/kg	TM181	7.67	3.52				
			M	M				
Barium	<0.6 mg/kg	TM181	62.8	99.2				
			#	#				
Beryllium	<0.01 mg/kg	TM181	0.98	0.482				
			M	M				
Boron	<0.7 mg/kg	TM181	2.37	0.702				
			#	#				
Cadmium	<0.02 mg/kg	TM181	<0.02	0.25				
			M	M				
Copper	<1.4 mg/kg	TM181	42.5	9.94				
			M	M				
Iron	<1000 mg/kg	TM181	24600	21700				
			#	#				
Lead	<0.7 mg/kg	TM181	45.7	9.78				
			M	M				
Manganese	<0.13 mg/kg	TM181	507	772				
			M	M				
Mercury	<0.14 mg/kg	TM181	0.414	0.218				
			M	M				
Molybdenum	<0.1 mg/kg	TM181	0.733	0.311				
			#	#				
Nickel	<0.2 mg/kg	TM181	32	19.7				
			M	M				
Selenium	<1 mg/kg	TM181	1.18	1				
			#	#				
Vanadium	<0.2 mg/kg	TM181	16.9	13.1				
			#	#				
Zinc	<1.9 mg/kg	TM181	85.6	21.2				
			M	M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.0287	0.0522				
			M	M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	BH02	WS06			
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	1.00	0.50 - 1.00			
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.	Date Sampled	17/11/2017	17/11/2017			
*	Subcontracted test.	Sample Time					
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	21/11/2017	21/11/2017			
(F)	Trigger breach confirmed	SDG Ref	171122-90	171122-90			
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16608694	16608583			
		AGS Reference	ES6	ES2			
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	58	86			
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	165	<44			
			M	M			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5			
			#	#			
Benzene	<10 µg/kg	TM089	31.9	<10			
			M	M			
Toluene	<2 µg/kg	TM089	14.2	<2			
			M	M			
Ethylbenzene	<3 µg/kg	TM089	4.72	<3			
			M	M			
m,p-Xylene	<6 µg/kg	TM089	15.3	<6			
			M	M			
o-Xylene	<3 µg/kg	TM089	7.08	<3			
			M	M			
sum of detected mpo xylene by GC	<9 µg/kg	TM089	22.4	<9			
sum of detected BTEX by GC	<24 µg/kg	TM089	73.2	<24			
Aliphatics >C5-C6	<10 µg/kg	TM089	13	<10			
Aliphatics >C6-C8	<10 µg/kg	TM089	21.2	<10			
Aliphatics >C8-C10	<10 µg/kg	TM089	18.9	<10			
Aliphatics >C10-C12	<10 µg/kg	TM089	16.5	<10			
Aliphatics >C12-C16	<100 µg/kg	TM173	3060	<100			
Aliphatics >C16-C21	<100 µg/kg	TM173	2650	1440			
Aliphatics >C21-C35	<100 µg/kg	TM173	3920	3240			
Aliphatics >C35-C44	<100 µg/kg	TM173	<100	<100			
Total Aliphatics >C12-C44	<100 µg/kg	TM173	9630	4690			
Aromatics >EC5-EC7	<10 µg/kg	TM089	31.9	<10			
Aromatics >EC7-EC8	<10 µg/kg	TM089	14.2	<10			
Aromatics >EC8-EC10	<10 µg/kg	TM089	38.9	<10			
Aromatics >EC10-EC12	<10 µg/kg	TM089	11.8	<10			
Aromatics >EC12-EC16	<100 µg/kg	TM173	2210	<100			
Aromatics >EC16-EC21	<100 µg/kg	TM173	9540	<100			
Aromatics >EC21-EC35	<100 µg/kg	TM173	34400	4810			
Aromatics >EC35-EC44	<100 µg/kg	TM173	11800	5600			
Aromatics >EC40-EC44	<100 µg/kg	TM173	4600	2620			
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	58000	10400			
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	67800	15100			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	BH02	WS06			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference					
M	mCERTS accredited.						
aq	Aqueous / settled sample.		1.00	0.50 - 1.00			
diss.filt	Dissolved / filtered sample.		Soil/Solid (S)	Soil/Solid (S)			
tot.unfilt	Total / unfiltered sample.		17/11/2017	17/11/2017			
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		21/11/2017	21/11/2017			
(F)	Trigger breach confirmed		171122-90	171122-90			
1-5&*\$@	Sample deviation (see appendix)		16608694	16608583			
			ES6	ES2			
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM116	99.1	102			
Toluene-D8	%	TM116	95	97.2			
4-bromofluorobenzene**	%	TM116	75.2	89.3			
Dichlorodifluoromethane	<6 µg/kg	TM116	<6	<6			
Chloromethane	<7 µg/kg	TM116	<7	<7			
Vinyl Chloride	<6 µg/kg	TM116	<6	<6			
Bromomethane	<10 µg/kg	TM116	<10	<10			
Chloroethane	<10 µg/kg	TM116	<10	<10			
Trichlorofluoromethane	<6 µg/kg	TM116	<6	<6			
1,1-Dichloroethene	<10 µg/kg	TM116	<10	<10			
Carbon Disulphide	<7 µg/kg	TM116	<7	<7			
Dichloromethane	<10 µg/kg	TM116	51.6	14.4			
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10	<10			
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10	<10			
1,1-Dichloroethane	<8 µg/kg	TM116	<8	<8			
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6	<6			
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<10			
Bromochloromethane	<10 µg/kg	TM116	<10	<10			
Chloroform	<8 µg/kg	TM116	<8	<8			
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7	<7			
1,1-Dichloropropene	<10 µg/kg	TM116	<10	<10			
Carbontetrachloride	<10 µg/kg	TM116	<10	<10			
1,2-Dichloroethane	<5 µg/kg	TM116	<5	<5			
Benzene	<9 µg/kg	TM116	25	<9			
Trichloroethene	<9 µg/kg	TM116	<9	<9			
1,2-Dichloropropane	<10 µg/kg	TM116	<10	<10			
Dibromomethane	<9 µg/kg	TM116	<9	<9			
Bromodichloromethane	<7 µg/kg	TM116	<7	<7			
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10			
Toluene	<7 µg/kg	TM116	9.48	<7			
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10			
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10	<10			
1,3-Dichloropropane	<7 µg/kg	TM116	<7	<7			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	BH02	WS06			
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	1.00	0.50 - 1.00			
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)			
aq	Aqueous / settled sample.		17/11/2017	17/11/2017			
diss.filt	Dissolved / filtered sample.		.	.			
tot.unfilt	Total / unfiltered sample.		21/11/2017	21/11/2017			
*	Subcontracted test.		171122-90	171122-90			
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16608694	16608583			
(F)	Trigger breach confirmed		ES6	ES2			
1-5&5@	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Tetrachloroethene	<5 µg/kg	TM116	<5	<5			
			M	M			
Dibromochloromethane	<10 µg/kg	TM116	<10	<10			
			M	M			
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<10			
			M	M			
Chlorobenzene	<5 µg/kg	TM116	<5	<5			
			M	M			
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10			
			M	M			
Ethylbenzene	<4 µg/kg	TM116	<4	<4			
			M	M			
p/m-Xylene	<10 µg/kg	TM116	<10	<10			
			#	#			
o-Xylene	<10 µg/kg	TM116	<10	<10			
			M	M			
Styrene	<10 µg/kg	TM116	<10	<10			
			#	#			
Bromoform	<10 µg/kg	TM116	<10	<10			
			M	M			
Isopropylbenzene	<5 µg/kg	TM116	<5	<5			
			#	#			
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10			
			#	#			
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<16			
			M	M			
Bromobenzene	<10 µg/kg	TM116	<10	<10			
			M	M			
Propylbenzene	<10 µg/kg	TM116	<10	<10			
			M	M			
2-Chlorotoluene	<9 µg/kg	TM116	<9	<9			
			M	M			
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<8			
			M	M			
4-Chlorotoluene	<10 µg/kg	TM116	<10	<10			
			M	M			
tert-Butylbenzene	<14 µg/kg	TM116	<14	<14			
			M	M			
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<9			
			#	#			
sec-Butylbenzene	<10 µg/kg	TM116	<10	<10			
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<10			
			M	M			
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<8			
			M	M			
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<5			
			M	M			
n-Butylbenzene	<11 µg/kg	TM116	<11	<11			
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<10			
			M	M			
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<14			
			M	M			
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<10			
			#	#			
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<20			
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<20			
Naphthalene	<13 µg/kg	TM116	<13	<13			
			M	M			
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<20			
			#	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH02 ES 6 1.00 SOLID 17/11/2017 00:00:00 26/11/2017 15:16:39 171122-90 16608694 TM048	04/12/2017	Eva Guerra	n	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS06 ES 2 0.50 - 1.00 SOLID 17/11/2017 00:00:00 25/11/2017 12:26:29 171122-90 16608583 TM048	04/12/2017	Eva Guerra	n	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.194

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171122-90

Lab Sample Number(s) 16608583

Sampled Date 17-Nov-2017

Customer Sample Ref. WS06 ES2

Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 0.241

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.32

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00263	<0.0005	0.00526	<0.001	0.5	2	25
Barium	0.0212	<0.0002	0.0424	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.004	<0.0003	0.008	<0.0006	2	50	100
Mercury Dissolved (CVAf)	0.0000333	<0.00001	0.0000666	<0.00002	0.01	0.2	2
Molybdenum	0.00658	<0.0005	0.0132	<0.001	0.5	10	30
Nickel	0.00375	<0.0004	0.0075	<0.0008	0.4	10	40
Lead	0.00248	<0.0002	0.00496	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.000603	<0.0005	0.00121	<0.001	0.1	0.5	7
Zinc	0.00698	<0.001	0.014	<0.002	4	50	200
Chloride	18.2	<2	36.4	<4	800	15000	25000
Fluoride	1.44	<0.5	2.88	<1	10	150	500
Sulphate (soluble)	48.5	<2	97	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	9.32	<3	18.6	<6	500	800	1000

Leach Test Information

Date Prepared 29-Nov-2017

pH (pH Units) 8.79

Conductivity (µS/cm) 409.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

07/12/2017 10:03:03

10:02:54 07/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.194

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171122-90

Lab Sample Number(s) 16608583

Sampled Date 17-Nov-2017

Customer Sample Ref. WS06 ES2

Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 0.241

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.32

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	0.311	<0.2	0.622	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.1	<0.001	18	<0.002	-	-	-	-
Calcium	3.87	<0.012	7.74	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.0055	<0.0055	<0.011	<0.011	-	-	-	-
Phenol by HPLC (W)	0.00054	<0.0005	0.00108	<0.001	-	-	-	-
2-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	0.563	<0.036	1.13	<0.072	-	-	-	-
3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Beryllium	0.000127	<0.0001	0.000254	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	4.14	<0.019	8.28	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.0302	<0.005	0.0604	<0.01	-	-	-	-
Hardness Total	12	<1	24	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 29-Nov-2017

pH (pH Units) 8.79

Conductivity (µS/cm) 409.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.194

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171122-90

Lab Sample Number(s) 16608583

Sampled Date 17-Nov-2017

Customer Sample Ref. WS06 ES2

Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 0.241

Loss on Ignition (%) -

Sum of BTEX (mg/kg) <0.024

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.32

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,6-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	<0.00064	<0.00064	<0.00128	<0.00128	-	-	-
4-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,6-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,4,5-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
4-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-
2,3,5,6-tetrachlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
Manganese	0.0989	<0.001	0.198	<0.002	-	-	-
2,3,4,6-tetrachlorophenol	<0.001	<0.001	<0.002	<0.002	-	-	-
2,4-Dinitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-
DNOC	<0.006	<0.006	<0.012	<0.012	-	-	-
Pentachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-
Vanadium	0.00604	<0.001	0.0121	<0.002	-	-	-

Leach Test Information

Date Prepared 29-Nov-2017

pH (pH Units) 8.79

Conductivity (µS/cm) 409.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

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Client Reference: TA8066
Order Number: TA8066

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Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part 2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990/BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16608694	16608583
Customer Sample Ref.	BH02	WS06
AGS Ref.	ES6	ES2
Depth	1.00	0.50 - 1.00
Type	Soil/Solid (S)	Soil/Solid (S)

Ammoniacal Nitrogen		02-Dec-2017
Anions by Kone (soil)	02-Dec-2017	01-Dec-2017
Anions by Kone (w)		04-Dec-2017
Asbestos ID in Solid Samples	04-Dec-2017	04-Dec-2017
CEN 2:1 Leachate (1 Stage)		29-Nov-2017
CEN Readings		02-Dec-2017
Chromium III	04-Dec-2017	04-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate		04-Dec-2017
Dissolved Metals by ICP-MS		04-Dec-2017
Dissolved Organic/Inorganic Carbon		04-Dec-2017
EPH CWG (Aliphatic) GC (S)	30-Nov-2017	30-Nov-2017
EPH CWG (Aromatic) GC (S)	30-Nov-2017	30-Nov-2017
Fluoride		02-Dec-2017
GRO by GC-FID (S)	01-Dec-2017	01-Dec-2017
Hexavalent Chromium (s)	04-Dec-2017	04-Dec-2017
Hexavalent Chromium (w)		04-Dec-2017
Low Level Phenols by HPLC (W)		05-Dec-2017
Mercury Dissolved		04-Dec-2017
Metals by iCap-OES Dissolved (W)		05-Dec-2017
Metals in solid samples by OES	05-Dec-2017	04-Dec-2017
PAH by GCMS	01-Dec-2017	01-Dec-2017
pH	04-Dec-2017	04-Dec-2017
pH Value of Filtered Water		04-Dec-2017
Phenols by HPLC (S)	30-Nov-2017	02-Dec-2017
Phenols by ms (w)		07-Dec-2017
Phenols Spec MS (S)	06-Dec-2017	06-Dec-2017
Sample description	25-Nov-2017	26-Nov-2017
Total Organic Carbon	29-Nov-2017	30-Nov-2017
Total Sulphur	30-Nov-2017	30-Nov-2017
TPH CWG GC (S)	01-Dec-2017	01-Dec-2017
VOC MS (S)	01-Dec-2017	01-Dec-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171122-90
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number: TA8066Report Number: 435827
Superseded Report:

ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1694
Ammoniacal Nitrogen as N	TM099	97.6 93.47 : 108.25

Anions by Kone (soil)

Component	Method Code	QC 1623	QC 1657
Chloride (soluble)	TM243	66.67 89.30 : 110.70	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	57.34 70.45 : 129.55	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1688
Chloride	TM184	107.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	105.2 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1615	QC 1612	QC 1632
Free Cyanide	TM153	95.7 84.60 : 110.40	93.4 84.60 : 110.40	
Free Cyanide (W)	TM227			103.0 93.25 : 112.75
Thiocyanate	TM153	91.02 83.02 : 103.47	91.62 83.02 : 103.47	
Thiocyanate (W)	TM227			105.25 97.75 : 109.75
Total Cyanide	TM153	103.57 87.53 : 111.13	95.0 87.53 : 111.13	
Total Cyanide (W)	TM227			102.25 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1654
Aluminium	TM152	99.33 90.09 : 112.69
Antimony	TM152	98.83 81.00 : 119.70
Arsenic	TM152	97.67 92.40 : 113.00



CERTIFICATE OF ANALYSIS

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Superseded Report:

Dissolved Metals by ICP-MS

		QC 1654
Barium	TM152	100.33 93.11 : 112.81
Beryllium	TM152	98.67 88.27 : 113.27
Bismuth	TM152	104.33 86.72 : 115.61
Boron	TM152	100.33 86.47 : 111.70
Cadmium	TM152	98.17 90.28 : 114.48
Chromium	TM152	98.0 91.07 : 114.29
Cobalt	TM152	98.67 89.58 : 114.68
Copper	TM152	97.83 88.45 : 117.93
Lead	TM152	103.17 89.25 : 115.12
Lithium	TM152	100.0 88.50 : 116.05
Manganese	TM152	99.0 91.63 : 112.33
Molybdenum	TM152	96.67 91.08 : 111.63
Nickel	TM152	96.5 89.60 : 117.38
Niobium	TM152	96.38 96.38 : 128.85
Phosphorus	TM152	99.33 90.43 : 111.75
Selenium	TM152	99.5 88.13 : 108.33
Silver	TM152	91.83 90.04 : 97.49
Strontium	TM152	99.0 91.27 : 106.32
Tellurium	TM152	84.83 81.16 : 111.23
Thallium	TM152	93.67 81.70 : 117.09
Titanium	TM152	96.5 89.62 : 110.62
Tungsten	TM152	96.5 90.13 : 111.33
Uranium	TM152	100.83 92.30 : 116.90
Vanadium	TM152	90.33 88.22 : 118.55
Zinc	TM152	97.33 89.30 : 115.44
Zirconium	TM152	85.51 85.51 : 109.42

Dissolved Organic/Inorganic Carbon



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Superseded Report:

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1684
Dissolved Inorganic Carbon	TM090	108.5 91.15 : 111.35
Dissolved Organic Carbon	TM090	103.5 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1695
Total Aliphatics >C12-C35	TM173	92.71 71.82 : 103.92

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1695
Total Aromatics >EC12-EC35	TM173	97.33 68.32 : 103.07

Fluoride

Component	Method Code	QC 1695
Fluoride	TM104	98.67 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1648
Benzene by GC (Moisture Corrected)	TM089	110.0 83.15 : 118.53
Ethylbenzene by GC (Moisture Corrected)	TM089	111.0 81.56 : 117.75
m & p Xylene by GC (Moisture Corrected)	TM089	112.25 80.40 : 118.80
MTBE GC-FID (Moisture Corrected)	TM089	112.5 83.25 : 126.67
o Xylene by GC (Moisture Corrected)	TM089	111.5 80.82 : 119.41
QC	TM089	67.52 66.35 : 110.89
Toluene by GC (Moisture Corrected)	TM089	109.0 83.39 : 118.40

Hexavalent Chromium (s)



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Superseded Report:

Hexavalent Chromium (s)

Component	Method Code	QC 1618	QC 1638
Hexavalent Chromium	TM151	94.0 90.20 : 107.00	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1672
Hexavalent Chromium	TM241	95.0 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1685
Mercury Dissolved (CVAF)	TM183	103.0 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1649
Calcium	TM228	94.1 86.15 : 110.75
Iron	TM228	90.67 77.20 : 102.80
Magnesium	TM228	91.5 83.80 : 108.64
Potassium	TM228	93.2 85.58 : 109.10
Sodium	TM228	95.1 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1609	QC 1637
Aluminium	TM181	90.37 75.13 : 109.48	93.33 75.13 : 109.48
Antimony	TM181	94.98 84.48 : 110.90	93.82 84.48 : 110.90
Arsenic	TM181	95.37 83.14 : 108.73	95.89 83.14 : 108.73
Barium	TM181	92.97 77.47 : 102.53	92.97 77.47 : 102.53
Beryllium	TM181	93.15 84.19 : 106.77	95.55 84.19 : 106.77
Boron	TM181	91.81 76.55 : 106.69	94.35 76.55 : 106.69



CERTIFICATE OF ANALYSIS

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SDG: 171122-90
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

Metals in solid samples by OES

		QC 1609	QC 1637
Cadmium	TM181	98.4 86.37 : 111.59	98.94 86.37 : 111.59
Chromium	TM181	95.78 81.29 : 118.71	98.31 81.29 : 118.71
Cobalt	TM181	97.18 85.45 : 109.14	97.49 85.45 : 109.14
Copper	TM181	90.68 81.33 : 103.33	93.16 81.33 : 103.33
Iron	TM181	95.14 82.44 : 111.71	98.61 82.44 : 111.71
Lead	TM181	93.62 83.33 : 106.95	94.04 83.33 : 106.95
Manganese	TM181	88.89 80.56 : 102.33	93.33 80.56 : 102.33
Mercury	TM181	100.0 84.13 : 111.85	100.0 84.13 : 111.85
Molybdenum	TM181	93.44 84.19 : 110.39	96.53 84.19 : 110.39
Nickel	TM181	95.34 84.19 : 109.77	96.97 84.19 : 109.77
Phosphorus	TM181	95.06 73.47 : 116.86	94.01 73.47 : 116.86
Selenium	TM181	94.66 81.32 : 108.59	96.74 81.32 : 108.59
Strontium	TM181	92.18 84.70 : 105.87	97.89 84.70 : 105.87
Thallium	TM181	92.97 81.19 : 105.37	63.67 81.19 : 105.37
Tin	TM181	96.1 85.92 : 110.00	97.52 85.92 : 110.00
Titanium	TM181	87.69 73.44 : 113.17	96.15 73.44 : 113.17
Vanadium	TM181	89.57 81.86 : 105.26	92.33 81.86 : 105.26
Zinc	TM181	96.34 85.64 : 110.14	99.48 85.64 : 110.14

PAH by GCMS

Component	Method Code	QC 1674
Acenaphthene	TM218	94.0 82.97 : 108.44
Acenaphthylene	TM218	90.0 77.27 : 104.05
Anthracene	TM218	92.0 78.18 : 102.20
Benz(a)anthracene	TM218	104.5 80.40 : 121.27
Benzo(a)pyrene	TM218	113.5 86.92 : 120.63
Benzo(b)fluoranthene	TM218	105.5 82.24 : 121.86
Benzo(ghi)perylene	TM218	100.0 83.49 : 115.72



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Order Number: TA8066Report Number: 435827
Superseded Report:

PAH by GCMS

		QC 1674
Benzo(k)fluoranthene	TM218	108.0 86.60 : 115.15
Chrysene	TM218	107.0 86.11 : 112.00
Dibenzo(ah)anthracene	TM218	110.0 83.84 : 116.37
Fluoranthene	TM218	96.0 81.23 : 104.94
Fluorene	TM218	96.5 83.68 : 108.62
Indeno(123cd)pyrene	TM218	108.0 83.72 : 116.90
Naphthalene	TM218	97.5 81.32 : 109.34
Phenanthrene	TM218	95.0 82.06 : 103.85
Pyrene	TM218	94.0 81.04 : 103.65

pH

Component	Method Code	QC 1639	QC 1628
pH	TM133	100.65 99.61 : 101.95	101.3 99.61 : 101.95

pH Value of Filtered Water

Component	Method Code	QC 1601
pH Value of Filtered Water	TM256	100.94 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1669	QC 1695
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	100.0 85.25 : 114.75	100.0 70.10 : 89.90
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	94.15 75.71 : 124.29	94.74 84.69 : 104.79
Catechol by HPLC (S)	TM062 (S)	83.81 64.10 : 135.90	0.95 24.84 : 108.44
Cresols by HPLC (S)	TM062 (S)	94.15 78.85 : 107.41	92.07 72.20 : 110.60
Napthol by HPLC (S)	TM062 (S)	117.14 75.62 : 124.38	79.29 91.99 : 139.23
Phenol by HPLC (S)	TM062 (S)	118.54 79.53 : 120.47	109.27 82.00 : 107.15
Resorcinol HPLC (S)	TM062 (S)	157.86 86.85 : 145.65	130.19 96.51 : 136.70



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Superseded Report:

Phenols by HPLC (S)

		QC 1669	QC 1695
Xylenols by HPLC (S)	TM062 (S)	101.46 84.65 : 109.70	98.96 82.47 : 110.25

Phenols by ms (w)

Component	Method Code	QC 1658
2,3,4,6-tetrachlorophenol	TM205	101.63 61.39 : 121.01
2,4,5-trichlorophenol	TM205	105.5 68.35 : 126.10
2,4,6-trichlorophenol	TM205	106.88 63.79 : 126.64
2,4-dichlorophenol	TM205	106.63 65.30 : 128.60
2,4-dimethylphenol	TM205	108.38 57.50 : 131.00
2,6-dichlorophenol	TM205	106.88 63.93 : 129.85
2-chlorophenol	TM205	106.13 64.51 : 127.89
2-methylphenol	TM205	108.62 61.66 : 132.61
2-nitrophenol	TM205	101.13 58.88 : 126.38
3-methylphenol	TM205	108.5 70.73 : 131.40
4-chloro-3-methylphenol	TM205	108.12 73.70 : 129.95
4-methylphenol	TM205	107.75 67.13 : 130.58
4-nitrophenol	TM205	107.0 68.50 : 136.75
Pentachlorophenol	TM205	85.88 47.74 : 105.49
Phenol	TM205	110.38 60.43 : 134.90

Total Organic Carbon

Component	Method Code	QC 1684	QC 1624
Total Organic Carbon	TM132	101.37 75.74 : 101.50	103.2 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1618
Total Sulphur %	TM132	99.72 81.05 : 118.95



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Superseded Report:

VOC MS (S)

Component	Method Code	QC 1606
1,1,1,2-tetrachloroethane	TM116	105.0 77.56 : 115.55
1,1,1-Trichloroethane	TM116	99.4 74.97 : 113.76
1,1,2-Trichloroethane	TM116	99.8 77.12 : 116.04
1,1-Dichloroethane	TM116	107.6 74.46 : 129.15
1,2-Dichloroethane	TM116	111.2 82.41 : 125.49
1,4-Dichlorobenzene	TM116	108.2 72.76 : 126.34
2-Chlorotoluene	TM116	106.6 68.08 : 113.44
4-Chlorotoluene	TM116	102.8 63.64 : 113.30
Benzene	TM116	110.8 81.05 : 117.28
Carbon Disulphide	TM116	100.4 74.91 : 122.14
Carbontetrachloride	TM116	113.4 77.80 : 119.23
Chlorobenzene	TM116	102.8 75.00 : 115.53
Chloroform	TM116	105.4 77.34 : 121.84
Chloromethane	TM116	87.4 52.63 : 138.74
Cis-1,2-Dichloroethene	TM116	113.4 74.69 : 124.27
Dibromomethane	TM116	102.4 67.80 : 121.75
Dichloromethane	TM116	111.0 81.11 : 133.25
Ethylbenzene	TM116	104.8 72.53 : 109.84
Hexachlorobutadiene	TM116	93.4 23.60 : 154.69
Isopropylbenzene	TM116	93.2 54.46 : 125.44
Naphthalene	TM116	115.2 74.47 : 129.31
o-Xylene	TM116	93.2 67.46 : 102.22
p/m-Xylene	TM116	97.5 68.32 : 108.91
Sec-Butylbenzene	TM116	96.8 50.86 : 134.07
Tetrachloroethene	TM116	108.4 76.95 : 121.02
Toluene	TM116	101.8 74.24 : 107.42
Trichloroethene	TM116	104.2 77.61 : 111.54



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Location: Glassworks Barnsley

Client Reference: TA8066
Order Number: TA8066

Report Number: 435827
Superseded Report:

VOC MS (S)

		QC 1606
Trichlorofluoromethane	TM116	98.0 70.00 : 130.00
Vinyl Chloride	TM116	102.2 68.05 : 125.93

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .

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CERTIFICATE OF ANALYSIS

SDG:	171122-90	Client Reference:	TA8066	Report Number:	435827
Location:	Glassworks Barnsley	Order Number:	TA8066	Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



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LS11 5SX

Attention: Mark Burton

CERTIFICATE OF ANALYSIS

Date: 03 January 2018
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171129-118
Your Reference: TA8066
Location: BARNSELY
Report No: 438657

This report has been revised and directly supersedes 437622 in its entirety.

We received 10 samples on Wednesday November 29, 2017 and 4 of these samples were scheduled for analysis which was completed on Wednesday January 03, 2018. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16657890	BH03A	ES4	3.00 - 3.45	27/11/2017
16657882	TP03	ES02	0.20	27/11/2017
16657883	TP03	ES04	0.50	27/11/2017
16657884	TP03	ES06	1.00	27/11/2017
16657885	TP03	ES09	2.10	27/11/2017
16657886	TP04	ES02	0.20	27/11/2017
16657887	TP04	ES04	0.50	27/11/2017
16657888	TP04	ES08	1.00	27/11/2017
16657891	TP04	W11	2.10	27/11/2017
16657889	TP04	ES10	2.30	27/11/2017

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

5.4

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELEY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		16657883	16657884	16657887	16657888
	Customer Sample Reference		TP03	TP03	TP04	TP04
	AGS Reference		ES04	ES06	ES04	ES08
	Depth (m)		0.50	1.00	0.50	1.00
	Container		250g Amber Jar (ALE210) 1kg TUB	250g Amber Jar (ALE210) 1kg TUB	250g Amber Jar (ALE210) 200 ml Glass Bottle	60g VOC (ALE215)
	Sample Type		S	S	S	S
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2		X	X	
Anions by Kone (soil)	All	NDPs: 0 Tests: 2	X			X
Anions by Kone (w)	All	NDPs: 0 Tests: 2		X	X	
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 2	X			X
CEN Readings	All	NDPs: 0 Tests: 3		X	X	X
Chromium III	All	NDPs: 0 Tests: 4	X	X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 4	X	X	X	X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2		X	X	
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2		X	X	
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 2	X			X
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 2	X			X
Fluoride	All	NDPs: 0 Tests: 2		X	X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 2	X			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 2	X			X
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2		X	X	



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	16657883	16657884	16657887	16657888
							TP03	TP03	TP04	TP04
							ES04	ES06	ES04	ES08
							0.50	1.00	0.50	1.00
							250g Amber Jar (ALE210) 1kg TUB	250g Amber Jar (ALE210) 1kg TUB	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)
							S	S	S	S
Low Level Phenols by HPLC (W)	All	NDPs: 0 Tests: 1								
Mercury Dissolved	All	NDPs: 0 Tests: 2								
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2								
Metals in solid samples by OES	All	NDPs: 0 Tests: 2								
PAH by GCMS	All	NDPs: 0 Tests: 2								
pH	All	NDPs: 0 Tests: 2								
pH Value of Filtered Water	All	NDPs: 0 Tests: 2								
Phenols by HPLC (S)	All	NDPs: 0 Tests: 2								
Phenols by HPLC (W)	All	NDPs: 0 Tests: 1								
Phenols by ms (w)	All	NDPs: 0 Tests: 2								
Phenols Spec MS (S)	All	NDPs: 0 Tests: 2								
Sample description	All	NDPs: 0 Tests: 4								
Total Organic Carbon	All	NDPs: 0 Tests: 2								
Total Sulphur	All	NDPs: 0 Tests: 2								
TPH CWG GC (S)	All	NDPs: 0 Tests: 2								



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

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Superseded Report: 437622

Results Legend



Test


No Determination
Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Sample Type

VOC MS (S)

All

NDPs: 0
Tests: 2

X

X

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

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Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
-----------	----------	------	-----------------	--------	-------------	--------	------------	-------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16657883	TP03	0.50	Black	Stone/Soil	None	None
16657884	TP03	1.00	Black	Stone/Soil	Vegetation	None
16657887	TP04	0.50	Dark Brown	Loamy Sand	Stones	Vegetation
16657888	TP04	1.00	Dark Brown	Silty Clay Loam	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Results Legend		Customer Sample Ref.	TP03	TP03	TP04	TP04		
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&+5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	9.7	2.2	11	16		
Phenol	<0.01 mg/kg	TM062 (S)	0.133			<0.01		
			#			M		
Cresols	<0.01 mg/kg	TM062 (S)	0.3			<0.01		
			#			M		
Xylenols	<0.015 mg/kg	TM062 (S)	<0.15			<0.015		
			#			M		
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.1			<0.01		
			#			M		
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.15			<0.015		
			#			M		
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	0.433			<0.06		
			#			M		
Sulphur, Total	<0.02 %	TM132	0.413			0.0933		
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0949			0.0401		
			#			#		
pH	1 pH Units	TM133	8.06			9.25		
			#			M		
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6			<0.6		
			#			#		
Cyanide, Free	<1 mg/kg	TM153	<1			<1		
			#			M		
Chromium, Trivalent	<0.9 mg/kg	TM181	<0.9			15.2		
Antimony	<0.6 mg/kg	TM181	<0.6			3.32		
			#			#		
Arsenic	<0.6 mg/kg	TM181	28.9			9.48		
			#			M		
Barium	<0.6 mg/kg	TM181	139			169		
			#			#		
Beryllium	<0.01 mg/kg	TM181	2.8			0.603		
			#			M		
Boron	<0.7 mg/kg	TM181	6.2			9.51		
			#			#		
Cadmium	<0.02 mg/kg	TM181	0.686			0.397		
			#			M		
Copper	<1.4 mg/kg	TM181	159			45.6		
			#			M		
Iron	<1000 mg/kg	TM181	119000			24400		
			#			#		
Lead	<0.7 mg/kg	TM181	33.4			71.6		
			#			M		
Manganese	<0.13 mg/kg	TM181	536			430		
			#			M		
Mercury	<0.14 mg/kg	TM181	0.929			<0.14		
			#			M		
Molybdenum	<0.1 mg/kg	TM181	11.7			1.48		
			#			#		
Nickel	<0.2 mg/kg	TM181	61.4			15.5		
			#			M		
Selenium	<1 mg/kg	TM181	3.5			<1		
			#			#		
Vanadium	<0.2 mg/kg	TM181	26.7			19.4		
			#			#		
Zinc	<1.9 mg/kg	TM181	528			118		
			#			M		
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.359			0.0521		
			#			M		



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

TPH CWG (S)

Results Legend		Customer Sample Ref.	TP03	TP04				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.		0.50	1.00				
diss.filt	Dissolved / filtered sample.		Soil/Solid (S)	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.		27/11/2017	27/11/2017				
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		29/11/2017	29/11/2017				
(F)	Trigger breach confirmed		171129-118	171129-118				
1-5&*\$@	Sample deviation (see appendix)		16657883	16657888				
			ES04	ES08				
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	39	72				
			2					
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	3530	<44				
			2 #	M				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5				
			2 #	#				
Benzene	<10 µg/kg	TM089	<10	<10				
			2 #	M				
Toluene	<2 µg/kg	TM089	46.6	7.2				
			2 #	M				
Ethylbenzene	<3 µg/kg	TM089	12.2	<3				
			2 #	M				
m,p-Xylene	<6 µg/kg	TM089	89.9	7.2				
			2 #	M				
o-Xylene	<3 µg/kg	TM089	42.2	3.6				
			2 #	M				
sum of detected mpo xylene by GC	<9 µg/kg	TM089	132	10.8				
			2					
sum of detected BTEX by GC	<24 µg/kg	TM089	191	<24				
			2					
Aliphatics >C5-C6	<10 µg/kg	TM089	38.9	<10				
			2					
Aliphatics >C6-C8	<10 µg/kg	TM089	118	<10				
			2					
Aliphatics >C8-C10	<10 µg/kg	TM089	624	<10				
			2					
Aliphatics >C10-C12	<10 µg/kg	TM089	1290	<10				
			2					
Aliphatics >C12-C16	<100 µg/kg	TM173	41400	1020				
Aliphatics >C16-C21	<100 µg/kg	TM173	168000	8250				
Aliphatics >C21-C35	<100 µg/kg	TM173	744000	45400				
Aliphatics >C35-C44	<100 µg/kg	TM173	94300	5420				
Total Aliphatics >C12-C44	<100 µg/kg	TM173	1050000	60000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10				
			2					
Aromatics >EC7-EC8	<10 µg/kg	TM089	46.6	<10				
			2					
Aromatics >EC8-EC10	<10 µg/kg	TM089	561	14.4				
			2					
Aromatics >EC10-EC12	<10 µg/kg	TM089	857	<10				
			2					
Aromatics >EC12-EC16	<100 µg/kg	TM173	201000	3380				
Aromatics >EC16-EC21	<100 µg/kg	TM173	1090000	28300				
Aromatics >EC21-EC35	<100 µg/kg	TM173	2770000	99400				
Aromatics >EC35-EC44	<100 µg/kg	TM173	482000	21200				
Aromatics >EC40-EC44	<100 µg/kg	TM173	140000	6910				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	4540000	152000				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	5590000	212000				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

VOC MS (S)

Results Legend		Customer Sample Ref.	TP03	TP04				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.		0.50	1.00				
diss.filt	Dissolved / filtered sample.		Soil/Solid (S)	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.		27/11/2017	27/11/2017				
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		29/11/2017	29/11/2017				
(F)	Trigger breach confirmed		171129-118	171129-118				
1-5&5@	Sample deviation (see appendix)		16657883	16657888				
			ES04	ES08				
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	102	103				
			2					
Toluene-D8	%	TM116	95.2	97.1				
			2					
4-bromofluorobenzene**	%	TM116	85	91.5				
			2					
Dichlorodifluoromethane	<6 µg/kg	TM116	<120	<60				
			2 #	M				
Chloromethane	<7 µg/kg	TM116	<140	<70				
			2 #	#				
Vinyl Chloride	<6 µg/kg	TM116	<120	<60				
			2 #	M				
Bromomethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Chloroethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Trichlorofluoromethane	<6 µg/kg	TM116	<120	<60				
			2 #	M				
1,1-Dichloroethene	<10 µg/kg	TM116	<200	<100				
			2 #	#				
Carbon Disulphide	<7 µg/kg	TM116	<140	<70				
			2 #	M				
Dichloromethane	<10 µg/kg	TM116	544	<100				
			2 #	#				
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<200	<100				
			2 #	M				
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,1-Dichloroethane	<8 µg/kg	TM116	<160	<80				
			2 #	M				
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<120	<60				
			2 #	M				
2,2-Dichloropropane	<10 µg/kg	TM116	<200	<100				
			2					
Bromochloromethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Chloroform	<8 µg/kg	TM116	<160	<80				
			2 #	M				
1,1,1-Trichloroethane	<7 µg/kg	TM116	<140	<70				
			2 #	M				
1,1-Dichloropropene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Carbontetrachloride	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,2-Dichloroethane	<5 µg/kg	TM116	<100	<50				
			2 #	M				
Benzene	<9 µg/kg	TM116	<180	<90				
			2 #	M				
Trichloroethene	<9 µg/kg	TM116	<180	<90				
			2 #	#				
1,2-Dichloropropane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Dibromomethane	<9 µg/kg	TM116	<180	<90				
			2 #	M				
Bromodichloromethane	<7 µg/kg	TM116	<140	<70				
			2 #	M				
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Toluene	<7 µg/kg	TM116	<140	<70				
			2 #	M				
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<200	<100				
			2					
1,1,2-Trichloroethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,3-Dichloropropane	<7 µg/kg	TM116	<140	<70				
			2 #	M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

VOC MS (S)

Results Legend		Customer Sample Ref.	TP03	TP04				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50	1.00				
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)				
aq	Aqueous / settled sample.		27/11/2017	27/11/2017				
diss.filt	Dissolved / filtered sample.		.	.				
tot.unfilt	Total / unfiltered sample.		29/11/2017	29/11/2017				
*	Subcontracted test.		171129-118	171129-118				
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16657883	16657888				
(F)	Trigger breach confirmed		ES04	ES08				
1-5&5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Tetrachloroethene	<5 µg/kg	TM116	<100	<50				
			2 #	M				
Dibromochloromethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,2-Dibromoethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Chlorobenzene	<5 µg/kg	TM116	<100	<50				
			2 #	M				
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Ethylbenzene	<4 µg/kg	TM116	<80	<40				
			2 #	M				
p/m-Xylene	<10 µg/kg	TM116	<200	<100				
			2 #	#				
o-Xylene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Styrene	<10 µg/kg	TM116	<200	<100				
			2 #	#				
Bromoform	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Isopropylbenzene	<5 µg/kg	TM116	<100	<50				
			2 #	#				
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<200	<100				
			2 #	#				
1,2,3-Trichloropropane	<16 µg/kg	TM116	<320	<160				
			2 #	M				
Bromobenzene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
Propylbenzene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
2-Chlorotoluene	<9 µg/kg	TM116	<180	<90				
			2 #	M				
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<160	<80				
			2 #	M				
4-Chlorotoluene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
tert-Butylbenzene	<14 µg/kg	TM116	<280	<140				
			2 #	M				
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<180	<90				
			2 #	#				
sec-Butylbenzene	<10 µg/kg	TM116	<200	<100				
			2					
4-Isopropyltoluene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,3-Dichlorobenzene	<8 µg/kg	TM116	<160	<80				
			2 #	M				
1,4-Dichlorobenzene	<5 µg/kg	TM116	<100	<50				
			2 #	M				
n-Butylbenzene	<11 µg/kg	TM116	<220	<110				
			2					
1,2-Dichlorobenzene	<10 µg/kg	TM116	<200	<100				
			2 #	M				
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<280	<140				
			2 #	M				
Tert-amyl methyl ether	<10 µg/kg	TM116	<200	<100				
			2 #	#				
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<400	<200				
			2					
Hexachlorobutadiene	<20 µg/kg	TM116	<400	<200				
			2					
Naphthalene	<13 µg/kg	TM116	2930	<130				
			2 #	M				
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<400	<200				
			2 #	#				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP03 ES 04 0.50 SOLID 27/11/2017 00:00:00 01/12/2017 14:21:31 171129-118 16657883 TM048	08/12/2017	Barbara Urbanek-Walsh	Loose fibres in soil.	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP04 ES 08 1.00 SOLID 27/11/2017 00:00:00 01/12/2017 14:00:53 171129-118 16657888 TM048	08/12/2017	Barbara Urbanek-Walsh	Soil containing ACM debris and loose fibres.	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNLEY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference	
Mass Sample taken (kg)	0.179
Mass of dry sample (kg)	0.175
Particle Size <4mm	>95%

Site Location	BARNLEY
Natural Moisture Content (%)	2.25
Dry Matter Content (%)	97.8

Case	
SDG	171129-118
Lab Sample Number(s)	16657884
Sampled Date	27-Nov-2017
Customer Sample Ref.	TP03 ES06
Depth (m)	1.00

Solid Waste Analysis

Total Organic Carbon (%)	-
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	-
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00828	<0.0005	0.0166	<0.001	0.5	2	25
Barium	0.0329	<0.0002	0.0658	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.00295	<0.0003	0.0059	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.0265	<0.0005	0.053	<0.001	0.5	10	30
Nickel	0.00325	<0.0004	0.0065	<0.0008	0.4	10	40
Lead	0.00202	<0.0002	0.00404	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.000812	<0.0005	0.00162	<0.001	0.1	0.5	7
Zinc	0.0052	<0.001	0.0104	<0.002	4	50	200
Chloride	35.2	<2	70.4	<4	800	15000	25000
Fluoride	<0.5	<0.5	<1	<1	10	150	500
Sulphate (soluble)	249	<2	498	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	242	<12	484	<24	500	800	1000

Leach Test Information

Date Prepared	05-Dec-2017
pH (pH Units)	7.94
Conductivity (µS/cm)	689.00
Temperature (°C)	17.50
Volume Leachant (Litres)	0.346
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates
03/01/2018 08:36:39

08:36:21 03/01/2018



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	BARNSELY
Mass Sample taken (kg)	0.179	Natural Moisture Content (%)	2.25
Mass of dry sample (kg)	0.175	Dry Matter Content (%)	97.8
Particle Size <4mm	>95%		

Case	
SDG	171129-118
Lab Sample Number(s)	16657884
Sampled Date	27-Nov-2017
Customer Sample Ref.	TP03 ES06
Depth (m)	1.00

Solid Waste Analysis

Total Organic Carbon (%)	-
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	-
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	7.4	<0.001	15	<0.002	-	-	-	-
Calcium	105	<0.012	210	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	3.45	<0.005	6.9	<0.01	-	-	-	-
2-methylphenol	6.85	<0.005	13.7	<0.01	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Magnesium	35.6	<0.036	71.2	<0.072	-	-	-	-
Phenol by HPLC (W)	43.7	<0.02	87.4	<0.04	-	-	-	-
3-methylphenol	13.3	<0.025	26.6	<0.05	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Cresols by HPLC (W)	50.9	<0.06	102	<0.12	-	-	-	-
4-methylphenol	5.73	<0.025	11.5	<0.05	-	-	-	-
Iron	0.257	<0.019	0.514	<0.038	-	-	-	-
Xylenols by HPLC (W)	39.7	<0.08	79.4	<0.16	-	-	-	-
2-chlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
Boron	0.118	<0.005	0.236	<0.01	-	-	-	-
Hardness Total	409	<1	818	<2	-	-	-	-
2,4-dimethylphenol	16.7	<0.025	33.4	<0.05	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	1.51	<0.03	3.02	<0.06	-	-	-	-

Leach Test Information

Date Prepared	05-Dec-2017
pH (pH Units)	7.94
Conductivity (µS/cm)	689.00
Temperature (°C)	17.50
Volume Leachant (Litres)	0.346
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.179

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

BARNSELY

Natural Moisture Content (%) 2.25

Dry Matter Content (%) 97.8

Case

SDG 171129-118

Lab Sample Number(s) 16657884

Sampled Date 27-Nov-2017

Customer Sample Ref. TP03 ES06

Depth (m) 1.00

Solid Waste Analysis

Total Organic Carbon (%) -

Loss on Ignition (%) -

Sum of BTEX (mg/kg) -

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) -

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
2-Isopropyl Phenol by HPLC (W)	10.2	<0.06	20.4	<0.12	-	-	-	-
4-chloro-3-methylphenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
2,6-dichlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
4-chlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	146	<0.025	292	<0.05	-	-	-	-
2,4-dichlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
2-nitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
2,4,6-trichlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
2,4,5-trichlorophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
4-nitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
2,3,5,6-tetrachlorophenol	0.00908	<0.005	0.0182	<0.01	-	-	-	-
Manganese	0.186	<0.001	0.372	<0.002	-	-	-	-
2,3,4,6-tetrachlorophenol	0.00861	<0.005	0.0172	<0.01	-	-	-	-
2,4-Dinitrophenol	<0.025	<0.025	<0.05	<0.05	-	-	-	-
DNOC	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Pentachlorophenol	<0.02	<0.02	<0.04	<0.04	-	-	-	-
Dinoseb	<0.04	<0.04	<0.08	<0.08	-	-	-	-
Vanadium	0.00181	<0.001	0.00362	<0.002	-	-	-	-

Leach Test Information

Date Prepared 05-Dec-2017

pH (pH Units) 7.94

Conductivity (µS/cm) 689.00

Temperature (°C) 17.50

Volume Leachant (Litres) 0.346

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

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Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNLEY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference	
Mass Sample taken (kg)	0.211
Mass of dry sample (kg)	0.175
Particle Size <4mm	>95%

Site Location	BARNLEY
Natural Moisture Content (%)	20.8
Dry Matter Content (%)	82.8

Case	
SDG	171129-118
Lab Sample Number(s)	16657887
Sampled Date	27-Nov-2017
Customer Sample Ref.	TP04 ES04
Depth (m)	0.50

Solid Waste Analysis

Total Organic Carbon (%)	-
Loss on Ignition (%)	-
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	-
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00502	<0.0005	0.01	<0.001	0.5	2	25
Barium	0.447	<0.0002	0.894	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.00321	<0.0003	0.00642	<0.0006	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.00461	<0.0005	0.00922	<0.001	0.5	10	30
Nickel	0.000541	<0.0004	0.00108	<0.0008	0.4	10	40
Lead	0.00543	<0.0002	0.0109	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	<0.0005	<0.0005	<0.001	<0.001	0.1	0.5	7
Zinc	0.0107	<0.001	0.0214	<0.002	4	50	200
Chloride	3	<2	6	<4	800	15000	25000
Fluoride	0.582	<0.5	1.16	<1	10	150	500
Sulphate (soluble)	14	<2	28	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	<3	<3	<6	<6	500	800	1000

Leach Test Information

Date Prepared	04-Dec-2017
pH (pH Units)	9.00
Conductivity (µS/cm)	140.00
Temperature (°C)	18.40
Volume Leachant (Litres)	0.314
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNLEY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference		Site Location	BARNLEY
Mass Sample taken (kg)	0.211	Natural Moisture Content (%)	20.8
Mass of dry sample (kg)	0.175	Dry Matter Content (%)	82.8
Particle Size <4mm	>95%		

Case

SDG 171129-118
Lab Sample Number(s) 16657887
Sampled Date 27-Nov-2017
Customer Sample Ref. TP04 ES04
Depth (m) 0.50

Solid Waste Analysis

Total Organic Carbon (%) -
Loss on Ignition (%) -
Sum of BTEX (mg/kg) -
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) -
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.2	<0.001	18	<0.002	-	-	-	-
Calcium	12.2	<0.012	24.4	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol by HPLC (W)	0.00059	<0.0005	0.00118	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	3.55	<0.036	7.1	<0.072	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	0.0023	<0.0005	0.0046	<0.001	-	-	-	-
Iron	0.525	<0.019	1.05	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.0744	<0.005	0.149	<0.01	-	-	-	-
Hardness Total	45.1	<1	90.2	<2	-	-	-	-
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	0.00289	<0.00064	0.00578	<0.00128	-	-	-	-
Manganese	0.00878	<0.001	0.0176	<0.002	-	-	-	-
Vanadium	0.00942	<0.001	0.0188	<0.002	-	-	-	-

Leach Test Information

Date Prepared 04-Dec-2017
pH (pH Units) 9.00
Conductivity (µS/cm) 140.00
Temperature (°C) 18.40
Volume Leachant (Litres) 0.314
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
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Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELY

Client Reference: TA8066
Order Number:

Report Number: 438657
Superseded Report: 437622

Test Completion Dates

Lab Sample No(s)	16657883	16657884	16657887	16657888
Customer Sample Ref.	TP03	TP03	TP04	TP04
AGS Ref.	ES04	ES06	ES04	ES08
Depth	0.50	1.00	0.50	1.00
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen		08-Dec-2017	06-Dec-2017	
Anions by Kone (soil)	06-Dec-2017			06-Dec-2017
Anions by Kone (w)		08-Dec-2017	07-Dec-2017	
Asbestos ID in Solid Samples	08-Dec-2017			08-Dec-2017
CEN 2:1 Leachate (1 Stage)		05-Dec-2017	21-Dec-2017	
CEN Readings		06-Dec-2017	27-Dec-2017	
Chromium III	07-Dec-2017	08-Dec-2017	06-Dec-2017	12-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate	06-Dec-2017	08-Dec-2017	07-Dec-2017	06-Dec-2017
Dissolved Metals by ICP-MS		08-Dec-2017	06-Dec-2017	
Dissolved Organic/Inorganic Carbon		08-Dec-2017	07-Dec-2017	
EPH CWG (Aliphatic) GC (S)	06-Dec-2017			06-Dec-2017
EPH CWG (Aromatic) GC (S)	06-Dec-2017			06-Dec-2017
Fluoride		08-Dec-2017	07-Dec-2017	
GRO by GC-FID (S)	08-Dec-2017			08-Dec-2017
Hexavalent Chromium (s)	07-Dec-2017			08-Dec-2017
Hexavalent Chromium (w)		07-Dec-2017	06-Dec-2017	
Low Level Phenols by HPLC (W)			16-Dec-2017	
Mercury Dissolved		08-Dec-2017	07-Dec-2017	
Metals by iCap-OES Dissolved (W)		08-Dec-2017	06-Dec-2017	
Metals in solid samples by OES	08-Dec-2017			12-Dec-2017
PAH by GCMS	07-Dec-2017			07-Dec-2017
pH	06-Dec-2017			06-Dec-2017
pH Value of Filtered Water		07-Dec-2017	07-Dec-2017	
Phenols by HPLC (S)	08-Dec-2017			05-Dec-2017
Phenols by HPLC (W)		08-Dec-2017		
Phenols by ms (w)		19-Dec-2017	03-Jan-2018	
Phenols Spec MS (S)	07-Dec-2017			07-Dec-2017
Sample description	01-Dec-2017	01-Dec-2017	01-Dec-2017	01-Dec-2017
Total Organic Carbon	06-Dec-2017			05-Dec-2017
Total Sulphur	05-Dec-2017			04-Dec-2017
TPH CWG GC (S)	08-Dec-2017			08-Dec-2017
VOC MS (S)	08-Dec-2017			08-Dec-2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171129-118
Location: BARNSELYClient Reference: TA8066
Order Number:Report Number: 438657
Superseded Report: 437622

ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1679	QC 1686
Ammoniacal Nitrogen as N	TM099	100.0 93.47 : 108.25	100.0 91.84 : 108.16

Anions by Kone (soil)

Component	Method Code	QC 1644	QC 1632
Chloride (soluble)	TM243	89.30 : 110.70	89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 : 129.55	70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1656	QC 1678
Chloride	TM184	102.0 92.93 : 115.43	103.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40	96.40 : 108.40
Sulphate (soluble)	TM184	105.2 90.53 : 113.03	104.8 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21	96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1643	QC 1615	QC 1696	QC 1605
Free Cyanide	TM153	93.3 84.60 : 110.40	92.0 84.60 : 110.40		
Free Cyanide (W)	TM227			104.75 93.25 : 112.75	101.5 93.25 : 112.75
Thiocyanate	TM153	90.42 83.02 : 103.47	89.22 83.02 : 103.47		
Thiocyanate (W)	TM227			105.25 97.75 : 109.75	104.25 97.75 : 109.75
Total Cyanide	TM153	99.29 87.53 : 111.13	97.86 87.53 : 111.13		
Total Cyanide (W)	TM227			108.75 95.25 : 111.75	105.5 95.25 : 111.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 1689	QC 1682
Aluminium	TM152	99.33 90.09 : 112.69	98.0 89.90 : 110.02
Antimony	TM152	103.33 81.00 : 119.70	105.83 79.80 : 122.00
Arsenic	TM152	105.5 92.40 : 113.00	106.0 90.42 : 111.32



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Dissolved Metals by ICP-MS

		QC 1689	QC 1682
Barium	TM152	100.83 93.11 : 112.81	101.5 92.02 : 112.48
Beryllium	TM152	99.5 88.27 : 113.27	99.67 86.15 : 118.35
Bismuth	TM152	103.17 86.72 : 115.61	103.0 88.90 : 106.90
Borate	TM152		94.44 88.00 : 112.00
Boron	TM152	92.0 86.47 : 111.70	94.33 86.68 : 117.67
Cadmium	TM152	102.67 90.28 : 114.48	103.0 92.07 : 109.87
Chromium	TM152	100.0 91.07 : 114.29	102.33 90.87 : 108.50
Cobalt	TM152	99.33 89.58 : 114.68	102.17 84.39 : 114.26
Copper	TM152	97.33 88.45 : 117.93	103.17 91.20 : 110.79
Lead	TM152	100.33 89.25 : 115.12	102.0 85.65 : 113.58
Lithium	TM152	94.67 88.50 : 116.05	97.5 89.26 : 119.04
Manganese	TM152	102.0 91.63 : 112.33	102.83 90.63 : 109.13
Molybdenum	TM152	100.33 91.08 : 111.63	99.5 87.00 : 108.89
Nickel	TM152	95.83 89.60 : 117.38	101.5 92.11 : 110.56
Niobium	TM152	96.38 : 128.85	
Phosphorus	TM152	98.5 90.43 : 111.75	103.17 90.52 : 115.47
Selenium	TM152	106.5 88.13 : 108.33	102.83 88.44 : 113.86
Silver	TM152	92.0 90.04 : 97.49	89.67 81.52 : 114.92
Strontium	TM152	104.67 91.27 : 106.32	98.67 90.72 : 114.82
Tellurium	TM152	101.33 81.16 : 111.23	98.67 86.97 : 108.87
Thallium	TM152	96.5 81.70 : 117.09	96.0 80.92 : 114.72
Titanium	TM152	101.33 89.62 : 110.62	95.83 90.08 : 111.18
Tungsten	TM152	97.83 90.13 : 111.33	98.33 91.72 : 109.22
Uranium	TM152	99.5 92.30 : 116.90	97.5 90.58 : 113.28
Vanadium	TM152	105.17 88.22 : 118.55	102.17 88.43 : 114.30
Zinc	TM152	102.33 89.30 : 115.44	104.33 86.52 : 115.27
Zirconium	TM152	85.51 : 109.42	



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Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1630	QC 1606
Dissolved Inorganic Carbon	TM090	101.33 91.15 : 111.35	101.17 94.43 : 110.53
Dissolved Organic Carbon	TM090	103.33 94.18 : 111.18	106.67 99.25 : 108.95

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1675
Total Aliphatics >C12-C35	TM173	87.92 70.76 : 104.69

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1675
Total Aromatics >EC12-EC35	TM173	92.67 68.16 : 102.29

Fluoride

Component	Method Code	QC 1678	QC 1606
Fluoride	TM104	98.0 92.67 : 104.67	99.33 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1674
Benzene by GC (Moisture Corrected)	TM089	109.5 78.80 : 119.54
Ethylbenzene by GC (Moisture Corrected)	TM089	114.5 78.42 : 121.07
m & p Xylene by GC (Moisture Corrected)	TM089	114.75 77.69 : 121.76
MTBE GC-FID (Moisture Corrected)	TM089	103.5 77.69 : 125.19
o Xylene by GC (Moisture Corrected)	TM089	112.5 77.88 : 121.47
QC	TM089	100.14 69.62 : 106.27
Toluene by GC (Moisture Corrected)	TM089	111.0 78.31 : 121.42

Hexavalent Chromium (s)



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Hexavalent Chromium (s)

Component	Method Code	QC 1647	QC 1692
Hexavalent Chromium	TM151	92.0 90.20 : 107.00	96.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1628	QC 1612
Hexavalent Chromium	TM241	97.6 92.00 : 104.00	99.6 92.00 : 104.00

Mercury Dissolved

Component	Method Code	QC 1660	QC 1651
Mercury Dissolved (CVAf)	TM183	95.7 73.51 : 120.83	93.6 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1651	QC 1692
Calcium	TM228	95.5 86.15 : 110.75	104.0 86.15 : 110.75
Iron	TM228	87.33 77.20 : 102.80	97.33 77.20 : 102.80
Magnesium	TM228	95.1 83.80 : 108.64	104.0 83.80 : 108.64
Potassium	TM228	94.7 85.58 : 109.10	106.0 85.58 : 109.10
Sodium	TM228	95.6 84.00 : 111.30	103.0 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1609	QC 1670
Aluminium	TM181	89.63 75.13 : 109.48	93.33 80.01 : 112.97
Antimony	TM181	97.3 84.48 : 110.90	100.77 84.48 : 118.55
Arsenic	TM181	91.52 83.14 : 108.73	96.4 87.69 : 109.58
Barium	TM181	96.88 77.47 : 102.53	95.31 81.38 : 110.22
Beryllium	TM181	95.55 84.19 : 106.77	95.21 85.83 : 108.41
Boron	TM181	90.4 76.55 : 106.69	90.96 83.88 : 109.63



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Metals in solid samples by OES

		QC 1609	QC 1670
Cadmium	TM181	93.62 86.37 : 111.59	96.81 88.34 : 110.05
Chromium	TM181	98.1 81.29 : 118.71	99.37 81.29 : 118.71
Cobalt	TM181	92.16 85.45 : 109.14	96.24 87.71 : 110.26
Copper	TM181	96.51 81.33 : 103.33	93.45 85.64 : 106.59
Iron	TM181	97.92 82.44 : 111.71	99.31 81.99 : 118.01
Lead	TM181	88.94 83.33 : 106.95	93.4 86.25 : 109.61
Manganese	TM181	91.52 80.56 : 102.33	90.51 82.29 : 105.35
Mercury	TM181	95.69 84.13 : 111.85	99.22 87.62 : 110.64
Molybdenum	TM181	93.44 84.19 : 110.39	98.07 86.47 : 109.19
Nickel	TM181	93.24 84.19 : 109.77	95.8 87.43 : 110.63
Phosphorus	TM181	90.72 73.47 : 116.86	93.26 77.53 : 107.97
Selenium	TM181	94.96 81.32 : 108.59	94.96 86.31 : 108.23
Strontium	TM181	94.08 84.70 : 105.87	93.87 86.88 : 109.57
Thallium	TM181	94.53 81.19 : 105.37	94.14 85.06 : 112.06
Tin	TM181	93.62 85.92 : 110.00	96.81 85.70 : 112.34
Titanium	TM181	85.38 73.44 : 113.17	92.31 80.40 : 114.25
Vanadium	TM181	91.41 81.86 : 105.26	93.87 84.96 : 106.52
Zinc	TM181	96.34 85.64 : 110.14	97.73 87.17 : 108.73

PAH by GCMS

Component	Method Code	QC 1694	QC 1670
Acenaphthene	TM218	96.0 82.09 : 110.18	92.0 78.17 : 114.45
Acenaphthylene	TM218	94.5 77.92 : 100.70	89.5 73.70 : 105.55
Anthracene	TM218	94.5 79.96 : 103.02	90.5 50.58 : 133.35
Benz(a)anthracene	TM218	104.0 80.00 : 122.30	104.0 73.03 : 124.35
Benzo(a)pyrene	TM218	106.0 86.92 : 126.33	102.0 76.86 : 123.01
Benzo(b)fluoranthene	TM218	96.0 84.53 : 122.14	93.0 75.92 : 130.86
Benzo(ghi)perylene	TM218	92.5 77.49 : 119.12	89.5 80.30 : 117.80



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PAH by GCMS

		QC 1694	QC 1670
Benzo(k)fluoranthene	TM218	101.5 88.94 : 117.08	98.5 81.49 : 113.89
Chrysene	TM218	104.5 87.67 : 116.32	99.5 77.31 : 114.50
Dibenzo(ah)anthracene	TM218	102.5 85.66 : 119.61	99.0 77.77 : 118.30
Fluoranthene	TM218	96.5 84.49 : 109.33	92.0 80.77 : 108.59
Fluorene	TM218	99.0 84.28 : 107.54	96.0 79.13 : 110.70
Indeno(123cd)pyrene	TM218	102.5 86.46 : 120.70	98.5 78.65 : 117.12
Naphthalene	TM218	98.5 82.88 : 115.56	95.0 77.09 : 108.37
Phenanthrene	TM218	95.0 81.59 : 110.61	93.0 76.02 : 112.05
Pyrene	TM218	96.0 83.25 : 107.60	92.5 79.98 : 107.66

pH

Component	Method Code	QC 1623
pH	TM133	100.91 99.61 : 101.95

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pH Value of Filtered Water

Component	Method Code	QC 1601	QC 1637
pH Value of Filtered Water	TM256	100.94 99.73 : 102.16	101.62 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1607	QC 1619
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	96.1 70.10 : 89.90	94.16 85.25 : 114.75
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	95.32 84.69 : 104.79	86.55 75.71 : 124.29
Catechol by HPLC (S)	TM062 (S)	70.48 24.84 : 108.44	112.38 64.10 : 135.90
Cresols by HPLC (S)	TM062 (S)	92.69 72.20 : 110.60	89.56 78.85 : 107.41
Napthol by HPLC (S)	TM062 (S)	109.29 91.99 : 139.23	120.0 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	113.91 82.00 : 107.15	104.64 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	137.74 96.51 : 136.70	152.2 86.85 : 145.65



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Phenols by HPLC (S)

		QC 1607	QC 1619
Xylenols by HPLC (S)	TM062 (S)	101.46 82.47 : 110.25	97.81 84.65 : 109.70

Phenols by HPLC (W)

Component	Method Code	QC 1662
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	95.0 92.00 : 110.00
2-Isopropyl Phenol by HPLC (W)	TM259	101.0 84.00 : 138.00
Cresols by HPLC (W)	TM259	95.33 88.33 : 106.33
Napthol by HPLC (W)	TM259	101.0 84.00 : 108.00
Phenol by HPLC (W)	TM259	102.0 93.00 : 111.00
Xylenols by HPLC (W)	TM259	99.17 90.50 : 113.50

Phenols by ms (w)

Component	Method Code	QC 1634	QC 1601
2,3,4,6-tetrachlorophenol	TM205	97.5 61.39 : 121.01	101.63 61.39 : 121.01
2,4,5-trichlorophenol	TM205	103.63 68.35 : 126.10	108.88 68.35 : 126.10
2,4,6-trichlorophenol	TM205	100.63 63.79 : 126.64	106.88 63.79 : 126.64
2,4-dichlorophenol	TM205	101.87 65.30 : 128.60	107.38 65.30 : 128.60
2,4-dimethylphenol	TM205	94.5 57.50 : 131.00	113.38 57.50 : 131.00
2,6-dichlorophenol	TM205	101.5 63.93 : 129.85	104.63 63.93 : 129.85
2-chlorophenol	TM205	98.63 64.51 : 127.89	106.63 64.51 : 127.89
2-methylphenol	TM205	100.25 61.66 : 132.61	110.5 61.66 : 132.61
2-nitrophenol	TM205	95.5 58.88 : 126.38	92.25 58.88 : 126.38
3-methylphenol	TM205	102.13 70.73 : 131.40	112.63 70.73 : 131.40
4-chloro-3-methylphenol	TM205	104.88 73.70 : 129.95	114.13 73.70 : 129.95
4-methylphenol	TM205	102.87 67.13 : 130.58	113.25 67.13 : 130.58
4-nitrophenol	TM205	104.75 68.50 : 136.75	112.63 68.50 : 136.75
Pentachlorophenol	TM205	76.25 47.74 : 105.49	87.13 47.74 : 105.49
Phenol	TM205	101.63 60.43 : 134.90	111.63 60.43 : 134.90

Total Organic Carbon



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Total Organic Carbon

Component	Method Code	QC 1649	QC 1652
Total Organic Carbon	TM132	100.91 75.74 : 101.50	103.65 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1691	QC 1677
Total Sulphur %	TM132	91.37 81.05 : 118.95	96.46 81.05 : 118.95

VOC MS (S)

Component	Method Code	QC 1605
1,1,1,2-tetrachloroethane	TM116	92.6 77.56 : 115.55
1,1,1-Trichloroethane	TM116	96.6 74.97 : 113.76
1,1,2-Trichloroethane	TM116	88.8 77.12 : 116.04
1,1-Dichloroethane	TM116	105.4 74.46 : 129.15
1,2-Dichloroethane	TM116	104.0 82.41 : 125.49
1,4-Dichlorobenzene	TM116	91.8 72.76 : 126.34
2-Chlorotoluene	TM116	83.8 69.73 : 114.13
4-Chlorotoluene	TM116	87.8 66.90 : 112.46
Benzene	TM116	101.6 81.05 : 117.28
Carbon Disulphide	TM116	94.6 74.91 : 122.14
Carbontetrachloride	TM116	102.8 77.80 : 119.23
Chlorobenzene	TM116	92.2 75.00 : 115.53
Chloroform	TM116	97.8 77.34 : 121.84
Chloromethane	TM116	80.4 52.63 : 138.74
Cis-1,2-Dichloroethene	TM116	102.2 74.69 : 124.27
Dibromomethane	TM116	88.0 67.80 : 121.75
Dichloromethane	TM116	101.6 81.11 : 133.25



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VOC MS (S)

		QC 1605
Ethylbenzene	TM116	86.8 72.53 : 109.84
Hexachlorobutadiene	TM116	75.2 23.60 : 154.69
Isopropylbenzene	TM116	69.2 54.46 : 125.44
Naphthalene	TM116	98.4 74.47 : 129.31
o-Xylene	TM116	77.2 67.46 : 102.22
p/m-Xylene	TM116	79.5 68.32 : 108.91
Sec-Butylbenzene	TM116	68.6 50.86 : 134.07
Tetrachloroethene	TM116	91.6 76.95 : 121.02
Toluene	TM116	90.6 74.24 : 107.42
Trichloroethene	TM116	95.6 77.61 : 111.54
Trichlorofluoromethane	TM116	89.6 70.00 : 130.00
Vinyl Chloride	TM116	97.8 68.05 : 125.93

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.

The figure detailed is the percentage recovery result for the AQC.

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.



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Location:	BARNLEY	Order Number:		Superseded Report:	437622

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



ALS Environmental Analytical Services

Asbestos Report

SDGnumber : 171207-151
Client Reference: TA8066
Attention : Mark Burton

Location : Glassworks Barnsley
Order No. :
Date Received : 07/12/2017 07:00:00

Asbestos Identification - Soil

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Customer Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS38 ES 3 1.00 - 1.20 SOLID 01/12/2017 00:00:00 11/12/2017 15:38:50 171207-151 16711584 TM048	15/12/2017	Neville Mann	Loose fibres in soil	Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

DRAFT



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Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528700

Fax: (01244) 528701

email: hawardencustomerservices@alsglobal.com

Website: www.alsenvironmental.co.uk

Soil Engineering
Parkside Lane
Dewsbury Road
Leeds
West Yorkshire
LS11 5SX

Attention: Jon Duxbury

CERTIFICATE OF ANALYSIS

Date: 22 December 2017
Customer: H_SOILENG_LEE
Sample Delivery Group (SDG): 171207-151
Your Reference: TA8066
Location: Glassworks Barnsley
Report No: 438042

We received 28 samples on Thursday December 07, 2017 and 8 of these samples were scheduled for analysis which was completed on Friday December 22, 2017. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16711572	BH01	ES1	0.20	01/12/2017
16711573	DP34	ES1	0.20 - 0.50	01/12/2017
16711574	DP34	ES2	0.50 - 1.00	01/12/2017
16711575	DP34	ES3	1.00 - 1.20	01/12/2017
16711576	DP35	ES1	0.20 - 0.50	01/12/2017
16711577	DP35	ES2	0.50 - 1.00	01/12/2017
16711578	DP35	ES3	1.00 - 1.20	01/12/2017
16711579	DP36	ES1	0.20 - 0.50	01/12/2017
16711580	DP36	ES2	0.50 - 1.00	01/12/2017
16711581	DP36	ES3	1.00 - 1.20	01/12/2017
16711558	WS07	ES1	0.20 - 0.50	01/12/2017
16711559	WS07	ES2	0.50 - 1.00	01/12/2017
16711560	WS07	ES3	1.00 - 1.20	01/12/2017
16711561	WS15	ES1	0.20 - 0.50	01/12/2017
16711562	WS15	ES2	0.50 - 1.00	01/12/2017
16711563	WS15	ES3	1.00 - 1.20	01/12/2017
16711564	WS33	ES1	0.20 - 0.50	01/12/2017
16711565	WS33	ES2	0.50 - 1.00	01/12/2017
16711566	WS33	ES3	1.00 - 1.20	01/12/2017
16711567	WS33	ES10	1.20 - 2.00	01/12/2017
16711582	WS38	ES1	0.20 - 0.50	01/12/2017
16711583	WS38	ES2	0.50 - 1.00	01/12/2017
16711584	WS38	ES3	1.00 - 1.20	01/12/2017
16711585	WS38	ES10	1.20 - 2.00	01/12/2017
16711571	WS40	ES3	1.00 - 1.20	01/12/2017
16711568	WS44	ES1	0.20 - 0.50	01/12/2017
16711569	WS44	ES2	0.50 - 1.00	01/12/2017
16711570	WS44	ES10	1.20 - 2.00	01/12/2017

Maximum Sample/Coolbox Temperature (°C) :

11

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type										
						16711558	16711561	16711562	16711565	16711566	16711567	16711584			
						WS07	WS15	WS15	WS33	WS33	WS33	WS38			
						ES1	ES1	ES2	ES2	ES3	ES10	ES3			
						0.20 - 0.50	0.20 - 0.50	0.50 - 1.00	0.50 - 1.00	1.00 - 1.20	1.20 - 2.00	1.00 - 1.20			
						60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215) 250g Amber Jar (ALE210) 1kg TUB	1kg Glass			
						S	S	S	S	S	S	S			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2													
ANC at pH4 and ANC at pH 6	All	NDPs: 0 Tests: 2													
Anions by Kone (soil)	All	NDPs: 0 Tests: 6													
Anions by Kone (w)	All	NDPs: 0 Tests: 4													
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 6													
CEN Readings	All	NDPs: 0 Tests: 4													
Chromium III	All	NDPs: 0 Tests: 7													
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 7													
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4													
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 4													
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 6													
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 6													
Fluoride	All	NDPs: 0 Tests: 4													
GRO by GC-FID (S)	All	NDPs: 0 Tests: 8													
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 6													



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	16711584	WS38	ES3	1.00 - 1.20	1 kg Glass	S						
	16711567	WS33	ES10	1.20 - 2.00	60g VOC (ALE215)	S						
					250g Amber Jar (ALE210)	S						
					1kg TUB	S						
					60g VOC (ALE215)	S						
Hexavalent Chromium (w)	All	NDPs: 0 Tests: 2										
Loss on Ignition in soils	All	NDPs: 0 Tests: 2										
Low Level Phenols by HPLC (W)	All	NDPs: 0 Tests: 2										
Mercury Dissolved	All	NDPs: 0 Tests: 4										
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 2										
Metals in solid samples by OES	All	NDPs: 0 Tests: 6										
Mineral Oil	All	NDPs: 0 Tests: 2										
PAH by GCMS	All	NDPs: 0 Tests: 8										
PCBs by GCMS	All	NDPs: 0 Tests: 2										
pH	All	NDPs: 0 Tests: 8										
pH Value of Filtered Water	All	NDPs: 0 Tests: 2										
Phenols by HPLC (S)	All	NDPs: 0 Tests: 6										
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2										
Phenols by ms (w)	All	NDPs: 0 Tests: 2										
Phenols Spec MS (S)	All	NDPs: 0 Tests: 6										



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Results Legend

X Test
N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type																
						16711558	16711561	16711562	16711565	16711566	16711567	16711584	16711584	16711584	16711584	16711584	16711584	16711584	16711584	16711584	16711584
						WS07	WS15	WS15	WS33	WS33	WS33	WS38	WS38	WS38	WS38	WS38	WS38	WS38	WS38	WS38	WS38
						ES1	ES1	ES2	ES2	ES3	ES10	ES3	ES3	ES3	ES3	ES3	ES3	ES3	ES3	ES3	ES3
						0.20 - 0.50	0.20 - 0.50	0.50 - 1.00	0.50 - 1.00	1.00 - 1.20	1.20 - 2.00	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20	1.00 - 1.20
						60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)	60g VOC (ALE215)
						250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)
						1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB	1kg TUB
						S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Sample description	All	NDPs: 0 Tests: 8																			
Total Dissolved Solids	All	NDPs: 0 Tests: 2																			
Total Organic Carbon	All	NDPs: 0 Tests: 8																			
Total Sulphur	All	NDPs: 0 Tests: 6																			
TPH CWG GC (S)	All	NDPs: 0 Tests: 6																			
VOC MS (S)	All	NDPs: 0 Tests: 6																			



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
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Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
16711558	WS07	0.20 - 0.50	Light Brown	Sandy Loam	Stones	None
16711561	WS15	0.20 - 0.50	Dark Brown	Sandy Loam	Stones	None
16711562	WS15	0.50 - 1.00	Dark Brown	Sandy Loam	Stones	None
16711565	WS33	0.50 - 1.00	Dark Brown	Sandy Clay	Vegetation	Stones
16711566	WS33	1.00 - 1.20	Dark Brown	Sandy Clay	Stones	None
16711567	WS33	1.20 - 2.00	Grey	Clay	Stones	None
16711584	WS38	1.00 - 1.20	Dark Brown	Sandy Clay	Crushed Brick	Stones
16711571	WS40	1.00 - 1.20	Dark Brown	Sandy Clay	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

DRAFT



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Results Legend		Customer Sample Ref.	WS07	WS15	WS15	WS33	WS33	WS33
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	5.7	8.8	10	18	17	18
Loss on ignition	<0.7 %	TM018		2.22			7.66	
				M			M	
Mineral oil >C10-C40	<1 mg/kg	TM061		87.9			31.9	
Mineral Oil Surrogate % recovery**	%	TM061		79.9			81.8	
Phenol	<0.01 mg/kg	TM062 (S)	<0.01		<0.01	<0.01		<0.01
			M		M	M		M
Cresols	<0.01 mg/kg	TM062 (S)	<0.01		<0.01	<0.01		<0.01
			M		M	M		M
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015		<0.015	<0.015		<0.015
			M		M	M		M
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01		<0.01	<0.01		<0.01
			M		M	M		M
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015		<0.015	<0.015		<0.015
			M		M	M		M
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06		<0.06	<0.06		<0.06
			M		M	M		M
Organic Carbon, Total	<0.2 %	TM132		0.741			3.12	
				M			M	
Sulphur, Total	<0.02 %	TM132	<0.02		0.0541	0.137		<0.02
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.00576		0.0213	0.0631		0.0125
			#		#	#		#
pH	1 pH Units	TM133	9.52	9.2	9.16	8.66	8.29	8.51
			M	M	M	M	M	M
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6		<0.6	<0.6		<0.6
			#		#	#		#
Cyanide, Free	<1 mg/kg	TM153	<1		<1	<1		<1
			M		M	M		M
PCB congener 28	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 52	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 101	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 118	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 138	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 153	<3 µg/kg	TM168		<3			<3	
				M			M	
PCB congener 180	<3 µg/kg	TM168		<3			<3	
				M			M	
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168		<21			<21	
Chromium, Trivalent	<0.9 mg/kg	TM181	3.64		7.63	14.2		18.8
Antimony	<0.6 mg/kg	TM181	<0.6		<0.6	1.18		0.831
			#		#	#		#
Arsenic	<0.6 mg/kg	TM181	19.1		6.21	14.7		12.9
			M		M	M		M
Barium	<0.6 mg/kg	TM181	27		93.8	142		92.5
			#		#	#		#
Beryllium	<0.01 mg/kg	TM181	0.115		0.422	2.05		1.38
			M		M	M		M
Boron	<0.7 mg/kg	TM181	3.41		10.6	11.9		3.87
			#		#	#		#
Cadmium	<0.02 mg/kg	TM181	0.341		0.414	0.0225		0.227
			M		M	M		M
Copper	<1.4 mg/kg	TM181	44.6		16.7	61.1		55.2
			M		M	M		M
Iron	<1000 mg/kg	TM181	6080		11200	23100		26900
			#		#	#		#



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks BarnsleyClient Reference: TA8066
Order Number:Report Number: 438042
Superseded Report:

Results Legend		Customer Sample Ref.	WS38	WS40				
#	ISO17025 accredited.							
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Moisture Content Ratio (% of as received sample)	%	PM024	10	22				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Cresols	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01	<0.01				
			M	M				
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015	<0.015				
			M	M				
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06	<0.06				
			M	M				
Sulphur, Total	<0.02 %	TM132	0.102	0.0345				
Fraction Organic Carbon (FOC)	<0.002 -	TM132	0.0107	0.0236				
			#	#				
pH	1 pH Units	TM133	9.07	7.92				
			M	M				
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	<0.6				
			#	#				
Cyanide, Free	<1 mg/kg	TM153	<1	<1				
			M	M				
Chromium, Trivalent	<0.9 mg/kg	TM181	8.26	17.4				
Antimony	<0.6 mg/kg	TM181	4.29	0.873				
			#	#				
Arsenic	<0.6 mg/kg	TM181	6.44	18.6				
			M	M				
Barium	<0.6 mg/kg	TM181	264	90.8				
			#	#				
Beryllium	<0.01 mg/kg	TM181	0.374	1.19				
			M	M				
Boron	<0.7 mg/kg	TM181	7.43	3.39				
			#	#				
Cadmium	<0.02 mg/kg	TM181	0.198	0.277				
			M	M				
Copper	<1.4 mg/kg	TM181	16.7	43.4				
			M	M				
Iron	<1000 mg/kg	TM181	12700	65200				
			#	#				
Lead	<0.7 mg/kg	TM181	28	83.5				
			M	M				
Manganese	<0.13 mg/kg	TM181	340	2130				
			M	M				
Mercury	<0.14 mg/kg	TM181	0.169	<0.14				
			M	M				
Molybdenum	<0.1 mg/kg	TM181	0.64	3.52				
			#	#				
Nickel	<0.2 mg/kg	TM181	9.32	38.2				
			M	M				
Selenium	<1 mg/kg	TM181	<1	<1				
			#	#				
Vanadium	<0.2 mg/kg	TM181	17.1	34				
			#	#				
Zinc	<1.9 mg/kg	TM181	123	131				
			M	M				
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243	0.283	0.386				
			M	M				



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS07	WS15	WS33	WS33	WS38	WS40
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&5@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	123	81	84	91	95	91
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	<44	<44	852	<44	51.5	<44
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	<5	<5	<5	<5	<5
Benzene	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Toluene	<2 µg/kg	TM089	<2	6.66	26.8	22	8.96	36.1
Ethylbenzene	<3 µg/kg	TM089	<3	<3	13.4	3.66	5.6	7.74
m,p-Xylene	<6 µg/kg	TM089	<6	<6	57.3	12.2	21.3	27.1
o-Xylene	<3 µg/kg	TM089	<3	4.44	34.2	4.88	7.84	10.3
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9	<9	91.5	17.1	29.1	37.4
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	<24	132	42.8	43.7	81.2
Aliphatics >C5-C6	<10 µg/kg	TM089	<10	<10	11	<10	<10	<10
Aliphatics >C6-C8	<10 µg/kg	TM089	<10	<10	32.9	<10	<10	<10
Aliphatics >C8-C10	<10 µg/kg	TM089	<10	<10	113	<10	<10	<10
Aliphatics >C10-C12	<10 µg/kg	TM089	<10	<10	285	<10	<10	<10
Aliphatics >C12-C16	<100 µg/kg	TM173	<100	1900	5320	<100	1120	1270
Aliphatics >C16-C21	<100 µg/kg	TM173	553	7540	5430	351	15600	1720
Aliphatics >C21-C35	<100 µg/kg	TM173	6240	54800	12500	5020	158000	2430
Aliphatics >C35-C44	<100 µg/kg	TM173	3940	98200	17700	<100	66500	<100
Total Aliphatics >C12-C44	<100 µg/kg	TM173	10700	162000	40900	5370	241000	5420
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10	<10	26.8	22	<10	<10
Aromatics >EC8-EC10	<10 µg/kg	TM089	<10	12.2	182	20.7	35.8	45.2
Aromatics >EC10-EC12	<10 µg/kg	TM089	<10	<10	190	<10	<10	<10
Aromatics >EC12-EC16	<100 µg/kg	TM173	<100	21500	34200	946	917	2410
Aromatics >EC16-EC21	<100 µg/kg	TM173	<100	102000	190000	12400	10200	19600
Aromatics >EC21-EC35	<100 µg/kg	TM173	9810	281000	464000	43500	69400	81900
Aromatics >EC35-EC44	<100 µg/kg	TM173	15800	236000	132000	13000	85100	20500
Aromatics >EC40-EC44	<100 µg/kg	TM173	8480	125000	47900	5040	48700	7240
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	25600	640000	820000	69900	166000	124000
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	36300	803000	862000	75300	406000	130000



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS07	WS15	WS33	WS33	WS38	WS40
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.							
tot.unfilt	Total / unfiltered sample.							
*	Subcontracted test.							
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery							
(F)	Trigger breach confirmed							
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	110	112	111	106	105	104
Toluene-D8	%	TM116	94.8	86.2	95.6	97.5	94.3	97.8
4-bromofluorobenzene**	%	TM116	91.8	72.6	86	89.2	83.5	92
Dichlorodifluoromethane	<6 µg/kg	TM116	<6 M	<6 M	<60 M	<60 M	<6 M	<120 M
Chloromethane	<7 µg/kg	TM116	<7 #	<7 #	<70 #	<70 #	<7 #	<140 #
Vinyl Chloride	<6 µg/kg	TM116	<6 M	<6 M	<60 M	<60 M	<6 M	<120 M
Bromomethane	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Chloroethane	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Trichlorofluoromethane	<6 µg/kg	TM116	<6 M	<6 M	<60 M	<60 M	<6 M	<120 M
1,1-Dichloroethene	<10 µg/kg	TM116	<10 #	<10 #	<100 #	<100 #	<10 #	<200 #
Carbon Disulphide	<7 µg/kg	TM116	<7 M	<7 M	<70 M	<70 M	<7 M	<140 M
Dichloromethane	<10 µg/kg	TM116	<10 #	<10 #	<100 #	<100 #	<10 #	<200 #
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
trans-1,2-Dichloroethene	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
1,1-Dichloroethane	<8 µg/kg	TM116	<8 M	<8 M	<80 M	<80 M	<8 M	<160 M
cis-1,2-Dichloroethene	<6 µg/kg	TM116	<6 M	<6 M	<60 M	<60 M	<6 M	<120 M
2,2-Dichloropropane	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
Bromochloromethane	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Chloroform	<8 µg/kg	TM116	<8 M	<8 M	<80 M	<80 M	<8 M	<160 M
1,1,1-Trichloroethane	<7 µg/kg	TM116	<7 M	<7 M	<70 M	<70 M	<7 M	<140 M
1,1-Dichloropropene	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Carbontetrachloride	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
1,2-Dichloroethane	<5 µg/kg	TM116	<5 M	<5 M	<50 M	<50 M	<5 M	<100 M
Benzene	<9 µg/kg	TM116	<9 M	<9 M	<90 M	<90 M	<9 M	<180 M
Trichloroethene	<9 µg/kg	TM116	<9 #	<9 #	<90 #	<90 #	<9 #	<180 #
1,2-Dichloropropane	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Dibromomethane	<9 µg/kg	TM116	<9 M	<9 M	<90 M	<90 M	<9 M	<180 M
Bromodichloromethane	<7 µg/kg	TM116	<7 M	<7 M	<70 M	<70 M	<7 M	<140 M
cis-1,3-Dichloropropene	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
Toluene	<7 µg/kg	TM116	<7 M	<7 M	<70 M	<70 M	<7 M	<140 M
trans-1,3-Dichloropropene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
1,1,2-Trichloroethane	<10 µg/kg	TM116	<10 M	<10 M	<100 M	<100 M	<10 M	<200 M
1,3-Dichloropropane	<7 µg/kg	TM116	<7 M	<7 M	<70 M	<70 M	<7 M	<140 M



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

VOC MS (S)

Results Legend		Customer Sample Ref.	WS07	WS15	WS33	WS33	WS38	WS40
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.20 - 0.50	0.50 - 1.00	0.50 - 1.00	1.20 - 2.00	1.00 - 1.20	1.00 - 1.20
M	mCERTS accredited.		Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
aq	Aqueous / settled sample.		01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017	01/12/2017
diss.filt	Dissolved / filtered sample.		.	.	.	.	.	.
tot.unfilt	Total / unfiltered sample.		07/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017	07/12/2017
*	Subcontracted test.		171207-151	171207-151	171207-151	171207-151	171207-151	171207-151
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		16711558	16711562	16711565	16711567	16711584	16711571
(F)	Trigger breach confirmed		ES1	ES2	ES2	ES10	ES3	ES3
1-5&*\$@	Sample deviation (see appendix)							
Component	LOD/Units	Method						
Tetrachloroethene	<5 µg/kg	TM116	<5	<5	<50	68.4	<5	<100
			M	M	M	M	M	M
Dibromochloromethane	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
1,2-Dibromoethane	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
Chlorobenzene	<5 µg/kg	TM116	<5	<5	<50	<50	<5	<100
			M	M	M	M	M	M
1,1,1,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
Ethylbenzene	<4 µg/kg	TM116	<4	<4	<40	<40	<4	<80
			M	M	M	M	M	M
p/m-Xylene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			#	#	#	#	#	#
o-Xylene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
Styrene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			#	#	#	#	#	#
Bromoform	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
Isopropylbenzene	<5 µg/kg	TM116	<5	<5	<50	<50	<5	<100
			#	#	#	#	#	#
1,1,2,2-Tetrachloroethane	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			#	#	#	#	#	#
1,2,3-Trichloropropane	<16 µg/kg	TM116	<16	<16	<160	<160	<16	<320
			M	M	M	M	M	M
Bromobenzene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
Propylbenzene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
2-Chlorotoluene	<9 µg/kg	TM116	<9	<9	<90	<90	<9	<180
			M	M	M	M	M	M
1,3,5-Trimethylbenzene	<8 µg/kg	TM116	<8	<8	<80	<80	<8	<160
			M	M	M	M	M	M
4-Chlorotoluene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
tert-Butylbenzene	<14 µg/kg	TM116	<14	<14	<140	<140	<14	<280
			M	M	M	M	M	M
1,2,4-Trimethylbenzene	<9 µg/kg	TM116	<9	<9	<90	<90	<9	<180
			#	#	#	#	#	#
sec-Butylbenzene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
4-Isopropyltoluene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
1,3-Dichlorobenzene	<8 µg/kg	TM116	<8	<8	<80	<80	<8	<160
			M	M	M	M	M	M
1,4-Dichlorobenzene	<5 µg/kg	TM116	<5	<5	<50	<50	<5	<100
			M	M	M	M	M	M
n-Butylbenzene	<11 µg/kg	TM116	<11	<11	<110	<110	<11	<220
1,2-Dichlorobenzene	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			M	M	M	M	M	M
1,2-Dibromo-3-chloropropane	<14 µg/kg	TM116	<14	<14	<140	<140	<14	<280
			M	M	M	M	M	M
Tert-amyl methyl ether	<10 µg/kg	TM116	<10	<10	<100	<100	<10	<200
			#	#	#	#	#	#
1,2,4-Trichlorobenzene	<20 µg/kg	TM116	<20	<20	<200	<200	<20	<400
Hexachlorobutadiene	<20 µg/kg	TM116	<20	<20	<200	<200	<20	<400
Naphthalene	<13 µg/kg	TM116	<13	<13	<130	<130	<13	<260
			M	M	M	M	M	M
1,2,3-Trichlorobenzene	<20 µg/kg	TM116	<20	<20	<200	<200	<20	<400
			#	#	#	#	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS07 ES 1 0.20 - 0.50 SOLID 01/12/2017 00:00:00 11/12/2017 15:34:58 171207-151 16711558 TM048	15/12/2017	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS15 ES 2 0.50 - 1.00 SOLID 01/12/2017 00:00:00 11/12/2017 08:56:00 171207-151 16711562 TM048	15/12/2017	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS15 ES 2 0.50 - 1.00 SOLID 01/12/2017 00:00:00 10/12/2017 13:08:17 171207-151 16711565 TM048	15/12/2017	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS33 ES 10 1.20 - 2.00 SOLID 01/12/2017 00:00:00 10/12/2017 13:06:50 171207-151 16711567 TM048	15/12/2017	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS38 ES 3 1.00 - 1.20 SOLID 01/12/2017 00:00:00 11/12/2017 15:38:50 171207-151 16711584 TM048	15/12/2017	Neville Mann	Loose fibres in soil	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS40 ES 3 1.00 - 1.20 SOLID 01/12/2017 00:00:00 11/12/2017 16:38:20 171207-151 16711571 TM048	15/12/2017	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 22

Dry Matter Content (%) 82

Case

SDG 171207-151

Lab Sample Number(s) 16711565

Sampled Date 01-Dec-2017

Customer Sample Ref. WS33 ES2

Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 6.31

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.132

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 8.66

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

Eluate Analysis	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00704	<0.0005	0.0141	<0.001	0.5	2	25
Barium	0.0601	<0.0002	0.12	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.0123	<0.0003	0.0246	<0.0006	2	50	100
Mercury Dissolved (CVAf)	0.000013	<0.00001	0.000026	<0.00002	0.01	0.2	2
Molybdenum	0.0229	<0.0005	0.0458	<0.001	0.5	10	30
Nickel	<0.0004	<0.0004	<0.0008	<0.0008	0.4	10	40
Lead	0.000465	<0.0002	0.00093	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.0111	<0.0005	0.0222	<0.001	0.1	0.5	7
Zinc	<0.001	<0.001	<0.002	<0.002	4	50	200
Chloride	27	<2	54	<4	800	15000	25000
Fluoride	1.34	<0.5	2.68	<1	10	150	500
Sulphate (soluble)	300	<2	600	<4	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	5.55	<3	11.1	<6	500	800	1000

Leach Test Information

Date Prepared 12-Dec-2017

pH (pH Units) 9.80

Conductivity (µS/cm) 842.00

Temperature (°C) 19.50

Volume Leachant (Litres) 0.312

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

22/12/2017 14:58:01

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 22

Dry Matter Content (%) 82

Case

SDG 171207-151

Lab Sample Number(s) 16711565

Sampled Date 01-Dec-2017

Customer Sample Ref. WS33 ES2

Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 6.31

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.132

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 8.66

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	9.6	<0.001	19	<0.002	-	-	-	-
Calcium	57.3	<0.012	115	<0.024	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.0055	<0.0055	<0.011	<0.011	-	-	-	-
Phenol by HPLC (W)	0.001	<0.0005	0.002	<0.001	-	-	-	-
2-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	6.54	<0.036	13.1	<0.072	-	-	-	-
3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	0.00058	<0.0005	0.00116	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	<0.019	<0.019	<0.038	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.0922	<0.005	0.184	<0.01	-	-	-	-
Hardness Total	170	<1	340	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 12-Dec-2017

pH (pH Units) 9.80

Conductivity (µS/cm) 842.00

Temperature (°C) 19.50

Volume Leachant (Litres) 0.312

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

22/12/2017 14:58:01

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.213
Mass of dry sample (kg) 0.175
Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 22
Dry Matter Content (%) 82

Case

SDG 171207-151
Lab Sample Number(s) 16711565
Sampled Date 01-Dec-2017
Customer Sample Ref. WS33 ES2
Depth (m) 0.50 - 1.00

Solid Waste Analysis

Total Organic Carbon (%) 6.31
Loss on Ignition (%) -
Sum of BTEX (mg/kg) 0.132
Sum of 7 PCBs (mg/kg) -
Mineral Oil (mg/kg) -
PAH Sum of 17 (mg/kg) -
pH (pH Units) 8.66
ANC to pH 6 (mol/kg) -
ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
2-Isopropyl Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-chloro-3-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,6-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Phenols Total of 5 Speciated by HPLC (W)	0.00158	<0.00064	0.00316	<0.00128	-	-	-	-
4-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,4-dichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,4,6-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,4,5-trichlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-nitrophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,3,5,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Manganese	0.00189	<0.001	0.00378	<0.002	-	-	-	-
2,3,4,6-tetrachlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2,4-Dinitrophenol	<0.005	<0.005	<0.01	<0.01	-	-	-	-
DNOC	<0.006	<0.006	<0.012	<0.012	-	-	-	-
Pentachlorophenol	<0.002	<0.002	<0.004	<0.004	-	-	-	-
Dinoseb	<0.008	<0.008	<0.016	<0.016	-	-	-	-
Vanadium	0.00207	<0.001	0.00414	<0.002	-	-	-	-

Leach Test Information

Date Prepared 12-Dec-2017
pH (pH Units) 9.80
Conductivity (µS/cm) 842.00
Temperature (°C) 19.50
Volume Leachant (Litres) 0.312
Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

22/12/2017 14:58:01

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.195

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171207-151

Lab Sample Number(s) 16711584

Sampled Date 01-Dec-2017

Customer Sample Ref. WS38 ES3

Depth (m) 1.00 - 1.20

Solid Waste Analysis

Total Organic Carbon (%) 1.07

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0437

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.07

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00252	<0.0005	0.00504	<0.001	0.5	2	25
Barium	0.0543	<0.0002	0.109	<0.0004	20	100	300
Cadmium	<0.00008	<0.00008	<0.00016	<0.00016	0.04	1	5
Chromium	-	-	-	-	0.5	10	70
Copper	0.00196	<0.0003	0.00392	<0.0006	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.00002	<0.00002	0.01	0.2	2
Molybdenum	0.00801	<0.0005	0.016	<0.001	0.5	10	30
Nickel	0.00122	<0.0004	0.00244	<0.0008	0.4	10	40
Lead	<0.0002	<0.0002	<0.0004	<0.0004	0.5	10	50
Antimony	-	-	-	-	0.06	0.7	5
Selenium	0.000695	<0.0005	0.00139	<0.001	0.1	0.5	7
Zinc	<0.001	<0.001	<0.002	<0.002	4	50	200
Chloride	23.5	<2	47	<4	800	15000	25000
Fluoride	<0.5	<0.5	<1	<1	10	150	500
Sulphate (soluble)	1650	<10	3300	<20	1000	20000	50000
Total Dissolved Solids	-	-	-	-	4000	60000	100000
Total Monohydric Phenols (W)	-	-	-	-	1	-	-
Dissolved Organic Carbon	3.37	<3	6.74	<6	500	800	1000

Leach Test Information

Date Prepared 12-Dec-2017

pH (pH Units) 9.07

Conductivity (µS/cm) 2,420.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

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14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.195

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171207-151

Lab Sample Number(s) 16711584

Sampled Date 01-Dec-2017

Customer Sample Ref. WS38 ES3

Depth (m) 1.00 - 1.20

Solid Waste Analysis

Total Organic Carbon (%) 1.07

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0437

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.07

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

	Conc ⁿ in 2:1 eluate (mg/l)		2:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg			
	Result	Limit of Detection	Result	Limit of Detection				
Ammoniacal Nitrogen as N	<0.2	<0.2	<0.4	<0.4	-	-	-	-
Chromium III	<0.03	<0.03	<0.06	<0.06	-	-	-	-
Hexavalent Chromium	<0.03	<0.03	<0.06	<0.06	-	-	-	-
pH Value of Filtered Water	8.8	<0.001	18	<0.002	-	-	-	-
Calcium	601	<0.12	1200	<0.24	-	-	-	-
Free Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Phenol	<0.0055	<0.0055	<0.011	<0.011	-	-	-	-
Phenol by HPLC (W)	0.00093	<0.0005	0.00186	<0.001	-	-	-	-
2-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Complex Cyanide (W)	<0.05	<0.05	<0.1	<0.1	-	-	-	-
Cresols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Magnesium	30	<0.036	60	<0.072	-	-	-	-
3-methylphenol	<0.001	<0.001	<0.002	<0.002	-	-	-	-
Beryllium	<0.0001	<0.0001	<0.0002	<0.0002	-	-	-	-
Xylenols by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
4-methylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Iron	<0.019	<0.019	<0.038	<0.038	-	-	-	-
2,3,5 Trimethyl-Phenol by HPLC (W)	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
2-chlorophenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-
Boron	0.0927	<0.005	0.185	<0.01	-	-	-	-
Hardness Total	1630	<1	3260	<2	-	-	-	-
2,4-dimethylphenol	<0.0005	<0.0005	<0.001	<0.001	-	-	-	-

Leach Test Information

Date Prepared 12-Dec-2017

pH (pH Units) 9.07

Conductivity (µS/cm) 2,420.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 2:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/1

Client Reference

Mass Sample taken (kg) 0.195

Mass of dry sample (kg) 0.175

Particle Size <4mm >95%

Site Location

Glassworks Barnsley

Natural Moisture Content (%) 11.1

Dry Matter Content (%) 90

Case

SDG 171207-151

Lab Sample Number(s) 16711584

Sampled Date 01-Dec-2017

Customer Sample Ref. WS38 ES3

Depth (m) 1.00 - 1.20

Solid Waste Analysis

Total Organic Carbon (%) 1.07

Loss on Ignition (%) -

Sum of BTEX (mg/kg) 0.0437

Sum of 7 PCBs (mg/kg) -

Mineral Oil (mg/kg) -

PAH Sum of 17 (mg/kg) -

pH (pH Units) 9.07

ANC to pH 6 (mol/kg) -

ANC to pH 4 (mol/kg) -

Eluate Analysis

2-Isopropyl Phenol by HPLC (W)

4-chloro-3-methylphenol

2,6-dichlorophenol

Phenols Total of 5 Speciated by HPLC (W)

4-chlorophenol

2,4-dichlorophenol

2-nitrophenol

2,4,6-trichlorophenol

2,4,5-trichlorophenol

4-nitrophenol

2,3,5,6-tetrachlorophenol

Manganese

2,3,4,6-tetrachlorophenol

2,4-Dinitrophenol

DNOC

Pentachlorophenol

Dinoseb

Vanadium

Concⁿ in 2:1
eluate (mg/l)

2:1 concⁿ
leached (mg/kg)

Limit values for compliance leaching test
using BS EN 12457-3 at L/S 10 l/kg

Result

Limit of Detection

Result

Limit of Detection

<0.0005

<0.0005

<0.001

<0.001

-

-

-

<0.0005

<0.0005

<0.001

<0.001

-

-

-

<0.001

<0.001

<0.002

<0.002

-

-

-

0.00093

<0.00064

0.00186

<0.00128

-

-

-

<0.0005

<0.0005

<0.001

<0.001

-

-

-

<0.0005

<0.0005

<0.001

<0.001

-

-

-

<0.001

<0.001

<0.002

<0.002

-

-

-

<0.001

<0.001

<0.002

<0.002

-

-

-

<0.001

<0.001

<0.002

<0.002

-

-

-

<0.001

<0.001

<0.002

<0.002

-

-

-

<0.0015

<0.0015

<0.003

<0.003

-

-

-

0.00246

<0.001

0.00492

<0.002

-

-

-

<0.0015

<0.0015

<0.003

<0.003

-

-

-

<0.005

<0.005

<0.01

<0.01

-

-

-

<0.006

<0.006

<0.012

<0.012

-

-

-

<0.002

<0.002

<0.004

<0.004

-

-

-

<0.008

<0.008

<0.016

<0.016

-

-

-

0.0101

<0.001

0.0202

<0.002

-

-

-

Leach Test Information

Date Prepared 12-Dec-2017

pH (pH Units) 9.07

Conductivity (µS/cm) 2,420.00

Temperature (°C) 19.60

Volume Leachant (Litres) 0.331

Volume of Eluate VE1 (Litres)

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

22/12/2017 14:58:01

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.099
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Glassworks Barnsley
Natural Moisture Content (%)	9.65
Dry Matter Content (%)	91.2

Case	
SDG	171207-151
Lab Sample Number(s)	16711561
Sampled Date	01-Dec-2017
Customer Sample Ref.	WS15 ES1
Depth (m)	0.20 - 0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	0.741
Loss on Ignition (%)	2.22
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	87.9
PAH Sum of 17 (mg/kg)	<50
pH (pH Units)	9.2
ANC to pH 6 (mol/kg)	0.317
ANC to pH 4 (mol/kg)	2.01

Eluate Analysis	C2 Conc ⁿ in 10:1 eluate (mg/l)		A2 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00237	<0.0005	0.0237	<0.005	0.5	2	25
Barium	0.0198	<0.0002	0.198	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00124	<0.001	0.0124	<0.01	0.5	10	70
Copper	0.00275	<0.0003	0.0275	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00171	<0.0005	0.0171	<0.005	0.5	10	30
Nickel	0.000893	<0.0004	0.00893	<0.004	0.4	10	40
Lead	0.00456	<0.0002	0.0456	<0.002	0.5	10	50
Antimony	0.000465	<0.0001	0.00465	<0.001	0.06	0.7	5
Selenium	<0.0005	<0.0005	<0.005	<0.005	0.1	0.5	7
Zinc	0.00789	<0.001	0.0789	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	3.2	<2	32	<20	1000	20000	50000
Total Dissolved Solids	59	<5	590	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared	12-Dec-2017
pH (pH Units)	9.41
Conductivity (µS/cm)	66.70
Temperature (°C)	19.30
Volume Leachant (Litres)	0.891

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

22/12/2017 14:58:02

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.108
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Glassworks Barnsley
Natural Moisture Content (%)	20.5
Dry Matter Content (%)	83

Case	
SDG	171207-151
Lab Sample Number(s)	16711566
Sampled Date	01-Dec-2017
Customer Sample Ref.	WS33 ES3
Depth (m)	1.00 - 1.20

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	3.12
Loss on Ignition (%)	7.66
Sum of BTEX (mg/kg)	0.145
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	31.9
PAH Sum of 17 (mg/kg)	113
pH (pH Units)	8.29
ANC to pH 6 (mol/kg)	0.0777
ANC to pH 4 (mol/kg)	0.121

Eluate Analysis	C2 Conc ⁿ in 10:1 eluate (mg/l)		A2 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00196	<0.0005	0.0196	<0.005	0.5	2	25
Barium	0.0109	<0.0002	0.109	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.0015	<0.0003	0.015	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00538	<0.0005	0.0538	<0.005	0.5	10	30
Nickel	0.000527	<0.0004	0.00527	<0.004	0.4	10	40
Lead	0.000709	<0.0002	0.00709	<0.002	0.5	10	50
Antimony	0.000522	<0.0001	0.00522	<0.001	0.06	0.7	5
Selenium	0.00218	<0.0005	0.0218	<0.005	0.1	0.5	7
Zinc	0.00329	<0.001	0.0329	<0.01	4	50	200
Chloride	4.1	<2	41	<20	800	15000	25000
Fluoride	0.579	<0.5	5.79	<5	10	150	500
Sulphate (soluble)	38.8	<2	388	<20	1000	20000	50000
Total Dissolved Solids	149	<5	1490	<50	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	500	800	1000

Leach Test Information

Date Prepared	12-Dec-2017
pH (pH Units)	8.48
Conductivity (µS/cm)	191.00
Temperature (°C)	19.40
Volume Leachant (Litres)	0.882

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation
Mcerts Certification does not apply to leachates

22/12/2017 14:58:02

14:57:36 22/12/2017



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM072	Modified: US EPA Method 8141A	Determination of Phenols by GC-MS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part 2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990/BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM182	CEN/TC 292 - WI 292046-characterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM205		Determination of Phenols in Waste Waters using Solid Phase Extraction, Acetylation, Gas Chromatography and Mass Selective Detection
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES
TM241	Methods for the Examination of Waters and Associated Materials; Chromium in Raw and Potable Waters and Sewage Effluents 1980.	The Determination of Hexavalent Chromium in Waters and Leachates using the Kone Analyser
TM243		Mixed Anions In Soils By Kone
TM255		Determination of Low Level Phenols in Waters and Leachates by HPLC
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Environmental Hawarden (Method codes TM) or ALS Environmental Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Test Completion Dates

Lab Sample No(s)	16711558	16711561	16711562	16711565	16711566	16711567	16711584	16711571
Customer Sample Ref.	WS07	WS15	WS15	WS33	WS33	WS33	WS38	WS40
AGS Ref.	ES1	ES1	ES2	ES2	ES3	ES10	ES3	ES3
Depth	0.20 - 0.50	0.20 - 0.50	0.50 - 1.00	0.50 - 1.00	1.00 - 1.20	1.20 - 2.00	1.00 - 1.20	1.00 - 1.20
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Ammoniacal Nitrogen				14-Dec-2017			14-Dec-2017	
ANC at pH4 and ANC at pH 6		14-Dec-2017			14-Dec-2017			
Anions by Kone (soil)	14-Dec-2017		14-Dec-2017	12-Dec-2017		14-Dec-2017	14-Dec-2017	12-Dec-2017
Anions by Kone (w)		15-Dec-2017		15-Dec-2017	15-Dec-2017		15-Dec-2017	
Asbestos ID in Solid Samples	15-Dec-2017		15-Dec-2017	15-Dec-2017		15-Dec-2017	15-Dec-2017	15-Dec-2017
CEN 10:1 Leachate (1 Stage)		12-Dec-2017			12-Dec-2017			
CEN 2:1 Leachate (1 Stage)				20-Dec-2017			12-Dec-2017	
CEN Readings		14-Dec-2017		22-Dec-2017	14-Dec-2017		15-Dec-2017	
Chromium III	18-Dec-2017		18-Dec-2017	22-Dec-2017		18-Dec-2017	16-Dec-2017	18-Dec-2017
Cyanide Comp/Free/Total/Thiocyanate	13-Dec-2017		13-Dec-2017	15-Dec-2017		13-Dec-2017	15-Dec-2017	12-Dec-2017
Dissolved Metals by ICP-MS		18-Dec-2017		22-Dec-2017	18-Dec-2017		15-Dec-2017	
Dissolved Organic/Inorganic Carbon		15-Dec-2017		14-Dec-2017	15-Dec-2017		15-Dec-2017	
EPH CWG (Aliphatic) GC (S)	14-Dec-2017		14-Dec-2017	15-Dec-2017		14-Dec-2017	14-Dec-2017	14-Dec-2017
EPH CWG (Aromatic) GC (S)	14-Dec-2017		14-Dec-2017	15-Dec-2017		14-Dec-2017	14-Dec-2017	14-Dec-2017
Fluoride		16-Dec-2017		16-Dec-2017	16-Dec-2017		16-Dec-2017	
GRO by GC-FID (S)	13-Dec-2017	14-Dec-2017	15-Dec-2017	13-Dec-2017	14-Dec-2017	14-Dec-2017	14-Dec-2017	15-Dec-2017
Hexavalent Chromium (s)	15-Dec-2017		15-Dec-2017	15-Dec-2017		15-Dec-2017	15-Dec-2017	15-Dec-2017
Hexavalent Chromium (w)				15-Dec-2017			15-Dec-2017	
Loss on Ignition in soils		13-Dec-2017			14-Dec-2017			
Low Level Phenols by HPLC (W)				18-Dec-2017			18-Dec-2017	
Mercury Dissolved		18-Dec-2017		15-Dec-2017	18-Dec-2017		15-Dec-2017	
Metals by iCap-OES Dissolved (W)				15-Dec-2017			18-Dec-2017	
Metals in solid samples by OES	19-Dec-2017		19-Dec-2017	15-Dec-2017		19-Dec-2017	15-Dec-2017	19-Dec-2017
Mineral Oil		14-Dec-2017			14-Dec-2017			
PAH by GCMS	14-Dec-2017	15-Dec-2017	14-Dec-2017	15-Dec-2017	15-Dec-2017	14-Dec-2017	15-Dec-2017	15-Dec-2017
PCBs by GCMS		15-Dec-2017			15-Dec-2017			
pH	15-Dec-2017	13-Dec-2017	15-Dec-2017	14-Dec-2017	12-Dec-2017	12-Dec-2017	15-Dec-2017	15-Dec-2017
pH Value of Filtered Water				14-Dec-2017			15-Dec-2017	
Phenols by HPLC (S)	13-Dec-2017		13-Dec-2017	14-Dec-2017		14-Dec-2017	14-Dec-2017	14-Dec-2017
Phenols by HPLC (W)		15-Dec-2017			15-Dec-2017			
Phenols by ms (w)				19-Dec-2017			19-Dec-2017	
Phenols Spec MS (S)	15-Dec-2017		15-Dec-2017	15-Dec-2017		15-Dec-2017	15-Dec-2017	15-Dec-2017
Sample description	11-Dec-2017	11-Dec-2017	11-Dec-2017	10-Dec-2017	10-Dec-2017	11-Dec-2017	10-Dec-2017	10-Dec-2017
Total Dissolved Solids		15-Dec-2017			15-Dec-2017			
Total Organic Carbon	13-Dec-2017	13-Dec-2017	13-Dec-2017	12-Dec-2017	14-Dec-2017	13-Dec-2017	14-Dec-2017	12-Dec-2017
Total Sulphur	15-Dec-2017		15-Dec-2017	15-Dec-2017		15-Dec-2017	15-Dec-2017	15-Dec-2017
TPH CWG GC (S)	14-Dec-2017		15-Dec-2017	15-Dec-2017		14-Dec-2017	14-Dec-2017	15-Dec-2017
VOC MS (S)	13-Dec-2017		13-Dec-2017	14-Dec-2017		14-Dec-2017	13-Dec-2017	14-Dec-2017



CERTIFICATE OF ANALYSIS

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SDG: 171207-151
Location: Glassworks Barnsley

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ASSOCIATED AQC DATA

Ammoniacal Nitrogen

Component	Method Code	QC 1696
Ammoniacal Nitrogen as N	TM099	100.4 93.47 : 108.25

ANC at pH4 and ANC at pH 6

Component	Method Code	QC 1626
ANC pH_4 dry soil	TM182	100.24 86.12 : 113.88
ANC pH_6 dry soil	TM182	118.29 61.00 : 139.00

Anions by Kone (soil)

Component	Method Code	QC 1671	QC 1619	QC 1688	QC 1629
Chloride (soluble)	TM243	89.30 : 110.70	89.30 : 110.70	89.30 : 110.70	67.14 89.30 : 110.70
Water Soluble Sulphate as SO4 2:1 Extract	TM243	70.45 : 129.55	55.96 70.45 : 129.55	70.45 : 129.55	58.17 70.45 : 129.55

Anions by Kone (w)

Component	Method Code	QC 1654
Chloride	TM184	106.0 92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	104.4 90.53 : 113.03
TON as NO3	TM184	107.0 96.26 : 111.21

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1686	QC 1693	QC 1692
Free Cyanide	TM153	94.4 84.60 : 110.40	94.1 84.60 : 110.40	
Free Cyanide (W)	TM227			104.5 93.25 : 112.75
Thiocyanate	TM153	91.02 83.02 : 103.47	91.62 83.02 : 103.47	
Thiocyanate (W)	TM227			106.25 97.75 : 109.75
Total Cyanide	TM153	94.29 87.53 : 111.13	100.71 87.53 : 111.13	
Total Cyanide (W)	TM227			108.5 95.25 : 111.75



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Dissolved Metals by ICP-MS

Component	Method Code	QC 1693	QC 1648	QC 1616	QC 1664	QC 1671
Aluminium	TM152	101.67 89.90 : 110.02	100.33 89.90 : 110.02	92.33 89.90 : 110.02	100.0 89.90 : 110.02	107.0 90.09 : 112.69
Antimony	TM152	90.5 79.80 : 122.00	91.0 79.80 : 122.00	100.0 79.80 : 122.00	96.33 79.80 : 122.00	104.0 81.00 : 119.70
Arsenic	TM152	89.83 90.42 : 111.32	91.0 90.42 : 111.32	93.5 90.42 : 111.32	98.33 90.42 : 111.32	100.5 92.40 : 113.00
Barium	TM152	99.67 92.02 : 112.48	98.67 92.02 : 112.48	90.0 92.02 : 112.48	97.33 92.02 : 112.48	99.5 93.11 : 112.81
Beryllium	TM152	99.83 86.15 : 118.35	94.67 86.15 : 118.35	92.83 86.15 : 118.35	96.17 86.15 : 118.35	108.17 88.27 : 113.27
Bismuth	TM152	105.0 88.90 : 106.90	102.33 88.90 : 106.90	95.67 88.90 : 106.90	98.0 88.90 : 106.90	113.0 86.72 : 115.61
Borate	TM152	104.94 88.00 : 112.00	98.15 88.00 : 112.00	90.74 88.00 : 112.00	100.0 88.00 : 112.00	
Boron	TM152	105.0 86.68 : 117.67	98.33 86.68 : 117.67	90.67 86.68 : 117.67	100.33 86.68 : 117.67	106.67 86.47 : 111.70
Cadmium	TM152	96.83 92.07 : 109.87	96.17 92.07 : 109.87	93.0 92.07 : 109.87	97.17 92.07 : 109.87	104.17 90.28 : 114.48
Chromium	TM152	94.33 90.87 : 108.50	93.33 90.87 : 108.50	93.0 90.87 : 108.50	98.17 90.87 : 108.50	105.33 91.07 : 114.29
Cobalt	TM152	97.0 84.39 : 114.26	96.33 84.39 : 114.26	92.5 84.39 : 114.26	100.5 84.39 : 114.26	106.17 89.58 : 114.68
Copper	TM152	96.17 91.20 : 110.79	95.17 91.20 : 110.79	93.17 91.20 : 110.79	97.33 91.20 : 110.79	104.83 88.45 : 117.93
Lead	TM152	103.83 85.65 : 113.58	100.83 85.65 : 113.58	93.33 85.65 : 113.58	98.17 85.65 : 113.58	108.83 89.25 : 115.12
Lithium	TM152	105.17 89.26 : 119.04	100.5 89.26 : 119.04	92.33 89.26 : 119.04	98.0 89.26 : 119.04	106.5 88.50 : 116.05
Manganese	TM152	95.67 90.63 : 109.13	95.0 90.63 : 109.13	92.5 90.63 : 109.13	98.17 90.63 : 109.13	103.5 91.63 : 112.33
Molybdenum	TM152	89.67 87.00 : 108.89	89.5 87.00 : 108.89	92.33 87.00 : 108.89	93.5 87.00 : 108.89	102.17 91.08 : 111.63
Nickel	TM152	95.33 92.11 : 110.56	94.33 92.11 : 110.56	91.5 92.11 : 110.56	98.67 92.11 : 110.56	105.33 89.60 : 117.38
Niobium	TM152					96.38 : 128.85
Phosphorus	TM152	92.33 90.52 : 115.47	93.5 90.52 : 115.47	91.17 90.52 : 115.47	96.83 90.52 : 115.47	107.33 90.43 : 111.75
Selenium	TM152	92.67 88.44 : 113.86	92.83 88.44 : 113.86	90.33 88.44 : 113.86	95.67 88.44 : 113.86	104.0 88.13 : 108.33
Silver	TM152	86.17 81.52 : 114.92	85.0 81.52 : 114.92	78.17 81.52 : 114.92	83.17 81.52 : 114.92	97.0 90.04 : 97.49
Strontium	TM152	96.0 90.72 : 114.82	95.0 90.72 : 114.82	89.33 90.72 : 114.82	94.67 90.72 : 114.82	98.67 91.27 : 106.32
Tellurium	TM152	89.0 86.97 : 108.87	88.33 86.97 : 108.87	84.0 86.97 : 108.87	90.67 86.97 : 108.87	96.67 81.16 : 111.23
Thallium	TM152	101.17 80.92 : 114.72	99.83 80.92 : 114.72	82.83 80.92 : 114.72	94.0 80.92 : 114.72	102.83 81.70 : 117.09
Titanium	TM152	100.5 90.08 : 111.18	101.5 90.08 : 111.18	96.0 90.08 : 111.18	98.83 90.08 : 111.18	106.0 89.62 : 110.62
Tungsten	TM152	100.5 91.72 : 109.22	98.67 91.72 : 109.22	95.5 91.72 : 109.22	99.0 91.72 : 109.22	108.67 90.13 : 111.33
Uranium	TM152	102.5 90.58 : 113.28	100.17 90.58 : 113.28	94.33 90.58 : 113.28	97.33 90.58 : 113.28	112.83 92.30 : 116.90



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Dissolved Metals by ICP-MS

		QC 1693	QC 1648	QC 1616	QC 1664	QC 1671
Vanadium	TM152	95.5 88.43 : 114.30	94.67 88.43 : 114.30	95.17 88.43 : 114.30	97.83 88.43 : 114.30	102.17 88.22 : 118.55
Zinc	TM152	93.33 86.52 : 115.27	92.0 86.52 : 115.27	94.0 86.52 : 115.27	97.33 86.52 : 115.27	102.67 89.30 : 115.44
Zirconium	TM152					85.51 : 109.42

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 1616	QC 1677	QC 1622
Dissolved Inorganic Carbon	TM090	99.0 94.43 : 110.53	105.5 94.43 : 110.53	100.33 91.15 : 111.35
Dissolved Organic Carbon	TM090	104.17 99.25 : 108.95	105.0 99.25 : 108.95	101.0 94.18 : 111.18

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1614	QC 1610
Total Aliphatics >C12-C35	TM173	85.83 66.17 : 105.28	88.75 70.76 : 104.69

EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1614	QC 1610
Total Aromatics >EC12-EC35	TM173	84.0 65.78 : 102.90	88.0 68.16 : 102.29

Fluoride

Component	Method Code	QC 1617
Fluoride	TM104	95.33 92.67 : 104.67

GRO by GC-FID (S)

Component	Method Code	QC 1682	QC 1635	QC 1696
Benzene by GC (Moisture Corrected)	TM089	109.5 79.14 : 118.69	109.0 79.14 : 118.69	102.5 78.80 : 119.54
Ethylbenzene by GC (Moisture Corrected)	TM089	113.0 76.65 : 121.92	112.5 76.65 : 121.92	107.0 78.42 : 121.07
m & p Xylene by GC (Moisture Corrected)	TM089	114.0 76.25 : 122.54	113.0 76.25 : 122.54	107.25 77.69 : 121.76
MTBE GC-FID (Moisture Corrected)	TM089	109.5 77.67 : 125.50	114.5 77.67 : 125.50	100.5 77.69 : 125.19



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GRO by GC-FID (S)

		QC 1682	QC 1635	QC 1696
o Xylene by GC (Moisture Corrected)	TM089	113.0 76.37 : 122.94	113.5 76.37 : 122.94	104.5 77.88 : 121.47
QC	TM089	92.18 70.17 : 114.42	76.94 70.17 : 114.42	93.49 69.62 : 106.27
Toluene by GC (Moisture Corrected)	TM089	110.5 75.95 : 122.88	111.5 75.95 : 122.88	107.5 78.31 : 121.42

Hexavalent Chromium (s)

Component	Method Code	QC 1636	QC 1654
Hexavalent Chromium	TM151	94.0 90.20 : 107.00	94.0 90.20 : 107.00

Hexavalent Chromium (w)

Component	Method Code	QC 1686	QC 1689
Hexavalent Chromium	TM241	95.0 92.00 : 104.00	96.4 92.00 : 104.00

Loss on Ignition in soils

Component	Method Code	QC 1658	QC 1602
Loss on Ignition	TM018	102.37 89.27 : 104.90	103.32 89.27 : 104.90

Mercury Dissolved

Component	Method Code	QC 1680	QC 1659
Mercury Dissolved (CVAf)	TM183	96.6 73.51 : 120.83	101.0 73.51 : 120.83

Metals by iCap-OES Dissolved (W)

Component	Method Code	QC 1696	QC 1630
Calcium	TM228	96.7 86.15 : 110.75	95.0 86.15 : 110.75
Iron	TM228	90.67 77.20 : 102.80	90.67 77.20 : 102.80
Magnesium	TM228	97.6 83.80 : 108.64	95.7 83.80 : 108.64
Potassium	TM228	93.8 85.58 : 109.10	90.3 85.58 : 109.10



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Metals by iCap-OES Dissolved (W)

		QC 1696	QC 1630
Sodium	TM228	97.7 84.00 : 111.30	94.4 84.00 : 111.30

Metals in solid samples by OES

Component	Method Code	QC 1664	QC 1635	QC 1662
Aluminium	TM181	88.15 80.01 : 112.97	94.07 80.01 : 112.97	102.22 80.01 : 112.97
Antimony	TM181	99.23 84.48 : 118.55	107.34 84.48 : 118.55	103.09 84.48 : 118.55
Arsenic	TM181	94.6 87.69 : 109.58	98.71 87.69 : 109.58	96.4 87.69 : 109.58
Barium	TM181	90.63 81.38 : 110.22	95.31 81.38 : 110.22	96.88 81.38 : 110.22
Beryllium	TM181	89.73 85.83 : 108.41	97.6 85.83 : 108.41	94.86 85.83 : 108.41
Boron	TM181	91.24 79.20 : 103.75	89.27 79.20 : 103.75	95.76 79.20 : 103.75
Cadmium	TM181	92.55 88.34 : 110.05	100.53 88.34 : 110.05	97.87 88.34 : 110.05
Chromium	TM181	95.99 81.29 : 118.71	103.8 81.29 : 118.71	103.8 81.29 : 118.71
Cobalt	TM181	91.54 87.71 : 110.26	100.31 87.71 : 110.26	97.18 87.71 : 110.26
Copper	TM181	90.98 85.64 : 106.59	98.11 85.64 : 106.59	95.2 85.64 : 106.59
Iron	TM181	95.14 81.99 : 118.01	107.64 81.99 : 118.01	110.42 81.99 : 118.01
Lead	TM181	98.72 82.55 : 105.90	96.17 82.55 : 105.90	91.06 82.55 : 105.90
Manganese	TM181	89.09 82.29 : 105.35	91.52 82.29 : 105.35	89.7 82.29 : 105.35
Mercury	TM181	100.39 87.62 : 110.64	101.96 87.62 : 110.64	100.0 87.62 : 110.64
Molybdenum	TM181	97.68 86.47 : 109.19	100.39 86.47 : 109.19	97.3 86.47 : 109.19
Nickel	TM181	90.91 87.43 : 110.63	100.47 87.43 : 110.63	97.67 87.43 : 110.63
Phosphorus	TM181	92.66 77.53 : 107.97	97.46 77.53 : 107.97	94.61 77.53 : 107.97
Selenium	TM181	97.33 86.31 : 108.23	101.19 86.31 : 108.23	97.92 86.31 : 108.23
Strontium	TM181	93.23 82.37 : 105.96	100.63 82.37 : 105.96	101.48 82.37 : 105.96
Thallium	TM181	94.14 85.06 : 112.06	99.61 85.06 : 112.06	98.44 85.06 : 112.06
Tin	TM181	95.74 85.70 : 112.34	99.29 85.70 : 112.34	96.81 85.70 : 112.34
Titanium	TM181	85.38 80.40 : 114.25	86.92 80.40 : 114.25	101.54 80.40 : 114.25
Vanadium	TM181	89.88 84.96 : 106.52	94.48 84.96 : 106.52	96.32 84.96 : 106.52
Zinc	TM181	95.46 87.17 : 108.73	102.09 87.17 : 108.73	101.57 87.17 : 108.73



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Mineral Oil

Component	Method Code	QC 1615
Mineral Oil	TM061	83.0 77.93 : 101.39

PAH by GCMS

Component	Method Code	QC 1627	QC 1617	QC 1604
Acenaphthene	TM218	92.0 82.60 : 105.38	95.0 74.71 : 115.62	93.0 82.09 : 110.18
Acenaphthylene	TM218	89.5 73.64 : 111.66	84.5 72.87 : 102.50	90.5 77.92 : 100.70
Anthracene	TM218	89.5 73.49 : 107.13	90.5 77.17 : 105.56	90.0 79.96 : 103.02
Benz(a)anthracene	TM218	103.5 82.35 : 116.46	104.5 80.47 : 122.11	100.0 80.00 : 122.30
Benzo(a)pyrene	TM218	105.5 83.39 : 123.49	105.0 79.25 : 128.38	104.0 86.92 : 126.33
Benzo(b)fluoranthene	TM218	95.5 80.60 : 126.56	101.5 82.39 : 123.81	94.5 84.53 : 122.14
Benzo(ghi)perylene	TM218	94.0 83.13 : 118.94	99.5 82.25 : 117.84	91.0 77.49 : 119.12
Benzo(k)fluoranthene	TM218	101.5 87.91 : 119.03	107.5 86.00 : 117.59	100.0 88.94 : 117.08
Chrysene	TM218	100.5 85.34 : 115.46	108.0 86.31 : 112.86	100.5 87.67 : 116.32
Dibenzo(ah)anthracene	TM218	102.5 82.98 : 121.47	107.5 82.69 : 119.50	99.0 85.66 : 119.61
Fluoranthene	TM218	92.5 82.03 : 107.26	96.5 80.37 : 111.80	93.5 84.49 : 109.33
Fluorene	TM218	94.5 81.48 : 108.26	96.0 79.98 : 109.78	96.0 84.28 : 107.54
Indeno(123cd)pyrene	TM218	102.5 84.02 : 120.55	107.5 82.79 : 119.36	99.5 86.46 : 120.70
Naphthalene	TM218	96.5 84.06 : 108.38	92.0 82.33 : 112.21	95.0 82.88 : 115.56
Phenanthrene	TM218	91.0 78.68 : 107.87	94.5 80.52 : 110.11	92.5 81.59 : 110.61
Pyrene	TM218	91.5 79.66 : 106.32	95.0 79.57 : 110.12	93.5 83.25 : 107.60

PCBs by GCMS

Component	Method Code	QC 1638
PCB congener 101	TM168	95.7 80.77 : 111.39
PCB congener 105	TM168	93.1 79.28 : 115.39
PCB congener 114	TM168	91.4 81.30 : 114.31
PCB congener 118	TM168	93.3 80.32 : 112.22



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PCBs by GCMS

		QC 1638
PCB congener 123	TM168	91.5 80.25 : 114.57
PCB congener 126	TM168	89.4 75.17 : 124.58
PCB congener 138	TM168	96.1 82.92 : 114.57
PCB congener 153	TM168	92.2 83.90 : 111.70
PCB congener 156	TM168	90.2 75.33 : 115.33
PCB congener 157	TM168	91.8 80.94 : 117.86
PCB congener 167	TM168	93.9 78.02 : 117.22
PCB congener 169	TM168	83.2 73.31 : 125.29
PCB congener 180	TM168	95.6 79.60 : 113.91
PCB congener 189	TM168	94.9 71.41 : 124.18
PCB congener 28	TM168	92.3 83.25 : 112.46
PCB congener 52	TM168	97.3 85.30 : 110.14
PCB congener 77	TM168	95.7 73.92 : 120.16
PCB congener 81	TM168	84.7 81.05 : 122.39

pH

Component	Method Code	QC 1684	QC 1670	QC 1681	QC 1676	QC 1622	QC 1654
pH	TM133	99.61 99.25 : 102.83	99.35 99.25 : 102.83	100.65 99.25 : 102.83	101.82 99.25 : 102.83	100.65 99.25 : 102.83	100.78 99.25 : 102.83

Component	Method Code	QC 1672
pH	TM133	101.3 99.25 : 102.83

pH Value of Filtered Water

Component	Method Code	QC 1688	QC 1669
pH Value of Filtered Water	TM256	101.08 99.73 : 102.16	101.21 99.73 : 102.16



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Phenols by HPLC (S)

Component	Method Code	QC 1688	QC 1621	QC 1664
2,3,5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	99.35 85.25 : 114.75	97.4 85.25 : 114.75	93.51 70.10 : 89.90
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	88.3 75.71 : 124.29	88.89 75.71 : 124.29	89.47 84.69 : 104.79
Catechol by HPLC (S)	TM062 (S)	52.38 64.10 : 135.90	7.62 64.10 : 135.90	78.1 24.84 : 108.44
Cresols by HPLC (S)	TM062 (S)	94.36 78.85 : 107.41	92.28 78.85 : 107.41	89.98 72.20 : 110.60
Napthol by HPLC (S)	TM062 (S)	107.14 75.62 : 124.38	95.0 75.62 : 124.38	110.0 91.99 : 139.23
Phenol by HPLC (S)	TM062 (S)	105.96 79.53 : 120.47	105.96 79.53 : 120.47	105.3 82.00 : 107.15
Resorcinol HPLC (S)	TM062 (S)	144.03 86.85 : 145.65	152.2 86.85 : 145.65	129.56 96.51 : 136.70
Xylenols by HPLC (S)	TM062 (S)	100.0 84.65 : 109.70	100.73 84.65 : 109.70	96.25 82.47 : 110.25

Phenols by HPLC (W)

Component	Method Code	QC 1621
2,3,5 Trimethyl-Phenol by HPLC (W)	TM259	88.0 89.00 : 113.00
2-Isopropyl Phenol by HPLC (W)	TM259	99.0 95.00 : 113.00
Cresols by HPLC (W)	TM259	91.33 84.57 : 102.57
Napthol by HPLC (W)	TM259	107.0 108.80 : 126.80
Phenol by HPLC (W)	TM259	99.0 89.00 : 107.00
Xylenols by HPLC (W)	TM259	100.5 88.83 : 112.83

Phenols by ms (w)

Component	Method Code	QC 1674
2,3,4,6-tetrachlorophenol	TM205	98.63 61.39 : 121.01
2,4,5-trichlorophenol	TM205	104.75 68.35 : 126.10
2,4,6-trichlorophenol	TM205	103.25 63.79 : 126.64
2,4-dichlorophenol	TM205	102.63 65.30 : 128.60
2,4-dimethylphenol	TM205	107.75 57.50 : 131.00
2,6-dichlorophenol	TM205	101.63 63.93 : 129.85
2-chlorophenol	TM205	99.63 64.51 : 127.89
2-methylphenol	TM205	104.63 61.66 : 132.61
2-nitrophenol	TM205	98.63 58.88 : 126.38



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

Phenols by ms (w)

		QC 1674
3-methylphenol	TM205	106.38 70.73 : 131.40
4-chloro-3-methylphenol	TM205	108.38 73.70 : 129.95
4-methylphenol	TM205	106.88 67.13 : 130.58
4-nitrophenol	TM205	110.75 68.50 : 136.75
Pentachlorophenol	TM205	79.38 47.74 : 105.49
Phenol	TM205	103.88 60.43 : 134.90

Total Dissolved Solids

Component	Method Code	QC 1689	QC 1613
Total Dissolved Solids	TM123	101.0 97.30 : 101.58	99.3 97.30 : 101.58

Total Organic Carbon

Component	Method Code	QC 1691	QC 1667	QC 1641	QC 1646	QC 1652
Total Organic Carbon	TM132	102.74 75.74 : 101.50	102.74 75.74 : 101.50	100.46 75.74 : 101.50	101.83 75.74 : 101.50	100.0 75.74 : 101.50

Total Sulphur

Component	Method Code	QC 1624	QC 1607
Total Sulphur %	TM132	93.49 81.05 : 118.95	89.25 81.05 : 118.95

VOC MS (S)

Component	Method Code	QC 1694	QC 1609
1,1,1,2-tetrachloroethane	TM116	98.2 77.56 : 115.55	97.8 77.56 : 115.55
1,1,1-Trichloroethane	TM116	94.8 74.97 : 113.76	96.8 74.97 : 113.76
1,1,2-Trichloroethane	TM116	90.8 77.12 : 116.04	94.0 77.12 : 116.04
1,1-Dichloroethane	TM116	103.4 74.46 : 129.15	103.0 74.46 : 129.15
1,2-Dichloroethane	TM116	101.8 82.41 : 125.49	108.2 82.41 : 125.49



CERTIFICATE OF ANALYSIS

Validated

SDG: 171207-151
Location: Glassworks Barnsley

Client Reference: TA8066
Order Number:

Report Number: 438042
Superseded Report:

VOC MS (S)

		QC 1694	QC 1609
1,4-Dichlorobenzene	TM116	97.6 72.76 : 126.34	101.0 72.76 : 126.34
2-Chlorotoluene	TM116	94.0 69.73 : 114.13	90.8 69.73 : 114.13
4-Chlorotoluene	TM116	92.8 66.90 : 112.46	89.4 66.90 : 112.46
Benzene	TM116	103.2 81.05 : 117.28	104.6 81.05 : 117.28
Carbon Disulphide	TM116	95.8 74.91 : 122.14	93.0 74.91 : 122.14
Carbontetrachloride	TM116	107.4 77.80 : 119.23	105.0 77.80 : 119.23
Chlorobenzene	TM116	96.4 75.00 : 115.53	94.2 75.00 : 115.53
Chloroform	TM116	98.2 77.34 : 121.84	99.8 77.34 : 121.84
Chloromethane	TM116	86.6 52.63 : 138.74	91.6 52.63 : 138.74
Cis-1,2-Dichloroethene	TM116	102.6 74.69 : 124.27	104.0 74.69 : 124.27
Dibromomethane	TM116	91.8 67.80 : 121.75	91.8 67.80 : 121.75
Dichloromethane	TM116	101.6 81.11 : 133.25	103.2 81.11 : 133.25
Ethylbenzene	TM116	92.8 72.53 : 109.84	93.2 72.53 : 109.84
Hexachlorobutadiene	TM116	43.0 23.60 : 154.69	70.0 23.60 : 154.69
Isopropylbenzene	TM116	72.0 54.46 : 125.44	79.0 54.46 : 125.44
Naphthalene	TM116	100.8 74.47 : 129.31	109.8 74.47 : 129.31
o-Xylene	TM116	82.2 67.46 : 102.22	81.4 67.46 : 102.22
p/m-Xylene	TM116	84.0 68.32 : 108.91	86.2 68.32 : 108.91
Sec-Butylbenzene	TM116	60.4 50.86 : 134.07	79.4 50.86 : 134.07
Tetrachloroethene	TM116	102.0 76.95 : 121.02	99.2 76.95 : 121.02
Toluene	TM116	92.2 74.24 : 107.42	92.8 74.24 : 107.42
Trichloroethene	TM116	98.0 77.61 : 111.54	97.2 77.61 : 111.54
Trichlorofluoromethane	TM116	92.6 70.00 : 130.00	94.6 70.00 : 130.00
Vinyl Chloride	TM116	98.2 68.05 : 125.93	106.2 68.05 : 125.93

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis .

The figure detailed is the percentage recovery result for the AQC .

The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control .



CERTIFICATE OF ANALYSIS

SDG:	171207-151	Client Reference:	TA8066	Report Number:	438042
Location:	Glassworks Barnsley	Order Number:		Superseded Report:	

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

General

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
§	Sampled on date not provided
◆	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



SOIL engineering

SUPPORTING FACTUAL DATA

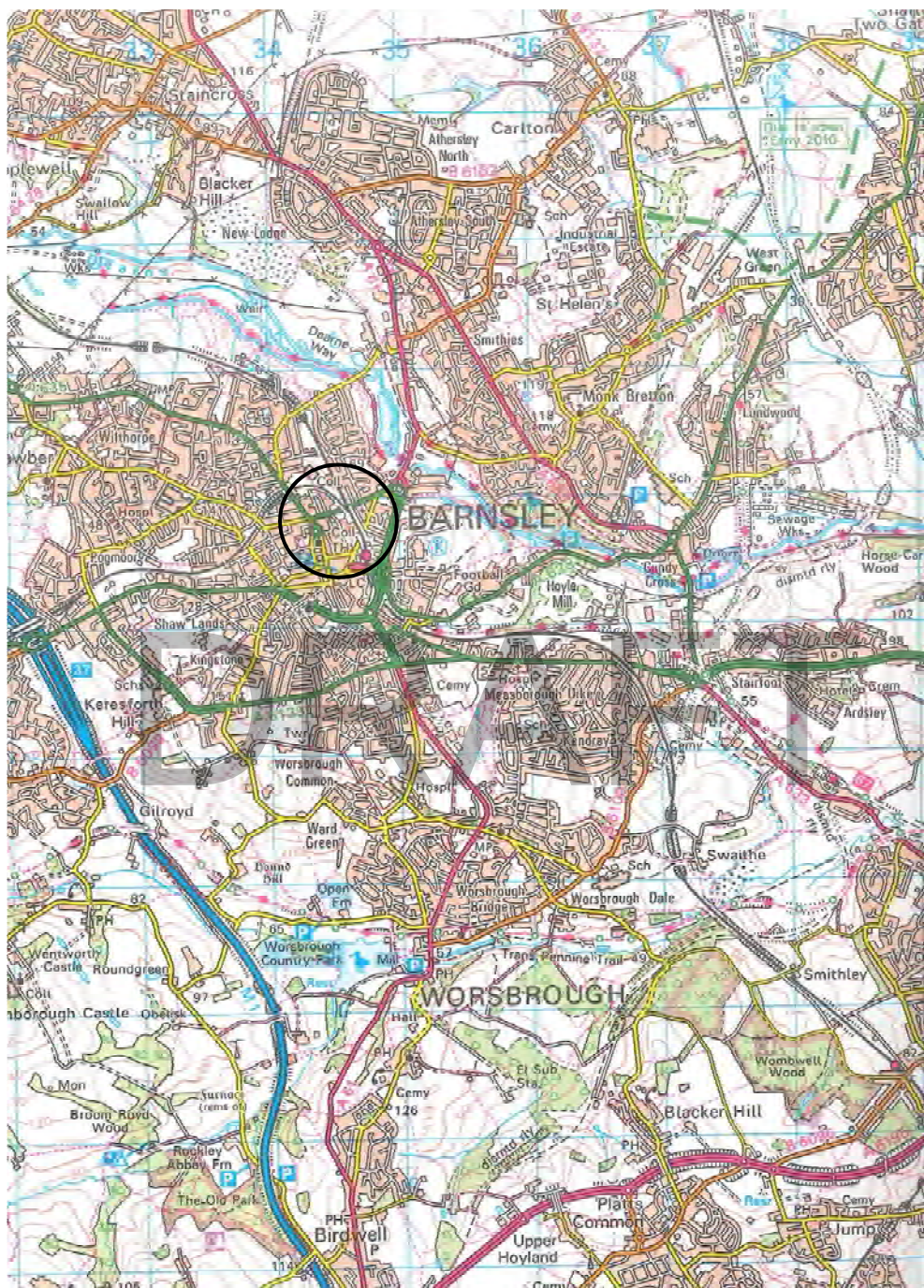
SECTION C

Plans and Drawings

SITE LOCATION PLAN

DRAFT

Project Name	Barnsley Glassworks	Site Location Plan	Scale
Project No.	TA8066		1:50,000
Engineer	Mott MacDonald		Figure No.
Employer	Henry Boot		1



Denotes Site Location

Reproduced from Ordnance Survey's 1:50,000 map number 111

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Recorded By:	Mark P Burton	Checked By:	paul.rodgers	Approved By:		 SOIL ENGINEERING Part of the Bachy Soletanche Group
Date:	11/01/2017	Date:	11/01/2018	Date:		
Form No.	SE-GOA-F-011	IssueNo.RevisionNo	2.04	Issue Date	17/08/2016	



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION C

Plans and Drawings

EXPLORATORY HOLE LOCATION PLAN

DRAFT



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION D Photographs

SOIL SAMPLE / ROCK CORE / CONCRETE CORE PHOTOGRAPHS

DRAFT

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH01 E
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		01



Box 1



Box 2

Photographed by	Date photographed	Filename 1	BH01E Box 1	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH01 E Box 2	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH01 E
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		02



Box 3



Box 4

Photographed by	Date photographed	Filename 1	BH01E Box 3	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH01E Box 4	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH01 E
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		03



BH01E Box 5



Photographed by	Date photographed	Filename 1	BH01E Box 5	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH01E Box 6	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH02
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		04



Box 1



Box 2

Photographed by	Date photographed	Filename 1	BH02 box 1	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH02 box 2	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH02
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		05



box 3



box 4

Photographed by	Date photographed	Filename 1	BH02 box 3	 SOIL engineering
Mark Burton	19/12/2017	Filename 2	BH02 box 4	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH02
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		06



Box 5

Photographed by	Date photographed	Filename 1	BH02 box 5	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017			
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		07



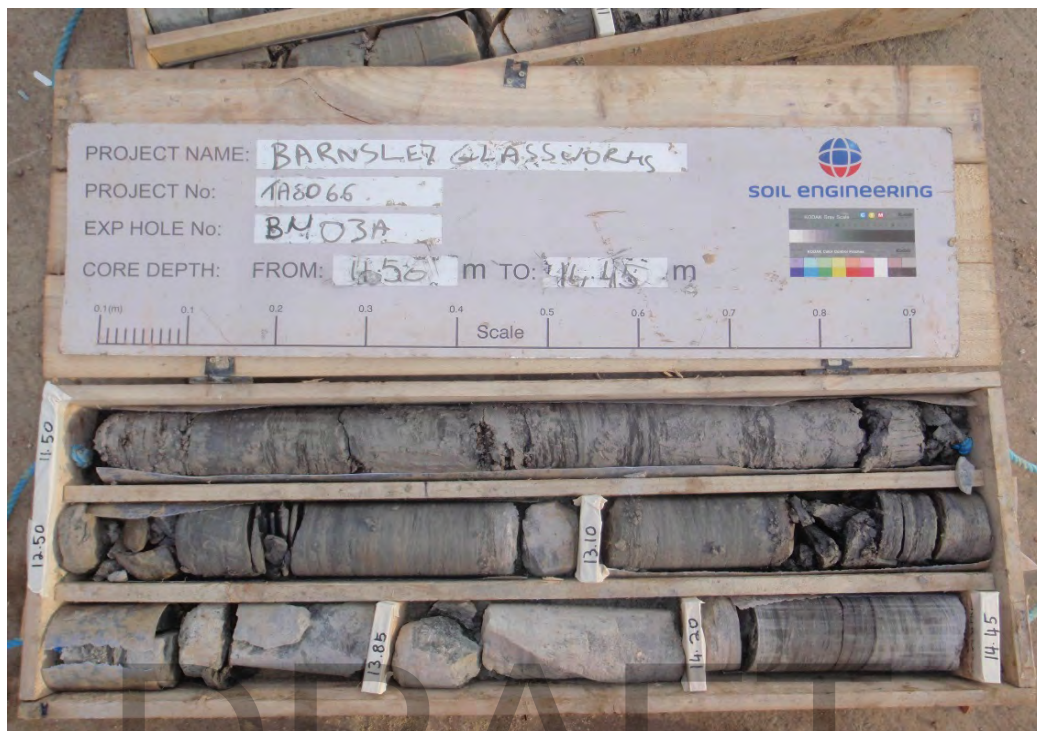
Box 1



Box 2

Photographed by	Date photographed	Filename 1	BH03A Box 1	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH03A box 2	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		08



Box 3



Box 4

Photographed by	Date photographed	Filename 1	BH03A Box 3	 SOIL ENGINEERING Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH03A Box 4	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		09



Box 5



Box 6

Photographed by	Date photographed	Filename 1	BH03A Box 5	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	BH03A Box 6	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		10



Box 7

Photographed by	Date photographed	Filename 1	BH03A Box 7	 SOIL engineering
Mark Burton	19/12/2017	Filename 2		
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		WS30
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		11



WS30 box 1

Photographed by	Date photographed	Filename 1	WS30 Box 1	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017			
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		WS31C
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		12



WS31C

Photographed by	Date photographed	Filename 1	WS31C	 SOIL engineering Part of the Bachy Soletanche Group
Mark Burton	19/12/2017			
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		WS32
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		13



WS32

Photographed by	Date photographed	Filename 1	WS32	 SOIL engineering
Mark Burton	19/12/2017			
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group



SOIL engineering

SUPPORTING FACTUAL DATA

SECTION D Photographs

EXCAVATION PHOTOGRAPHS

DRAFT

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		14



Face A



Face B

Photographed by	Date photographed	Filename 1	BH03A Face A	 SOIL engineering
Mark Burton	19/12/2017	Filename 2	BH03A Face B	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		BH03A
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		15



Spoil

Photographed by	Date photographed	Filename 1	BH03A Spoil	 SOIL engineering
Mark Burton	19/12/2017	Filename 2		
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		TP03
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		16



Face B



Face C

Photographed by	Date photographed	Filename 1	TP03 Face B	 SOIL engineering
Mark Burton	19/12/2017	Filename 2	TP03 Face C	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		TP03
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		17



DRAFT

Spoil

Photographed by	Date photographed	Filename 1	TP03 Spoil	 SOIL engineering
Mark Burton	19/12/2017			
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		TP04
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		18



TP04 Face B



Face c

Photographed by	Date photographed	Filename 1	TP04 Face B	 SOIL ENGINEERING Part of the Bachy Soletanche Group
Mark Burton	19/12/2017	Filename 2	TP04 Face C	
Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	

Project Name	Barnsley Glassworks	Photographic Record	Hole ID
Project No.	TA8066		TP04
Engineer	Mott MacDonald		Plate No.
Employer	Henry Boot		19



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Spoil

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Form No. SE-SDP-F-005	IssueNo.RevisionNo 2.04	Issue Date	05/11/2012	Part of the Bachy Soletanche Group



SOIL engineering

SUPPORTING FACTUAL DATA

APPENDIX 1

Explanatory Notes on Fieldwork, Logging
and Laboratory Testing

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FIELDWORK PROCEDURES

APPENDIX 1: FIELDWORK PROCEDURES

1.0 CABLE PERCUSSION BORING TECHNIQUES

Unless otherwise stated the light cable percussion technique of 'soft ground' boring has been employed in the formation of boreholes for this contract. In cohesive soils a clay cutter has been used to advance the boreholes whilst in granular deposits a shell has been employed. The combination of clay cutter and shell bring up disturbed material which is generally sufficiently representative to permit identification of the strata. Whilst these particular techniques allow the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils (e.g. thin layers of coarse and fine granular material) is inevitable.

2.0 DYNAMIC SAMPLING

As an alternative to cable percussion boring, Soil Engineering employs a number of techniques for the sampling of soils. The most common alternative techniques comprise some form of dynamic sampling system which involves sampling tubes being driven into the ground by means of a sliding weight.

'Window sampling' techniques form the most common type of dynamic sampling and typically comprise 1.0m long steel cylinders with elongated windows. These are driven to the required depth by the use of a percussive hammer. In the 'windowless' mode a plastic liner can be placed in the steel cylinders such that effectively continuous sampling can be undertaken. This method of sampling only produces Quality Class 3 or 4 samples which are not suitable for any form of laboratory machine testing.

3.0 ROUTINE SAMPLING

In the UK "undisturbed" samples of predominantly cohesive soils have historically generally been obtained in a 102mm diameter open drive sampler as described in the British Standard Code of Practice BS 5930: 1999 (ref 01). These samplers are known as U100 and historically are of two types; a metal tube or a plastic liner. BS EN ISO 22475-1: 2006 (ref 03) however makes it clear that such samplers will not produce a quality class 1 sample. It is this class of sample that is required for laboratory machine testing.

Alternative methods of sampling which will produce a class 1 sample are available and these include piston samplers, Shelby tubes and the UT100. The latter is a modification of the U100 and classifies as a thin wall sampler and as such is capable of obtaining class 1 samples. It should be noted however that this type of sampler is only suitable for certain ground conditions and cannot be used in very stiff to hard cohesive soils or in very granular cohesive soils. Equally other thin walled samplers such as the piston sampler are more appropriate for very soft and soft cohesive soils.

Soil Engineering recognise that in certain soil types, there will not be a single solution to sampling and it will be necessary to utilise a variety of sampling techniques in order to obtain the best quality samples possible. Such techniques may include rotary coring and this is described in section 4.0. For some 'difficult' soil types it may not be possible to obtain truly undisturbed samples, and engineering judgement will be required if such samples are to be used for geotechnical laboratory testing. Where such challenging soil types have been encountered and alternative sampling techniques used, this is discussed in the report text.

APPENDIX 1: FIELDWORK PROCEDURES

In granular deposits and mixed cohesive granular deposits where it is not possible to recover undisturbed samples, either large or small disturbed samples are normally obtained. The size of these samples are in accordance with the requirements of BS 5930: 1999 whilst the frequency of sampling is unique to this contract.

It is important to note that the number of blows taken to drive any kind of sampling tube is not necessarily indicative of the strength of the material being sampled. For this reason Soil Engineering recommends that no attempt is made to correlate such blows with the strength of cohesive strata.

4.0 ROTARY DRILLING

Where rotary open hole drilling techniques have been employed it is important to note that descriptions of the strata encountered are generally solely based on the lead drillers observations of cuttings and drill flush returns. Whilst such techniques can provide useful information in certain ground conditions it should be recognised that an accurate determination of subsurface rock strata can only be obtained by rotary coring techniques.

An examination of rock cores obtained by rotary drilling generally enables bedding planes, fissuring and consistency to be observed but does not necessarily reveal the presence of vertical fissures or joints. Where an appropriate core diameter and flushing medium have been used, sub-sampling of the core immediately following removal from the core barrel can produce quality Class 1 samples. Such samples require to be sealed and waxed in order to prevent moisture loss.

Details of the strata encountered are given on the borehole log along with the geologist's assessment of Total Core Recovery (TCR), Solid Core Recovery (SCR) and Rock Quality Designation (RQD) each expressed as a percentage of the individual core runs. When appropriate the Fracture Index (FI) or Fracture Spacing (If) is also given on the logs and represents respectively the number of natural fractures per metre run of core for core that has a similar intensity of fracturing, or the minimum, average and maximum spacing of such natural fractures over an arbitrary length of core of similar intensity of fracturing.

The symbols and abbreviations used on the rotary borehole logs are explained on the exploratory hole legend and notation sheet that precedes the exploratory hole records. It is considered however that the meaning of the abbreviations NI and NA needs further clarification. NI denotes material recovered non intact and applies to material that has numerous fractures or incipient fractures and which is either naturally broken up or which becomes broken up by drilling activities. The result in both cases is that the core is recovered in a highly fragmented state, generally as a gravel. The term NA is the abbreviation for not applicable and refers to any materials to which determination of a fracture index would be inappropriate, i.e. for clay bands.

Where significant core loss (>300mm) has occurred, it is Soil Engineering general policy to insert a separate 'stratum' on the log to coincide with the inferred zone of core loss. Unless there is good evidence as to the rock (or soil) type that has been lost, the legend column is left blank. For zones of inferred mine workings, an appropriate legend is used and this together with all the legends used on the logs is shown on the log notation sheet that precedes the exploratory logs in the report.

A summary of logging methodology for rock strata and core measurements is given in Appendix 1: Terminology used in the Description and Classification of Rocks.

APPENDIX 1: FIELDWORK PROCEDURES

5.0 IN SITU DYNAMIC PENETRATION TESTS

The Standard Penetration Test using either a split spoon (SPT) or a solid cone (SPT(C)), is generally employed where undisturbed samples cannot be obtained e.g. in granular soils, fill and rock etc, in order to obtain an indication of the in situ density, compaction or hardness. It can also be used as an alternative to undisturbed sampling in cohesive deposits. Inherent difficulties are present in obtaining true SPT or SPT(C) "N" values in water bearing fine grained granular deposits and careful consideration of the test technique and groundwater conditions are necessary before test results are used for design purposes.

The full procedure for carrying out the Standard Penetration Test (SPT) is given in BS EN ISO 22476-3: 2005 (ref 02). For fine to medium granular deposits and in clays the test consists of driving a 50mm external diameter split barrel sampler into the soil using a 63.5kg hammer dropping 760mm. In coarse granular soils or in rock, the split barrel may be replaced by a solid cone. The penetration resistance is expressed as the number of blows required to obtain 300mm penetration below an initial seating drive of 150mm through any disturbed ground at the bottom of the borehole. The number of blows for the 300mm test drive penetration is recorded on the borehole logs as the "N" value. A full record of the number of blows required to drive the sampler at 75mm intervals throughout the total 450mm drive is also tabulated along with the groundwater level at the time of test. Where full 450mm penetration is not achieved, it is important to distinguish how the blow count relates to the penetration of the sampler and this may be achieved in the following manner:

- (i) Where the test drive is terminated before full (300mm) penetration the number of blows for the partial test drive (usually 50) and the penetration of the sampler within the test drive are recorded. An approximate "N" value may be obtained by linear extrapolation of the number of blows recorded for the partial test drive.
- (ii) If the total seating drive penetration is equal to or less than 150mm then the number of blows (usually 25) and the depth of penetration within the initial seating penetration are recorded on the borehole logs.

The "N" value obtained from the Standard Penetration Test may be used to assess the relative density of sands and gravels in accordance with Clause 41.3.2 of BS 5930: 1999 (ref 01), as shown in table 1.

It should be noted that the "N" values reported on the logs are uncorrected, as specified in section 7.1.2 of BS EN ISO 22476-3:2005.

SPT's performed by Soil Engineering are carried out using automatic trip hammers that have been calibrated in accordance with BS EN ISO 22476-3:2005. The hammer ID and energy ratio are recorded on the 'header page' of each log and calibration certificates for the hammers used on the project are contained in the Appendix Section of the report, as required by BS EN ISO 22476-3:2005.

TABLE 1: DETERMINATION OF RELATIVE DENSITY FROM PENETRATION TESTS (from BS 5930)

Term	SPT N-Value: Blows/300mm Penetration
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

APPENDIX 1: FIELDWORK PROCEDURES

It should be noted that it is a requirement of BS EN ISO 22476-3: 2005 that all test hammers are calibrated. Soil Engineering routinely calibrate all their test hammers and the results of the calibration are expressed as an Energy Ratio (Er) on the exploratory hole logs. The Er value is required for design purposes and should be applied to the recorded test N value in the manner described in BS EN ISO 22476-3: 2005.

Standard Penetration Testing may also be performed in very stiff/hard clays in which it would be difficult to obtain undisturbed samples. In such cases the SPT "N" values may be used for design purposes based on correlations between "N" value and various soil parameters such as those proposed by Stroud and Butler (1975) (ref 04) and by Stroud (1989) (ref 05).

6.0 GROUNDWATER

The groundwater conditions entered on the exploratory hole records are those encountered at the time of the investigation. These however, may not represent the actual conditions or those which may apply in large excavations. The normal rate of boring does not always permit the recording of an equilibrium water level for any one water strike, particularly because the entry of water into a borehole may be reduced or even eliminated due to casing off a water bearing layer or due to a skin being formed on the borehole wall by the drilling tools. It should also be noted that groundwater conditions may vary seasonally and/or tidally and that the water levels as shown at the time of investigation should not necessarily be taken as being constant because they may be subject to such fluctuations.

More accurate information on groundwater conditions can be obtained from exploratory hole installations such as piezometers and standpipes. Normally a minimum of three or four monitoring visits are required at the site to provide this information.

References

- 01) BS 5930: 1999: Code of Practice for Site Investigation. British Standards Institution.
- 02) BS EN ISO 22476-3: 2005: Geotechnical Investigation and Testing - Field Testing - Part 3: Standard Penetration Test.
- 03) BS EN ISO 22475-1: 2006: Geotechnical Investigation and Testing - Sampling Methods and Groundwater measurements - Part 1: Technical Principles for Execution.
- 04) Stroud, M.A, Butler, F.G April 1975: 'The Standard Penetration Test and the Engineering Properties of Glacial Materials'. The Engineering Behaviour of Glacial Materials Proc. of Symp.
- 05) Stroud, M.A. 1989: 'The Standard Penetration Test - Its Application and Interpretation. Thomas Telford, London.



SOIL engineering

SUPPORTING FACTUAL DATA

APPENDIX 1

Explanatory Notes on Fieldwork, Logging
and Laboratory Testing

**TERMINOLOGY USED IN SOIL
DESCRIPTIONS**

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APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

1.0 GENERAL PROCEDURES

Soil descriptions contained in this report have been produced in accordance with the procedures and principles given in BS EN ISO 14688-1: 2002 (ref 01), BS EN ISO 14688-2: 2004 (ref 02) and also where there is no conflict with the European standards, in accordance with BS 5930: 1999 (ref 03).

For a soil description the main soil characteristics should be given in a standard word order although the word order can be adjusted to enhance and clarify if appropriate. The main soil characteristics can be divided as follows:-

- | | |
|---|--|
| 1 Mass Characteristics
comprising state and structure | 2 Material Characteristics
comprising nature and state |
| 1a Density and Field Strength | 2a Colour |
| 1b Discontinuities | 2b Composite Soil Types: particle grading and composition, shape and size |
| 1c Bedding | 2c Principal Soil Type, name in capitals eg CLAY |
| 3 Stratum Name (optional) | |
| 3a Geological group or Formation | |

The basic soil categories may be broadly summarised as follows, with categories i to iii covered by these notes and categories iv and v by separate notes.

- (i) Very coarse soils: greater than 63mm in diameter, ie cobbles and boulders.
- (ii) Coarse soils: 0.063mm to 63mm in diameter, ie sands and gravels.
- (iii) Fine soils: less than 0.063mm in diameter, ie clays and silts.
- (iv) Organic soils.
- (v) Man made "soils".

2.0 MASS CHARACTERISTICS OF SOILS

2.1 Cohesive Soils

For cohesive material determination of consistency is made in accordance with Table 1. The undrained shear strength of clays is determined by laboratory or field testing and is made in accordance with the terms given in Table 2.

TABLE 1: CONSISTENCY GUIDE FOR COHESIVE MATERIAL (from BS EN ISO 14688-1: 2002)

Term	Field Identification
Very Soft	Exudes between fingers when squeezed in the hand
Soft	Can be moulded by light finger pressure
Firm	Cannot be moulded, but can be rolled into 3mm thick thread
Stiff	Crumbles when rolled into 3mm thick thread
Very Stiff	Cannot be moulded and crumbles under pressure. Indented by thumbnail

APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

TABLE 2: STRENGTH TERMS OF FINE SOILS (from BS EN ISO 14688-2: 2004)

Strength Term	Undrained shear strength (Cu) kPa
Extremely Low	<10
Very Low	10 to 20
Low	20 to 40
Medium	40 to 75
High	75 to 150
Very High	150 to 300
Extremely High ¹	>300

¹ Materials with shear strengths greater than 300kPa may behave as weak rocks and should be described in accordance with BS EN ISO 14689-1

2.2 Granular Soils

For granular deposits relative density may only be determined by the Standard Penetration Test (SPT). The following table provides a scale of terms related to SPT 'N' values from BS 5930: 1999 (ref 03).

TABLE 3: ASSESSMENT OF RELATIVE DENSITY FOR GRANULAR SOILS (from BS 5930: 1999)

Term	Field Identification (generally in trial pits)	SPT 'N' Values (blows for 300mm penetration)
Very loose	Can be excavated with a spade	0-4
Loose	and 50mm wooden peg can be easily driven	4-10
Medium dense	-	10-30
Dense	Requires pick for excavation	30-50
Very dense	and 50mm wooden peg is hard to drive	over 50

N.B: The field identification terms for very loose/loose material and dense/very dense material are very subjective and should be treated with caution.

2.3 Discontinuities

The type of discontinuity should be described eg fissures, faults and shear planes together with their spacing as given in Table 4. Discontinuity openness, and surface texture eg rough, smooth, polished and striated are recorded although these may not always be added to the borehole log if the required level of detail is low.

2.4 Bedding

Bedding spacing is assessed using the thickness terms given in Table 4.

APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

TABLE 4: DESCRIPTIONS FOR DISCONTINUITIES AND BEDDING (from BS 5930: 1999)

DISCONTINUITIES		BEDDING	
Scale of SpacingTerm	Mean Spacing mm	Scale of BeddingTerm	Mean Thickness mm
Very widely	>2000	Very thickly bedded	>2000
Widely	2000-600	Thickly bedded	2000-600
Medium	600-200	Medium bedded	600-200
Closely	200-60	Thinly bedded	200-60
Very closely	60-20	Very thinly bedded	60-20
Extremely closely	<20	Thickly laminated	20-6
		Thinly laminated	<6

N.B: Spacing terms are also used for describing the distance between partings, isolated beds, laminae or roots etc.

Interbedded/interlaminated: alternating layers of different material type. These terms are given a thickness if material is present in equal proportions. Otherwise the thickness of and spacing between subordinate layers are defined.

3.0 MATERIAL CHARACTERISTICS OF SOIL

An examination of insitu soil deposits, disturbed or undisturbed samples allows the material characteristics to be recorded. These characteristics include colour, particle shape, particle grading and particle composition.

3.1 Colour

The recorded colour is based on the logger's general impression of the overall colour. For material with more than three colours the term multicoloured may be used. The term mottled is applied to soils which exhibit two colours, one of which is subordinate to the other.

White, cream, grey, black, yellow, orange, red, brown, green and blue etc may be used but supplemented as necessary with: light, dark, mottled and reddish brownish etc. All colouration associated with chemical changes is noted ie grey gleying on fissures.

3.2 Soil Types (Including Composite Soils)

3.2.1 Very Coarse Soils (Boulders and Cobbles)

Where the soil sample is considered large enough to be representative, material is described as shown in Table 5.

TABLE 5: DESCRIPTORS FOR VERY COARSE SOILS (from BS 5930: 1999)

Main Name	Estimated Boulder/Cobble Content of Very Coarse Fraction
BOULDERS	Over 50% is of boulder size (>200mm)
COBBLES	Over 50% is of cobble size (200mm to 63mm)

Mixtures of very coarse and finer materials are described by combining terms for the very coarse constituents with those for the finer constituents as shown in Table 6.

APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

TABLE 6: DESCRIPTORS FOR MIXTURES OF VERY COARSE AND FINER SOILS (from BS 5930: 1999)

Term	Composition (Approx %)
BOULDERS (or COBBLES) with a little finer material ⁽¹⁾	Up to 5% finer material
BOULDERS (or COBBLES) with some finer material ⁽¹⁾	5% to 20% finer material
BOULDERS (or COBBLES) with much finer material ⁽¹⁾	20% to 50% finer material
FINER MATERIAL with low boulder content	<5% boulders
FINER MATERIAL with low cobble content	<10% cobbles
FINER MATERIAL with medium boulder content	5% to 20% boulders
FINER MATERIAL with medium cobble content	10% to 20% cobbles
FINER MATERIAL with high boulder content (or cobbles)	>20% boulders or cobbles

(1) The description of "finer material" is made in accordance with BS 5930: 1999 ignoring the very coarse fraction; the principal soil type name of the finer material may also be given in capital letters, e.g. sandy GRAVEL with low boulder content; COBBLES with some sandy CLAY.

3.2.2 Coarse Soils (Gravel and Sand)

A coarse soil (omitting any cobbles and boulders) contains 65% or more of SAND or GRAVEL. The terms given in Table 7 are used to describe the coarse fraction.

TABLE 7: DESCRIPTORS FOR MIXTURES OF COARSE SOILS (from BS 5930: 1999)

Term	Principal Soil Type	Approximate Proportion of Secondary Constituent
Slightly sandy or gravelly	SAND	<5%
Sandy or gravelly	or	5% to 20%
Very sandy or gravelly	GRAVEL	>20%
-	SAND and GRAVEL	About equal proportions

3.2.3 Fine Soils and Mixtures of Fine and Coarse Soils

Fine soil should be described as either a SILT or a CLAY. The use of silty CLAY or clayey SILT is however permitted, where the presence of the secondary constituent is considered important.

For deposits that contain a mixture of soil types the descriptors given in Table 8 are used. The dominant secondary fraction is placed immediately before the principal soil type. It should also be noted that the terms silty and clayey are mutually exclusive in a coarse soil. The use of the terms sandy and gravelly are however permitted.

APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

TABLE 8: DESCRIPTORS FOR FINE SOILS AND COMPOSITE SOIL TYPES (from BS 5930: 1999)

Term	Principal Soil Type	Approximate Proportion of Secondary Constituent	
		Coarse Soil	Coarse and/or Fine Soil
Slightly clayey or silty and/or sandy or gravelly	SAND and/or		<5%
Clayey or silty and/or sandy or gravelly	GRAVEL		5% - 20% *
Very clayey or silty and/or sandy or gravelly			>20% *
Very sandy or gravelly	SILT or	>65% +	
Sandy and/or gravelly	CLAY	35% - 65%	
Slightly sandy and/or gravelly		<35%	

* or described as fine soil depending on assessed engineering behaviour

+ or described as coarse soil depending on assessed engineering behaviour

3.3 Particle Shape and Grading

For coarser granular deposits (gravel and cobbles) the particle shape is described as shown in Table 9. A schematic of angularity and form terms is given in Figure 1.

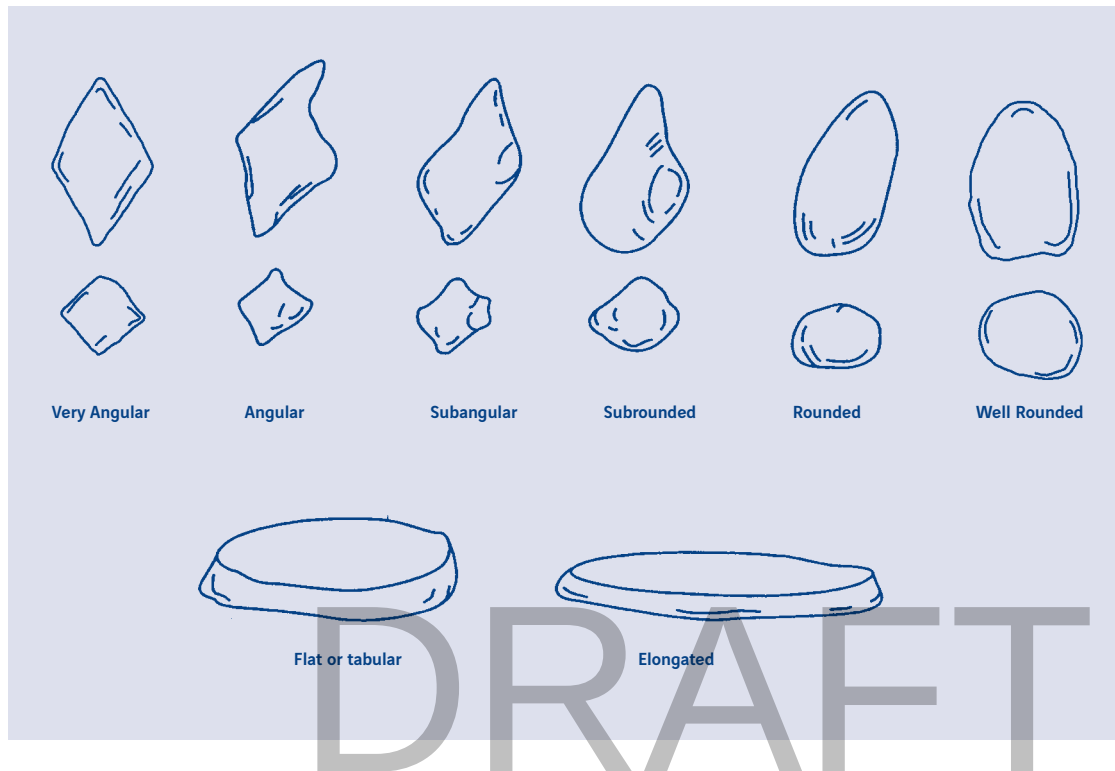
TABLE 9: DESCRIPTORS FOR PARTICLE SHAPE (from BS EN ISO 14688-1: 2002)

Angularity	Form	Surface Texture
Very Angular	Cubic	
Angular	Flat	Rough
Subangular	Elongated	Smooth
Subrounded		
Rounded		
Well Rounded		

The distribution of particle sizes within sands and gravels is described stating the predominant size fraction present eg fine to medium SAND.

APPENDIX 1: TERMINOLOGY USED IN SOIL DESCRIPTIONS

FIGURE 1: PARTICLE ANGULARITY AND FORM TERMS (from BS 5930: 1999 and Soil Engineering)



References

- 01) BS EN ISO 14688-1: 2002: Geotechnical Investigation and Testing - Identification and Classification of Soil Part 1: Identification and Description.
- 02) BS EN ISO 14688-2: 2004: Geotechnical Investigation and Testing - Identification and Classification of Soil Part 2: Principles for a Classification.
- 03) BS 5930: 1999: Code of Practice for Site Investigation. British Standards Institution.



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Explanatory Notes on Fieldwork, Logging
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**TERMINOLOGY USED IN THE
DESCRIPTION OF MADE GROUND**

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION OF MADE GROUND

1.0 GENERAL DEFINITIONS

Man made soils may be defined as those materials that have not been laid down by geomorphological processes. Under the heading of 'man made soils' two distinct material types can be identified as follows:-

TABLE 1: DEFINITIONS FOR MAN MADE SOILS

Term	Description
NATURAL SOILS (Reworked)	Use terminology outlined for soils in BS EN ISO 14688-1: 2002 (ref 01), BS EN ISO 14688-2: 2004 (ref 02) and BS 5930: 1999 (ref 03). Can be described using normal approach for soils. Can be tested in accordance with BS1377: 1990.
MAN MADE MATERIALS	Can also frequently be described using normal approach and terminology as above, and tested geotechnically. Includes materials that defy description in any standard manner and includes a range of exotic materials and artifacts. Often not testable in the field or in the laboratory. For example it is not possible to measure strength of a bicycle frame or liquid limit of plastic.

There is also a distinction between the terms "Fill" and "Made Ground" as follows:

FILL = Material placed under engineering control

MADE GROUND = Material placed without any kind of control, ie non engineered

2.0 IDENTIFICATION OF MAN MADE SOILS

Some common examples of man made soils are given in Table 2 on page 2. The table illustrates that the heading of 'man made' soils can cover a wide variety of materials, some of which may not readily appear to be anything other than natural.

Natural soils re-laid by man may be difficult to identify as such and so it is necessary to look for evidence in the form of artifacts or relic structure in the material.

For example as few as one or two artifacts may be diagnostic (rare brick fragments or car body at base of trial pit). Lenses or pockets of clay that are laminated etc help to indicate natural material that has been relaid. However be aware of the following:

Contamination by driller (Clinker from around rig, green grass from 15m...).

Contamination during trial pitting (brick rubble can fall from the upper layers in a pit and then get pushed in to natural deposits by the action of the excavator bucket).

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION OF MADE GROUND

TABLE 2: DEFINITIONS FOR MAN MADE SOILS

CATEGORY	EXAMPLE
Natural Soils re-laid by man	Embankment Fill Colliery Spoil (Coarse Discard) Drainage Layer e.g Gravel
Man Made Materials that can be described and which are testable geotechnically	Abutment backfill e.g Crushed rock Colliery Spoil (Fine Discard) Mine Tailings from non-coal mines Crushed Concrete Pulverised Fuel Ash (PFA) Chalk whiting (slurry from cement manufacture)
Man Made Materials that are NOT readily describable and which are not testable geotechnically	Landfill Demolition rubble (including frames, slates etc) Fly tipped materials Bury (glass work waste)

3.0 DESCRIPTION OF MAN MADE SOILS

Information that is be reported to define the material includes the following:-

Origin of materials, if known from desk study.

Layers and their inclination to inform on mode of tipping, whether ponded, end tipped, spread or stockpiled.

Large objects, obstructions such as concrete, masonry walls, old cars.

Presence of hollow objects, compressible/collapsible objects or voids such as oil drums, cellars, tanks.

Chemical wastes and dangerous or hazardous substances such as creosote, hospital wastes, unlabelled drums, asbestos.

Decomposable materials with note on degree of decomposition such as garden waste, paper.

Smell such as organic, phenolic, sulphurous, petrol.

Striking colours

Any dating possible such as type of bottles, newspapers, papers.

Signs of heat or combustion such as steam, smoke, burnt shale.

NOTES

Because of the variability of the constituents of man made soils, strength or in situ density descriptors are not generally assigned to made ground. Where describing fill as opposed to made ground it may be possible to use the descriptors that are used for natural soils.

Large or hollow objects cannot be sampled so the description is the sole information on condition and character of the features.

The constituents of made ground are grouped together under the above categories and it is usual to give volumetric percentages where possible.

Granular made ground may be given a particle size, although the following description methodology is employed.

MADE GROUND: Grey fine to coarse gravel sized fragments of brick and concrete.

OR

MADE GROUND: Grey gravelly clay with occasional subangular cobble sized fragments of brick. Gravel sized fragments are angular to subangular, fine, medium and coarse of brick.

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION OF MADE GROUND

In these two examples, note the use of term 'sized fragments' to describe the granular content. Because the material is man made we do not use the terms sand, gravel or cobbles etc in the same context as for natural soils. In other words it would be incorrect to use the following:

MADE GROUND: Grey gravelly clay with occasional cobbles. Gravel is angular coarse of brick, cobbles are rounded of brick.

The use of sand, gravel or cobble prior to 'sized fragments' is only intended to define a size range to the granular made ground material.

Similar grain size indicators are also used to describe the size of other man made materials such as concrete, bituminous road surfacing etc. In addition the terms can also be used to describe natural material that has been modified by man, such as wood that may be present in the form of railway sleepers etc. Where whole man made items are identified they should be described as follows:

'with numerous wooden railway sleepers'

For such materials it is necessary to add size measurements, since no other quantifying terms are used.

4.0 DEFINITIONS OF SOME MAN MADE SOILS

There is generally a lack of national guidance on the meaning of common terms used in made ground. This applies particularly to man made materials. For this reason descriptions of man made soils within this report aim to provide as much information as possible on the material being logged, whilst staying within the guidance provided in these notes.

For some sites a set of definitions for the likely range of made ground to be encountered may have been determined and where this is the case it is identified within the report text.

Some terms for one group of commonly encountered made ground are given below.

COMBUSTION PRODUCTS, often physically unstable and usually containing concentrations of metals and poly-aromatic hydrocarbons. The definitions below are workable compromises.

ASH: Sand or silt size by definition, so do not need but can use "ash sand", and cannot have "gravel size ash" although cinders can be gravel size but readily crush down. Can include unburnt coal.

CLINKER: Gravel size or larger by definition so do not need but can use "clinker gravel", and cannot have "sand size clinker".

SLAG: Materials fused or poured as liquid or scum or froth, of any size or shape, and will be at least strong. If in blocks or layers, can present difficulties for borehole or trial pit penetration. Slag is often pelletised, expanded or crushed for reuse in construction.

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION OF MADE GROUND

References

- 01) BS EN ISO 14688-1: 2002: Geotechnical Investigation and Testing - Identification and Classification of Soil Part 1: Identification and Description.
- 02) BS EN ISO 14688-2: 2004: Geotechnical Investigation and Testing - Identification and Classification of Soil Part 2: Principles for a Classification.
- 03) BS 5930: 1999: Code of Practice for Site Investigation. British Standards Institution.

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Explanatory Notes on Fieldwork, Logging
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**TERMINOLOGY USED IN THE
DESCRIPTION AND
CLASSIFICATION OF ROCKS**

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION AND CLASSIFICATION OF ROCKS

1.0 GENERAL PROCEDURES

Rock descriptions contained in this report have been produced in accordance with the procedure and principles given in BS EN ISO 14689-1: 2003 (ref 01) and where there is no conflict with the European standards in accordance with BS 5930: 1999: Section 6 (ref 02). For rock descriptions the main rock characteristics should be given in a standard word order. The description and classification is therefore based on the following:-

1	Material Characteristics	2	General Information
1a	Strength	2a	Minor Constituents
1b	Structure	2b	Geological Formation
1c	Colour		
1d	Texture		
1e	Grain size		
1f	Weathering and alteration effects		
1g	Rock name (in capitals e.g. SANDSTONE)		
3	Mass Characteristics		
3a	State of weathering		
3b	Fracture state		
3c	Discontinuities		

2.0 MATERIAL CHARACTERISTICS OF ROCK

2.1 Strength

The descriptors given in Table 1 are used to assess rock strength.

TABLE 1: DESCRIPTORS AND FIELD IDENTIFICATION FOR ROCK STRENGTH

Term	FIELD IDENTIFICATION	UNCONFINED COMPRESSIVE STRENGTH (MPa)
Extremely weak ¹	Indented by thumbnail	<1
Very weak	Crumbles under firm blows with point of geological hammer, can be peeled by pocket knife	1 to 5
Weak	Can be peeled by pocket knife with difficulty, shallow indentations can be made by firm blow with point of geological hammer	5 to 25
Medium strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with a single firm blow of geological hammer	25 to 50
Strong	Specimen requires more than one blow of geological hammer to fracture it	50 to 100
Very strong	Specimen requires many blows of geological hammer to fracture it	100 to 250
Extremely strong	Specimen can only be chipped with geological hammer	>250

¹ Some extremely weak rocks will behave as soils and should be described as soils in accordance with BS EN ISO 14688-1

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION AND CLASSIFICATION OF ROCKS

2.2 Structure

The descriptive terms for structure cover the inter-relationship of lithology and textural features in the rock. Terms include: bedding, laminated, foliated and banded. The thicknesses of these structures are described by the terms given in table 2 which also apply to the spacing of discontinuities (see section 4.3).

TABLE 2: DESCRIPTIVE TERMS FOR STRUCTURE AND DISCONTINUITY SPACING (from BS EN ISO 14689-1: 2003)

STRUCTURE (EG BEDDING, CLEAVAGE)	DISCONTINUITY (EG JOINT, FISSURE)	SPACING
Very thickly (bedded)	Very widely (jointed)	> 2m
Thickly (bedded)	Widely (jointed)	0.6m-2m
Medium (bedded)	Medium (jointed)	0.2m-0.6m
Thinly (bedded)	Closely (jointed)	60mm-200mm
Very thinly (bedded)	Very closely (jointed)	20mm-60mm
Laminated	Extremely closely (jointed)	6mm-20mm
Thinly laminated	-	< 6mm

2.3 Colour

Colour is described according to the scheme given in BS EN ISO 14689-1.

2.4 Texture

A description of rock texture is not normally required but when used refers to the arrangement of individual grains in the rock. Terms which may be used include: porphyritic, crystalline, amorphous and vitreous. For further guidance refer to BS 5930: 1999: section 44.2.4 (ref 02).

2.5 Grain Size

The descriptive scheme given in Table 14 of BS 5930: 1999 (ref 02) is used together with the accompanying notes in section 44.2.5.

2.6 Weathering and Alteration Effects

The results of weathering or alteration of the rock material are described in accordance with the principals given for rock mass in section 4.0.

2.7 Rock Name

An aid to the identification of rock type is given in Table A1 of BS EN ISO 14689-1:2003 (ref 01).

3.0 GENERAL INFORMATION

3.1 Minor/Other Characteristics

Information can include minor constituents as for soils (see Terminology used in Soil Descriptions) and can include abnormal mineralogy, presence of vugs etc.

3.2 Geological Formation

The geological formation, age and type of deposit are only given where this can be done with confidence and where no conjecture is involved.

4.0 MASS CHARACTERISTICS

4.1 Description of Weathering for the Rock Mass

Approach 1 in BS 5930 1999, provides guidance on the factual description of weathering effects at the material and mass scales. This factual description is mandatory and requires the following indicators of weathering to be described:

- Changes in colour
- Changes in fracture state
- Reduction in strength
- Presence, character & extent of weathering products

When further classification is required, use is made of Approach 4 in Figure 19 of BS 5930 and this table is reproduced as Table 3. Approach 4 is used for many specific formations in the UK, such as London Clay, Lias Clay and Mercia Mudstone. Chalk however is classified under Approach 5 as a special case.

It should be noted that Tables 2 and 13 in BS EN ISO 14689-1 are not relevant to the majority of rocks in the UK and are not reproduced in these notes.

TABLE 3: CLASSIFICATION OF WEATHERING INCORPORATING MATERIAL AND MASS FEATURES (Approach 4 in BS 5930 1999)

CLASS	CLASSIFIER	TYPICAL CHARACTERISTICS
A	Unweathered	Original strength, colour and fracture spacing
B	Partially Weathered	Slightly reduced strength, slightly closer fracture spacing, weathering penetrating in from fractures. Brown oxidation
C	Distinctly Weathered	Further weakened, much closer fracture spacing, grey reduction
D	Destructured	Greatly weakened, mottled, ordered lithorelics in matrix becoming weakened and disordered
E	Residual or reworked	Matrix with occasional altered random lithorelics, bedding destroyed. Classed as reworked if with foreign inclusions

4.2 Fracture State

For the purposes of logging and the recording of mechanical properties, fractures include: Joints (a discontinuity in the body of the rock along which there has been no visible displacement), Faults (a fracture along which there has been visible displacement), Bedding Fracture (a fracture along the bedding) and Cleavage Fracture (a fracture along a cleavage).

Fracture state is recorded in accordance with the terms detailed in BS EN ISO 22475-1: 2006 (ref 03) as follows:

Solid core

Core with at least one full diameter (but not necessarily a full circumference) between two natural fractures. By this definition core that has a single set of inclined fractures would have a solid core recovery of 100%. Where there are two or more sets of non parallel fractures only sections of the core in which the fractures actually intersect are excluded from the assessment of solid core.

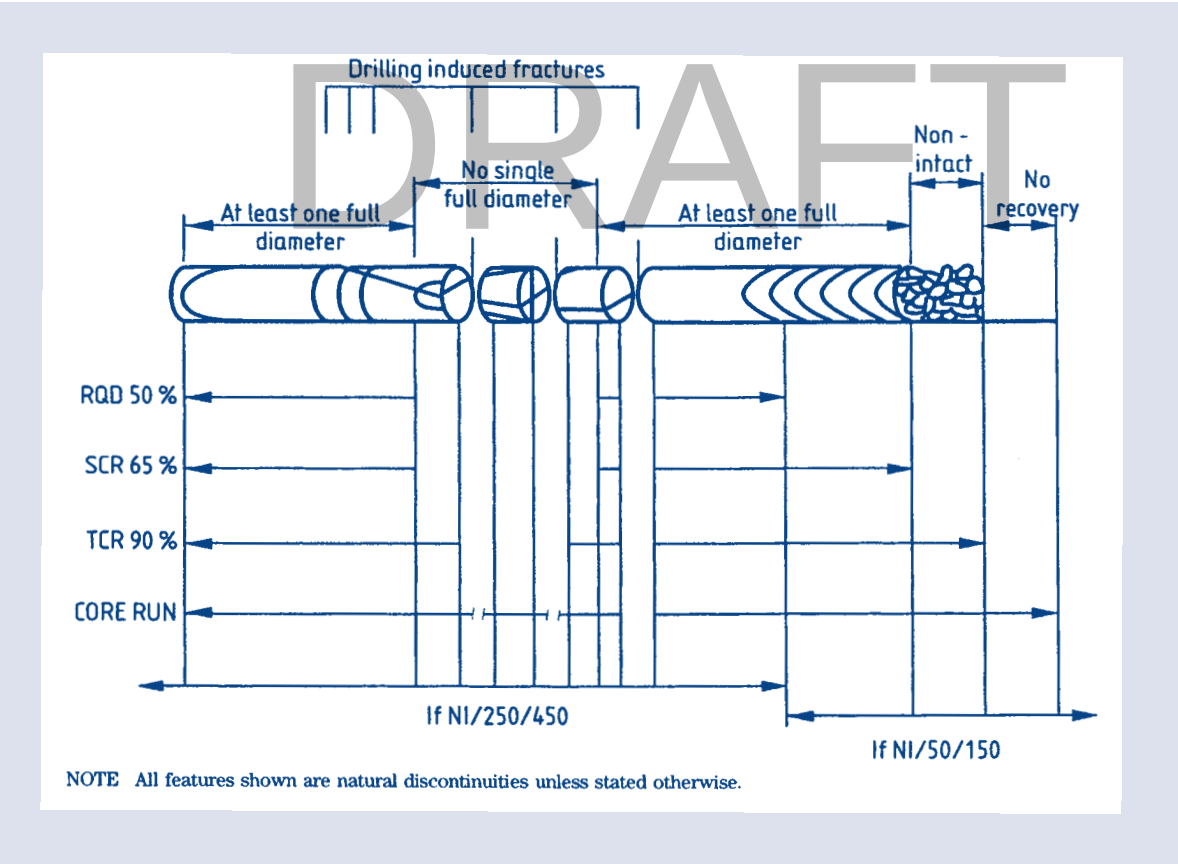
Based on these definitions the terms in Table 4 are defined and these are shown schematically in Figure 1.

APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION AND CLASSIFICATION OF ROCKS

TABLE 4: DESCRIPTORS FOR THE MECHANICAL LOGGING OF ROCK CORE

TERM	ABBREVIATION	DEFINITION
Total Core Recovery	TCR (%)	The percentage ratio of core recovered (both solid and non-intact) to the total length of core run
Solid Core Recovery	SCR (%)	The percentage of solid core recovered to total length of core run
Rock Quality Designation	RQD(%)	The total length of solid core pieces greater than 100mm between natural fractures expressed as a percentage of total length of core run
Fracture Index	FI	The number of natural fractures contained within a metre of core of similar intensity of fracturing. This need not correspond to core runs. (NI) is used to denote non intact fragmented core.
Fracture Spacing	If min ave max	The minimum, average & maximum spacing of natural fractures within core of similar intensity of fracturing. This need not correspond to core runs. (NI) is used to denote non intact fragmented core.

FIGURE 1: ILLUSTRATION OF FRACTURE LOGGING TERMS



APPENDIX 1: TERMINOLOGY USED IN THE DESCRIPTION AND CLASSIFICATION OF ROCKS

4.3 Discontinuities

Discontinuities are breaks in the rock mass and when observed in rock cores are described as:

Joint, Fissure, Fault, Induced Fracture, Incipient Fracture, Bedding Fracture and Vein. Descriptive terms for discontinuities are given below in the correct order:

Spacing:	Described in accordance with Table 1
Persistence:	Discontinuous or Continuous
Roughness:	See Table 5
Aperture:	See Table 6
Infill:	See Table 7

TABLE 5: DESCRIPTORS FOR DISCONTINUITY ROUGHNESS (After BS EN ISO 14689-1: 2003)

MEDIUM SCALE DESCRIPTORS	SMALL SCALE DESCRIPTORS	
	Rough (irregular)	Smooth
Stepped	Stepped rough	Stepped smooth
Undulating	Undulating rough	Undulating smooth
Planar	Planar rough	Planar smooth

Note: The large scale terms: wavy, curved and straight are only seen at the mass scale and are not observed in rock cores.

TABLE 6: DESCRIPTORS FOR DISCONTINUITY APERTURE (After BS EN ISO 14689-1: 2003)

APERTURE SIZE TERM	APERTURE
Very Tight	<0.1mm
Tight	0.1mm to 0.25mm
Partly Open	0.25mm to 0.5mm
Open	0.5mm to to 2.5mm
Moderately Wide	2.5mm to 10mm
Wide	1cm to 10cm
Very Wide	10cm to 100cm
Extremely Wide	>1.0m

TABLE 7: DESCRIPTORS FOR DISCONTINUITY INFILL

INFILL	INFILL DESCRIPTION DEFINITION
Clean	No fracture infill material
Stained	Colouration on rock only. No recognisable infill material
Filled or partially filled	Discontinuity filled with recognisable infill material which should be described, eg clay, gypsum etc, together with its thickness.

References

- 01) BS EN ISO 14689-1: 2003: Geotechnical Investigation and Testing - Identification and Classification of Rock Part 1: Identification and Description.
- 02) BS 5930: 1999: Code of Practice for Site Investigation. British Standards Institution.
- 03) BS EN ISO 22475-1: 2006: Geotechnical Investigation and Testing - Sampling Methods and Groundwater Measurements - Part 1: Technical Principles for Execution.

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SOIL engineering

SUPPORTING FACTUAL DATA

APPENDIX 1

Explanatory Notes on Fieldwork, Logging
and Laboratory Testing

**ASSESSMENT OF AGGRESSIVE
GROUND AND GROUNDWATER
CONDITIONS**

APPENDIX 1: ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS

Certain ground and groundwater conditions may be described as aggressive depending on their chemical composition which is related to previous industrial use. Where foundations are proposed to be constructed on industrial sites or on landfill sites in which the ground or groundwater may be contaminated with chemical waste, detailed consideration needs to be given to both the method of investigation and the severity of ground and groundwater conditions with respect to construction materials. For such sites it will usually be necessary to undertake a full chemical analysis in order to identify the potentially aggressive compounds.

On sites where new concrete foundations are to be constructed in natural ground it is usually only necessary to examine the sulfate content and pH level of the ground. The sulfate content of soils varies widely and can range from being virtually absent to extremely high concentrations in crystals such as gypsum. In between these two extremes sulfate may be disseminated throughout a soil or may be present in discrete bands or lenses. Because of this wide variation in the sulfate content of soils, the most reliable indication of possible aggressive conditions can be obtained by testing representative samples of groundwater. In order to take account of natural variations in the distribution of sulfates in the ground, samples should be taken at a number of locations that are well spaced across the site and at different depths.

The methods for the determination of total sulfate of soil and the sulfate content of groundwater and 2:1 aqueous soil extracts are given in various specifications including BS 1377 1990: Part 3: Section 5 (ref 01). The results of tests performed in accordance with BS 1377 yield results which are expressed as percentage of dry weight retained or grammes/litre SO_3 . Tests performed in accordance with other specifications however, tend to express results as SO_4 .

The classification of natural sulfate conditions is based on BRE Special Digest 1 2005 (ref 02). This digest makes most use of sulfate values expressed as milligrammes/litre SO_4 . In order to convert the results expressed as SO_3 (BS 1377) to SO_4 (BRE Special Digest 1) it is necessary to apply a multiplication factor of 1.2. In the following discussion of sulfate conditions values given in the tables are expressed in terms of SO_4 . The current approach to the classification of aggressive ground conditions given in BRE Special Digest 1 is based on the Aggressive Chemical Environment for Concrete (ACEC). This takes into account the type of site, sulfate concentration and groundwater acidity and mobility. Different site assessment procedures are used for natural ground, for brownfield sites that contain industrial waste and pyritic ground. The reactions of sulfates in the presence of other ions, notably carbonate and magnesium are also taken into account.

In general when the results of sulfate determinations are assessed, emphasis must be given to the samples which fall in the higher classes. Therefore if eight out of ten samples are found to be non aggressive and fall within Class DS1 and the remainder fall within Class DS2 it will be necessary to adopt the precautions appropriate to Class DS2 conditions for the whole site. The current digest differentiates between 'natural ground locations' and 'brownfield locations'.

Table 1 on page 2 is reproduced from the digest and deals with natural ground locations.

APPENDIX 1: ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS

TABLE 1: AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR NATURAL GROUND LOCATIONS (a) (From BRE Special Digest 1)

SULFATE				GROUNDWATER		
DESIGN SULFATE CLASS FOR LOCATION	2:1 WATER/SOIL EXTRACT ^(b)	GROUNDWATER	TOTAL POTENTIAL SULFATE ^(c)	STATIC WATER	MOBILE WATER	ACEC CLASS FOR LOCATION
1	2 (SO ₄ mg/l)	3 (SO ₄ mg/l)	4 (SO ₄ %)	5 (pH)	6 (pH)	7
DS-1	<500	<400	<0.24	>2.5	>5.5 ^(d) 2.5-5.5	AC-1s AC-1 ^(d) AC-2z
DS-2	500-1500	400-1400	0.24-0.6	>3.5 2.5-3.5	>5.5 2.5-5.5	AC-1s AC-2 AC-2s AC-3z
DS-3	1600-3000	1500-3000	0.7-1.2	>3.5 2.5-3.5	>5.5 2.5-5.5	AC-2s AC-3 AC-3s AC-4
DS-4	3100-6000	3100-6000	1.3-2.4	>3.5 2.5-3.5	>5.5 2.5-5.5	AC-3s AC-4 AC-4s AC-5
DS-5	>6000	>6000	>2.4	>3.5 2.5-3.5	>2.5	AC-4s AC-5

NOTES

- a) Applies to locations on sites that comprise either undisturbed ground that is in its natural state or clean fill derived from such ground.
b) The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous digests.
c) Applies only to locations where concrete will be exposed to sulphate ions (SO₄) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance.
d) For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l, increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

Suffix 's' indicates that the water has been classified as static

Concrete placed in a ACEC Class that includes the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements listed in Table D2 in the Digest.

Additional testing is required for those natural sites that contain pyrite. In particular it is essential to take account of the total potential sulfate content which might result from oxidation following ground disturbance. On such sites it is necessary to determine total sulfate content (AS% SO₄), total sulfur (TS%S). The total potential sulfate is then determined from $TPS\%SO_4 = 3.0 \times TS\%S$. Finally the amount of oxidisable sulfides (OS as %SO₄) is determined by subtracting the acid soluble sulfates (AS%SO₄) from the total potential sulfate content: $OS\%SO_4 = TPS\%SO_4 - AS\%SO_4$. It is important to note that this testing is in addition to and not instead of the standard sulfate determination testing.

Unless the site can be demonstrated to comprise natural ground, Table 2 for brownfield locations must be used in all assessments for the design of concrete. It should be noted that the effects of the magnesium ion become relevant to concrete design for certain Design Sulfate Classes.

APPENDIX 1: ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS

TABLE 2: AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS (a) (From BRE Special Digest 1)

SULFATE AND MAGNESIUM					STATIC POTENTIAL SULFATE (c)	GROUNDWATER		
DESIGN SULFATE CLASS FOR LOCATION	2:1 WATER/SOIL GROUNDWATER EXTRACT (b)		TOTAL			MOBILE WATER	ACEC WATER	CLASS FOR LOCATION
1	2 (SO ₄ mg/l)	3 (Mg mg/l)	4 (SO ₄ mg/l)	5 (Mg mg/l)	6 (SO ₄ %)	7 (pH) (d)	8 (pH) (d)	9
DS-1	<500	-	<400	-	<0.24	>2.5	>6.5 (d) 5.5-6.5 4.5-5.5 2.5-4.5	AC-1s AC-1 AC-2z AC-3z AC-4z
DS-2	500-1500	-	400-1400	-	0.24-0.6	>5.5 2.5-3.5	>6.5 5.5-6.5 4.5-5.5 2.5-4.5	AC-1s AC-2 AC-2s AC-3z AC-4z AC-5z
DS-3	1600-3000	-	1500-3000	-	0.7-1.2	>5.5 2.5-5.5	>6.5 5.5-6.5 2.5-5.5	AC-2s AC-3 AC-3s AC-4 AC-5
DS-4	3100-6000	<1200	3100-6000	<1000	1.3-2.4	>5.5 2.5-3.5	>6.5 2.5-6.5	AC-3s AC-4 AC-4s AC-5
DS-4m	3100-6000	>1200 (e)	3100-6000	>1000 (e)	1.3-2.4	>5.5 2.5-5.5	>6.5 2.5-6.5	AC-3s AC-4m AC-4ms AC-5m
DS-5	>6000	<1200	>6000	<1000	>2.4	>5.5 2.5-3.5	>2.5	AC-4s AC-5
DS-5m	>6000	>1200 (e)	>6000	>1000 (e)	>2.4	>5.5 2.5-5.5	>2.5	AC-4ms AC-5m

NOTES

- a) Brownfield locations are those sites or parts of sites that might contain chemical residues produced by industrial processes.
- b) The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous digests.
- c) Applies only to locations where concrete will be exposed to sulfate ions (SO₄) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance.
- d) An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content
- e) The limit on water soluble magnesium does not apply to brackish groundwater (chloride content between 12000mg/l and 17000mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Sea water (chloride about 18000mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

Suffix 's' indicates that the water has been classified as static

Concrete placed in ACEC Classes that include the suffix 'z' primarily have to resist acid conditions cements listed in Table D2 in the Digest.

Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.

APPENDIX 1: ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS

The pH value of groundwater provides a crude measure of the potential aggressiveness due to the presence of organic acids. The standard procedure for measuring the acidity of soils and groundwater is the electrometric method using a pH meter and is described in BS 1377: 1990: Part 3: Section 5. The pH value of pure water is 7.0 and the presence of acid substances will yield results with values less than 7. It should be noted however that the pH of most natural waters depends mainly on the dissolved carbon dioxide content and therefore lies between pH values of 6.5 and 8.5. It is generally accepted that soils or groundwater with pH values in the range 6 to 9 may be classified as near neutral. It should be noted that the pH value of soil and groundwater can change with time and it is therefore necessary to carry out testing on fresh samples of soil or water.

The pH value of the soil or groundwater also needs to be taken into consideration when the recorded sulfate content is borderline between two classes or approaches the upper limit of a given class. In these circumstances both the pH value and the mobility of the groundwater needs to be assessed and where doubt exists, the sample should be placed in the more severe class of the sulfate classification. This general approach may be justified on the grounds that the acids present will tend to break down the concrete surface and therefore make it more susceptible to sulfate attack. This will be especially so if the sample contains large amounts of sulfides since these can be converted to sulfuric acid.

Organic acids are often found in peaty or marshy soils in which the pH value is below 6.0. In such soils it will be necessary to take specific precautions to protect any concrete which would be exposed to organic acids. The recommended precautionary measures outlined in Tomlinson 2001 (ref 03) could be followed. In all cases where mineral acids are present the groundwater is likely to be aggressive with regard to foundation concrete and in these circumstances the recommendations given in BRE Special Digest 1 Part C will need to be followed.

Apart from acid groundwater, the effects of static and mobile groundwater tables are taken into account in BRE Special Digest 1 in 'Box C9' and the incremental rules in this table need to be viewed in relation to Tables C1 and C2 in the Digest.

Alkaline groundwater is not generally considered aggressive to concrete unless present in high concentrations. Unless the aggregate used in foundation concrete is of a reactive type, pH values of groundwater up to pH = 14 need not be considered as problematic.

References

- 01) BS 1377: 1990: Methods of Test for Soils for Civil Engineering Purposes. Part 3: Chemical Electrochemical Tests, British Standards Institution.
- 02) Building Research Establishment 2005: Concrete in Aggressive Ground. BRE Special Digest 1. Building Research Station, Garston
- 03) Tomlinson M.J 2001: Foundation Design and Construction. 7th Edition, Pearson, Prentice Hall.



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