



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-63 Client Reference: 2921-028 COC4-F Report Number: 427003
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH5-SS4				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	2.80 - 5.90				
dis.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	21/09/2017				
*	Subcontracted test.	Sampled 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	26/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170926-63				
1-55+5@	Sample deviation (see appendix)	Lab Sample No.(s)	16251961				
		AGS Reference					
Component	LOD/Units	Method					
Naphthalene-d8 % recovery**	%	TM218	88.1				
Acenaphthene-d10 % recovery**	%	TM218	92.6				
Phenanthrene-d10 % recovery**	%	TM218	84.9				
Chrysene-d12 % recovery**	%	TM218	92.9				
Perylene-d12 % recovery**	%	TM218	90.1				
Naphthalene	<9 µg/kg	TM218	58.9	#			
Acenaphthylene	<12 µg/kg	TM218	29.5	#			
Acenaphthene	<8 µg/kg	TM218	104	#			
Fluorene	<10 µg/kg	TM218	445	#			
Phenanthrene	<15 µg/kg	TM218	590	#			
Anthracene	<16 µg/kg	TM218	124	#			
Fluoranthene	<17 µg/kg	TM218	44.1	#			
Pyrene	<15 µg/kg	TM218	39.1	#			
Benz(a)anthracene	<14 µg/kg	TM218	<14	#			
Chrysene	<10 µg/kg	TM218	<10	#			
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15	#			
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14	#			
Benzo(a)pyrene	<15 µg/kg	TM218	<15	#			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18	#			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23	#			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24	#			
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	1430				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	1430				



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TPH CWG (S)

Results Legend		Customer Sample Ref.	2921-BH5-SS4				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	2.60 - 5.90				
dis. filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	21/09/2017				
*	Subcontracted test.	Sampled 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	26/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170926-63				
1-5&*\$@	Sample deviation (see appendix)	Lab Sample No.(s)	16251961				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	59				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	22900				
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	#			
Benzene	<10 µg/kg	TM089	<10	#			
Toluene	<2 µg/kg	TM089	<2	#			
Ethylbenzene	<3 µg/kg	TM089	<3	#			
Xylene	<6 µg/kg	TM089	<6	#			
o-Xylene	<3 µg/kg	TM089	<3	#			
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	26.7				
Aliphatics >C6-C8	<10 µg/kg	TM089	1160				
Aliphatics >C8-C10	<10 µg/kg	TM089	5610				
Aliphatics >C10-C12	<10 µg/kg	TM089	7390				
Aliphatics >C12-C16	<100 µg/kg	TM173	672000				
Aliphatics >C16-C21	<100 µg/kg	TM173	593000				
Aliphatics >C21-C35	<100 µg/kg	TM173	178000				
Aliphatics >C35-C44	<100 µg/kg	TM173	<100				
I Aliphatics >C12-C44	<100 µg/kg	TM173	1440000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	3740				
Aromatics >EC10-EC12	<10 µg/kg	TM089	4930				
Aromatics >EC12-EC16	<100 µg/kg	TM173	278000				
Aromatics >EC16-EC21	<100 µg/kg	TM173	325000				
Aromatics >EC21-EC35	<100 µg/kg	TM173	115000				
Aromatics >EC35-EC44	<100 µg/kg	TM173	1370				
Aromatics >EC40-EC44	<100 µg/kg	TM173	494				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	719000				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	2180000				



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Asbestos Identification - Soil

Table with 12 columns: Cust. Sample Ref., Date of Analysis, Analysed By, Comments, Amosite (Brown) Asbestos, Chrysotile (White) Asbestos, Crocidolite (Blue) Asbestos, Fibrous Actinolite, Fibrous Anthophyllite, Fibrous Tremolite, Non-Asbestos Fibre. Row 1: 2921-BH5-SS4, 04/10/17, Eva Guerra, -, Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#), Not Detected (#).



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 Location: CHARTERED LAND - HEU Order Number: Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		Site Location	CHARTERED LAND - HEUSTON S
Mass Sample taken (kg)	0.096	Natural Moisture Content (%)	6.61
Mass of dry sample (kg)	0.090	Dry Matter Content (%)	93.8
Particle Size <4mm	>95%		

Case
 SDG 170926-63
 Lab Sample Number(s) 16251961
 Sampled Date 21-Sep-2017
 Customer Sample Ref. 2921-BH5-SS4
 Depth (m) 2.60 - 5.90

**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	-	-
-	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Organic Carbon (%)	0.535
Loss on Ignition (%)	2.58
Sum of BTEX (mg/kg)	<0.024
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg)	909
PAH Sum of 17 (mg/kg)	-
pH (pH Units)	8.72
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

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	0.000566	<0.0005	0.00566	<0.005	0.5	2	25
Barium	0.0185	<0.0002	0.185	<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	<0.0003	<0.0003	<0.003	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00652	<0.0005	0.0652	<0.005	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Iron	0.00141	<0.0001	0.0141	<0.001	0.06	0.7	5
Manganese	0.000862	<0.0005	0.00862	<0.005	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<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)	13.5	<2	135	<20	1000	20000	50000
Total Dissolved Solids	71.4	<5	714	<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 02-Oct-2017
 pH (pH Units) 8.89
 Conductivity (µS/cm) 91.80
 Temperature (°C) 17.60
 Volume Leachant (Litres) 0.894

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

05/10/2017 13:49:56



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 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
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		
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		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
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		
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		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. 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)	16251961
Customer Sample Ref.	2921-BH5-SS4
AGS Ref.	
Depth	2.60 - 5.90
Type	Soil/Solid (S)

Anions by Kone (w)	04-Oct-2017
Asbestos ID in Solid Samples	04-Oct-2017
Boron Water Soluble	03-Oct-2017
CEN 10:1 Leachate (1 Stage)	02-Oct-2017
CEN Readings	03-Oct-2017
Cyanide Comp/Free/Total/Thiocyanate	05-Oct-2017
Dissolved Metals by ICP-MS	04-Oct-2017
Dissolved Organic/Inorganic Carbon	04-Oct-2017
EPH CWG (Aliphatic) GC (S)	02-Oct-2017
EPH CWG (Aromatic) GC (S)	02-Oct-2017
Fluoride	04-Oct-2017
GRO by GC-FID (S)	03-Oct-2017
Hexavalent Chromium (s)	29-Sep-2017
Hydrocarbons on Ignition in soils	05-Oct-2017
Heavy Metals by ICP-OES Dissolved	04-Oct-2017
Metals by iCap-OES Dissolved (W)	04-Oct-2017
Metals in solid samples by OES	04-Oct-2017
Mineral Oil	04-Oct-2017
PAH by GCMS	28-Sep-2017
PCBs by GCMS	03-Oct-2017
pH	27-Sep-2017
Phenols by HPLC (S)	30-Sep-2017
Phenols by HPLC (W)	05-Oct-2017
Sample description	27-Sep-2017
Total Dissolved Solids	04-Oct-2017
Total Organic Carbon	03-Oct-2017
Total Sulphate	03-Oct-2017
Total Sulphur	02-Oct-2017
TPH CWG GC (S)	03-Oct-2017



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Chromatogram

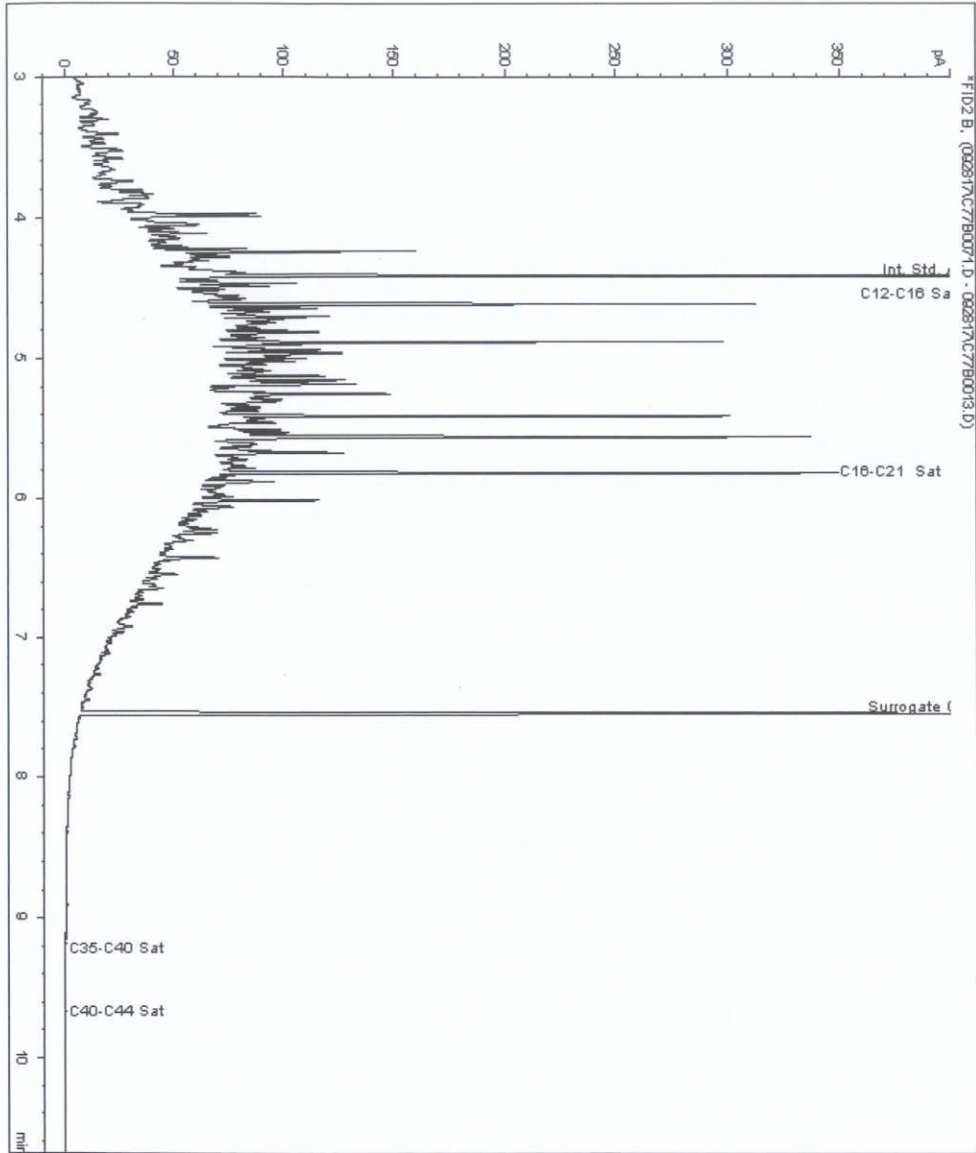
Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16257061
Sample ID : 2921-BH5-SS4

Depth : 2.60 - 5.90

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15223330-
Date Acquired : 29/09/2017 11:21:01 PM
Units : ppb
Dilution:





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Chromatogram

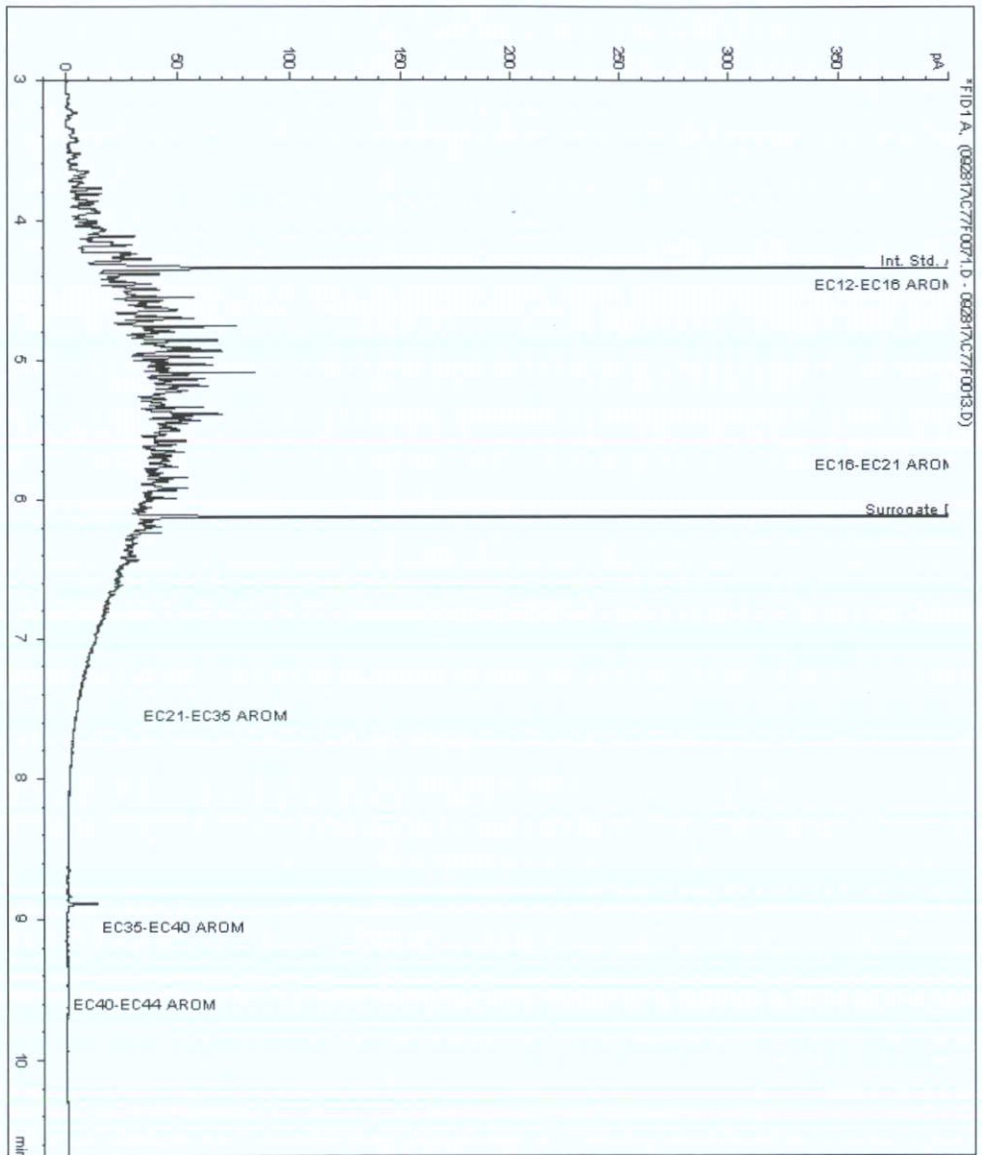
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16257061
Sample ID : 2921-BH5-SS4

Depth : 2.60 - 5.90

Speciated TPH - SATS (C12 - C40)

Sample Identity: 15223331-
Date Acquired : 29/09/2017 11:21:01 PM
Units : ppb
Dilution:





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Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Chromatogram

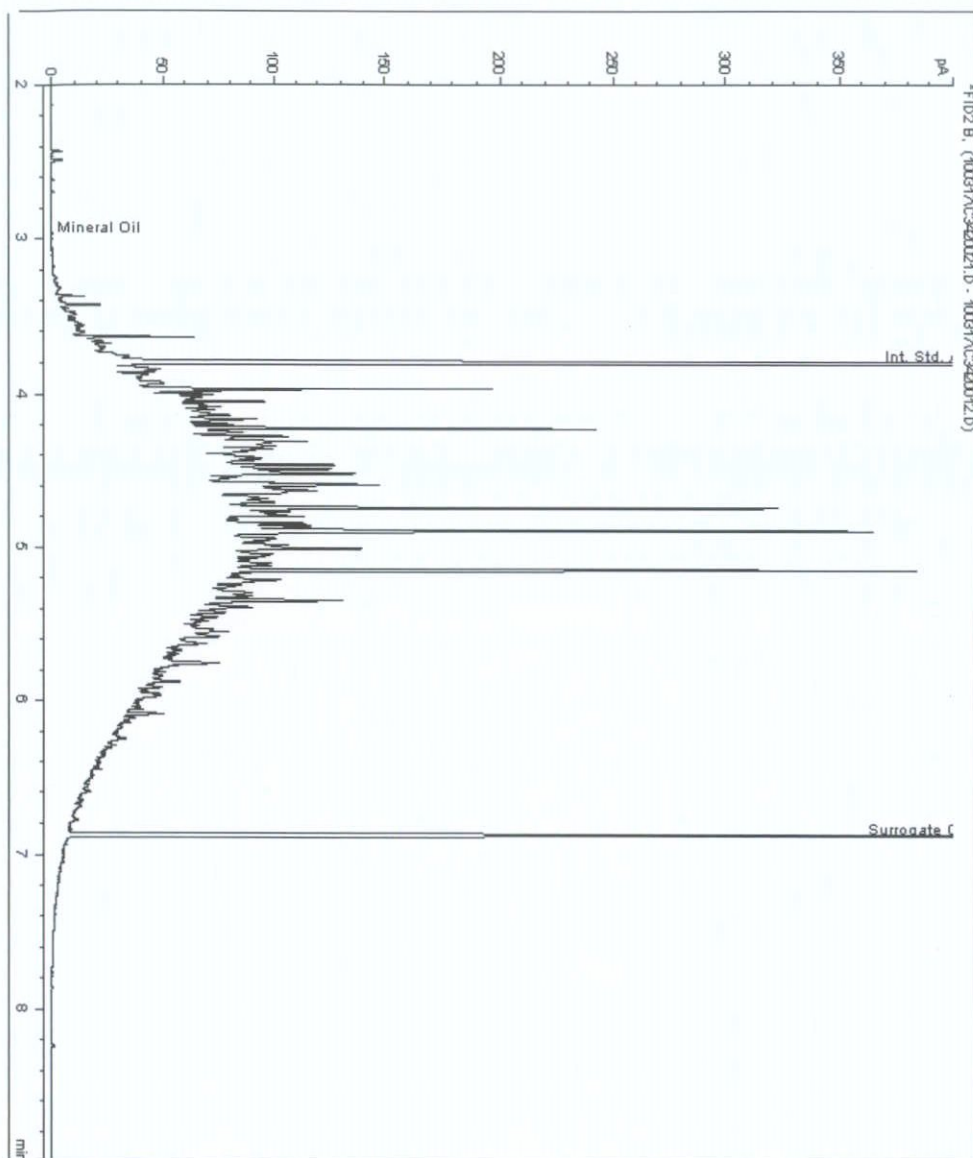
Analysis: Mineral Oil

Sample No : 16268722
Sample ID : 2921-BH5-SS4

Depth : 2.60 - 5.90

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15223333-
Date Acquired : 03/10/17 18:40:08 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :





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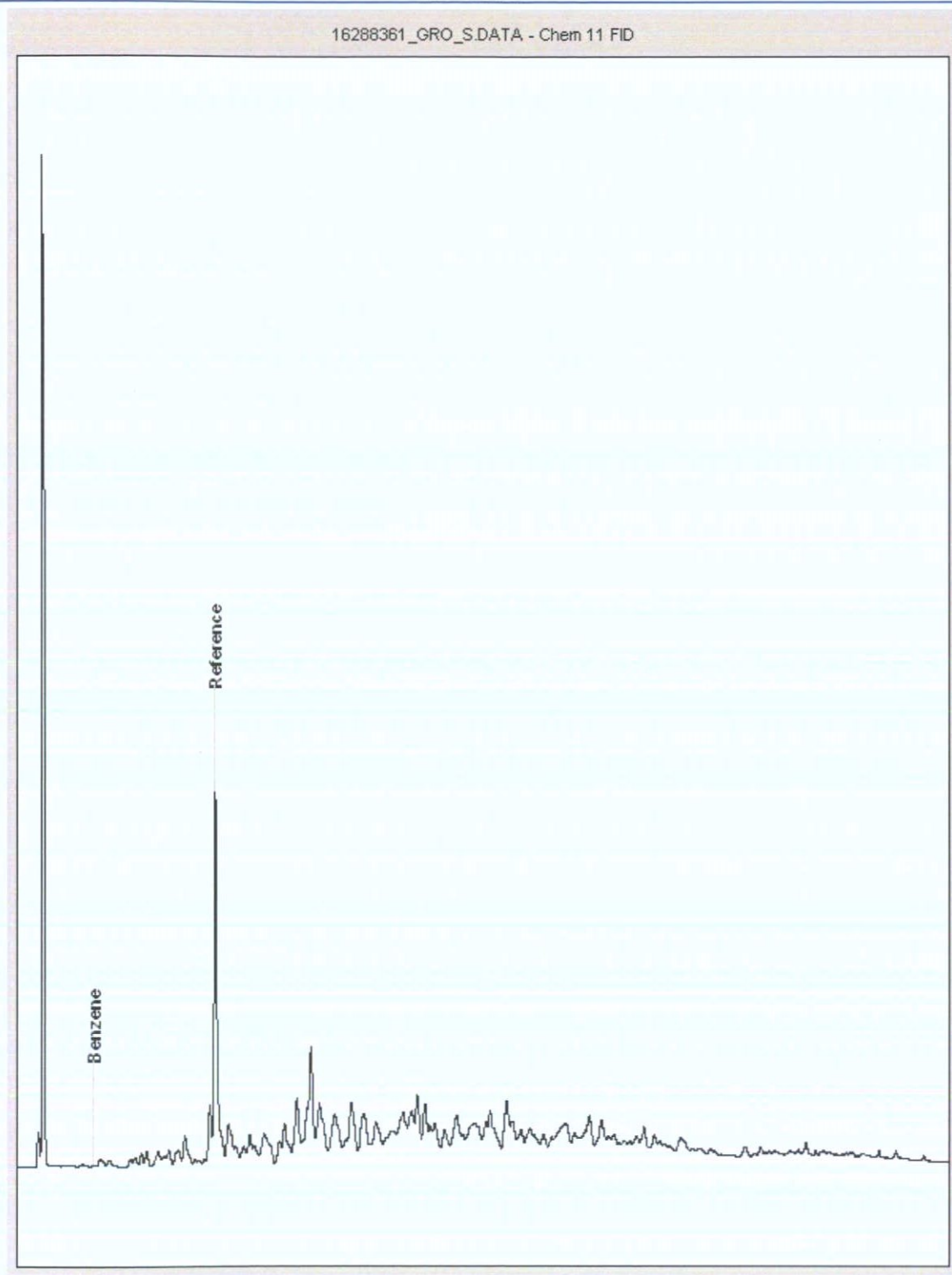
SDG: 170926-63 Client Reference: 2921-028 COC4-F Report Number: 427003
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16288361
Sample ID : 2921-BH5-SS4

Depth : 2.60 - 5.90





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 Location: ED LAND - HEUSTON SOUTH Order Number: Superseded Report:

Appendix

General

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 specified 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.

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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Attention: Caitriona Keogh

CERTIFICATE OF ANALYSIS

Date: 05 October 2017
Customer: D_MINEREX_DUB
Sample Delivery Group (SDG): 170926-64
Your Reference: 2921-028 COC4-G
Location: CHARTERED LAND - HEUSTON SOUTH QUARTER
Report No: 427004

We received 1 sample on Tuesday September 26, 2017 and 1 of these samples were scheduled for analysis which was completed on Thursday October 05, 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: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
16252008	2921-BH5-SS5		5.90 - 7.60	22/09/2017

Maximum Sample/Coolbox Temperature (°C) : 13.8

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: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HE Order Number: Superseded Report:

Results Legend		Lab Sample No(s)	16252008
X Test		Customer Sample Reference	2921-BH6-SS5
N No Determination Possible		AGS Reference	
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 RL - Recreational Water DW - Drinking Water Non-regulatory L - Unspecified Liquid SL - Sludge G - Gas OTH - Other		Depth (m)	5.90 - 7.60
		Container	60g VOC (ALE215) 250g Amber Jar (ALE210)
		Sample Type	S S
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 1	X
Boron Water Soluble	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
Loss on Ignition in soils	All	NDPs: 0 Tests: 1	X
Metals in solid samples by OES	All	NDPs: 0 Tests: 1	X
Mineral Oil	All	NDPs: 0 Tests: 1	X
PAH by GCMS	All	NDPs: 0 Tests: 1	X
PCBs 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
Sample description	All	NDPs: 0 Tests: 1	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Results Legend <input checked="" type="checkbox"/> Test <input type="checkbox"/> 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)	16252008	
	Customer Sample Reference	2921-BH6-SS5	
	AGS Reference		
	Depth (m)	5.90 - 7.60	
	Container	250g Amber Jar (ALE310)	609 VOC (ALE315)
	Sample Type	S	S
Total Organic Carbon	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>
Total Sulphate	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>
Total Sulphur	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>
TPH CWG GC (S)	All	NDPs: 0 Tests: 1	<input checked="" type="checkbox"/>



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEI Order Number: 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
16252008	2921-BH5-SS5	5.90 - 7.60	Dark Brown	Stone/Soil	Stones	Oil/Petroleum

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.

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

DCC PLAN NO: 4610/22
RECEIVED: 04/08/2022



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Results Legend		Customer Sample Ref.	2921-BH5-SS5				
#	ISO17025 accredited.	Depth (m)	5.90 - 7.60				
M	mCERTS accredited.	Sample Type	Soil/Solid (S)				
aq	Aqueous / settled sample.	Date Sampled	22/09/2017				
diss.filt	Dissolved / filtered sample.	Sampled Time					
tot.unfilt	Total / unfiltered sample.	Date Received	26/09/2017				
-	Subcontracted test.	SDG Ref	170926-64				
**	% 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	Lab Sample No.(s)	16252008				
(F)	Trigger breach confirmed	AGS Reference					
1-5&	Sample deviation (see appendix)						
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	8				
Loss on ignition	<0.7 %	TM018	1.37				
Mineral oil >C10-C40	<1 mg/kg	TM061	99.9	#			
Mineral Oil Surrogate % recovery**	%	TM061	81.5				
Phenol	<0.01 mg/kg	TM062 (S)	<0.01	#			
Organic Carbon, Total	<0.2 %	TM132	0.211	#			
Sulphur, Total	<0.02 %	TM132	0.0394				
Sulphate, Total potential	<0.06 %	TM132	0.118				
pH	1 pH Units	TM133	8.8	#			
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6	#			
Cyanide, Total	<1 mg/kg	TM153	<1	#			
Cyanide, Free	<1 mg/kg	TM153	<1	#			
PCB congener 28	<3 µg/kg	TM168	<3	#			
PCB congener 52	<3 µg/kg	TM168	<3	#			
PCB congener 101	<3 µg/kg	TM168	<3	#			
PCB congener 118	<3 µg/kg	TM168	<3	#			
PCB congener 138	<3 µg/kg	TM168	<3	#			
PCB congener 153	<3 µg/kg	TM168	<3	#			
PCB congener 180	<3 µg/kg	TM168	<3	#			
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21				
Antimony	<0.6 mg/kg	TM181	<0.6	#			
Arsenic	<0.6 mg/kg	TM181	3.9	#			
Barium	<0.6 mg/kg	TM181	28.4	#			
Cadmium	<0.02 mg/kg	TM181	0.684	#			
Chromium	<0.9 mg/kg	TM181	7.36	#			
Copper	<1.4 mg/kg	TM181	6.92	#			
Iron	<1000 mg/kg	TM181	10400	#			
Lead	<0.7 mg/kg	TM181	8.73	#			
Manganese	<0.13 mg/kg	TM181	522	#			
Mercury	<0.14 mg/kg	TM181	0.353	#			
Molybdenum	<0.1 mg/kg	TM181	1.93	#			
Nickel	<0.2 mg/kg	TM181	15.6	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-64	Client Reference: 2921-028 COC4-G	Report Number: 427004
Location: CHARTERED LAND - HE	Order Number:	Superseded Report:

Component	LOD/Units	Method	Customer Sample Ref.	2921-BH5-SS5	Depth (m)	Sample Type	Date Sampled	Sampled Time	Date Received	SDG Ref	Lab Sample No.(s)	AGS Reference
Selenium	<1 mg/kg	TM181		<1	5.90 - 7.60	Soli/Solid (S)	22/09/2017		26/09/2017	170926-64	16252008	
Zinc	<1.9 mg/kg	TM181		81.5								
Sulphate, Total	<48 mg/kg	TM221		303								
Sulphide, Oxidisable	<0.03 %	TM221		0.0877								
Boron, water soluble	<1 mg/kg	TM222		<1								



CERTIFICATE OF ANALYSIS

Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

PAH by GCMS

Results Legend		Customer Sample Ref.	2921-BH5-SS5				
#	ISO17025 accredited.						
M	mCERTS accredited.						
AQ	Aqueous / settled sample.						
dis.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					
Naphthalene-d8 % recovery**	%	TM218	118				
Acenaphthene-d10 % recovery**	%	TM218	118				
Phenanthrene-d10 % recovery**	%	TM218	108				
Chrysene-d12 % recovery**	%	TM218	114				
Perylene-d12 % recovery**	%	TM218	113				
Naphthalene	<9 µg/kg	TM218	9.95				
			#				
Acenaphthylene	<12 µg/kg	TM218	<12				
			#				
Acenaphthene	<8 µg/kg	TM218	23.1				
			#				
Fluorene	<10 µg/kg	TM218	44.5				
			#				
Phenanthrene	<15 µg/kg	TM218	53.6				
			#				
Anthracene	<16 µg/kg	TM218	<16				
			#				
Fluoranthene	<17 µg/kg	TM218	<17				
			#				
Pyrene	<15 µg/kg	TM218	<15				
			#				
Benzo(a)anthracene	<14 µg/kg	TM218	<14				
			#				
Chrysene	<10 µg/kg	TM218	<10				
			#				
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15				
			#				
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14				
			#				
Benzo(a)pyrene	<15 µg/kg	TM218	<15				
			#				
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18				
			#				
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23				
			#				
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24				
			#				
Coronene	<200 µg/kg	TM218	<200				
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	131				
PAH, Total Detected USEPA 16 + Coronene	<318 µg/kg	TM218	<318				



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Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	2921-BH5-SS5				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.	Depth (m)	5.90 - 7.60				
dis. filt	Dissolved / filtered sample.	Sample Type	Sol/Solid (S)				
tot.unfilt	Total / unfiltered sample.	Date Sampled	22/09/2017				
*	Subcontracted test.	Sampled 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	26/09/2017				
(F)	Trigger breach confirmed	SDG Ref	170926-64				
1-5	@	Sample deviation (see appendix)	Lab Sample No.(s)	16252008				
		AGS Reference					
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM089	84				
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089	4190	#			
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	#			
Benzene	<10 µg/kg	TM089	<10	#			
Toluene	<2 µg/kg	TM089	<2	#			
Ethylbenzene	<3 µg/kg	TM089	<3	#			
Xylene	<6 µg/kg	TM089	<6	#			
o-Xylene	<3 µg/kg	TM089	<3	#			
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	105				
Aliphatics >C8-C10	<10 µg/kg	TM089	827				
Aliphatics >C10-C12	<10 µg/kg	TM089	1620				
Aliphatics >C12-C16	<100 µg/kg	TM173	94500				
Aliphatics >C16-C21	<100 µg/kg	TM173	93000				
Aliphatics >C21-C35	<100 µg/kg	TM173	36900				
Aliphatics >C35-C44	<100 µg/kg	TM173	1160				
I Aliphatics >C12-C44	<100 µg/kg	TM173	226000				
Aromatics >EC5-EC7	<10 µg/kg	TM089	<10				
Aromatics >EC7-EC8	<10 µg/kg	TM089	<10				
Aromatics >EC8-EC10	<10 µg/kg	TM089	551				
Aromatics >EC10-EC12	<10 µg/kg	TM089	1080				
Aromatics >EC12-EC16	<100 µg/kg	TM173	16600				
Aromatics >EC16-EC21	<100 µg/kg	TM173	27200				
Aromatics >EC21-EC35	<100 µg/kg	TM173	13300				
Aromatics >EC35-EC44	<100 µg/kg	TM173	429				
Aromatics >EC40-EC44	<100 µg/kg	TM173	<100				
Total Aromatics >EC12-EC44	<100 µg/kg	TM173	57600				
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173	287000				



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SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEL Order Number: Superseded Report:

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
Cust. Sample Ref.	2921-BH5-SS5	04/10/17	Eva Guerra	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Depth (m)	5.90 - 7.60										
Sample Type	SOLID										
Date Sampled	22/09/2017										
Date Received	00:00:00										
SDG	27/09/2017										
Original Sample	11:32:45										
Method Number	170926-64										
	16252008										
	TM048										



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Validated

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
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		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
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		
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		
TM218	Determination of PAH by GCMS Microwave extraction	The determination of PAH in soil samples by microwave extraction and GC-MS		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. 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: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Test Completion Dates

Table with 2 columns: Lab Sample No(s), Customer Sample Ref., AGS Ref., Depth, Type. Values include 16252008, 2921-BHS-SS5, 5.90 - 7.60, Soil/Solid (S).

Main test completion dates table with 2 columns: Test Name, Date. Includes Asbestos ID in Solid Samples (04-Oct-2017), Boron Water Soluble (03-Oct-2017), Cyanide Comp/Free/Total/Thiocyanate (05-Oct-2017), etc.



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SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

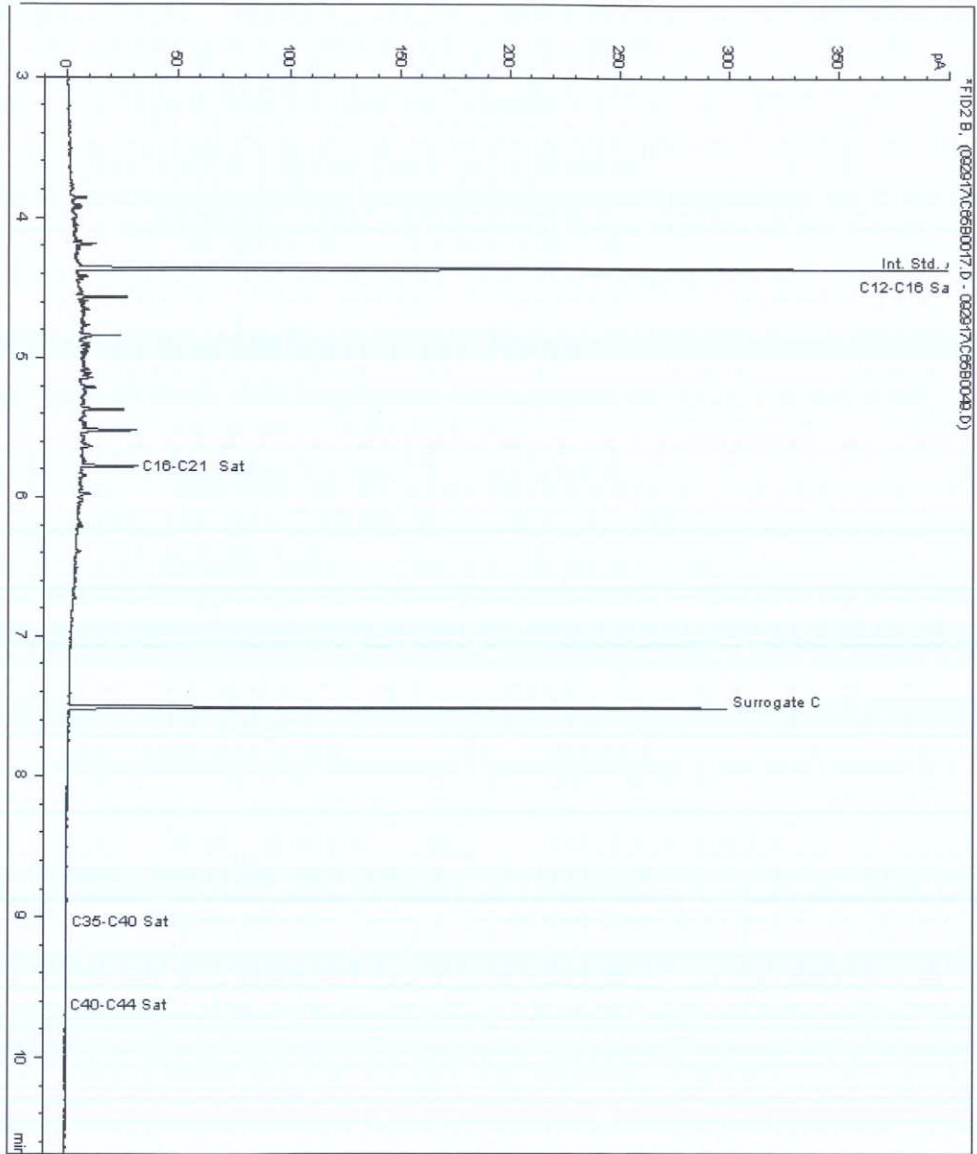
Chromatogram

Analysis: EPH CWG (Aliphatic) GC (S)

Sample No : 16257225
Sample ID : 2921-BH5-SS5

Depth : 5.90 - 7.60

Speciated TPH - SATS (C12 - C40)
Sample Identity: 15223239-
Date Acquired : 29/09/2017 11:40:15 PM
Units : pbb
Dilution: 2921-BH5-SS5[5.90 - 7.60] ->





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SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

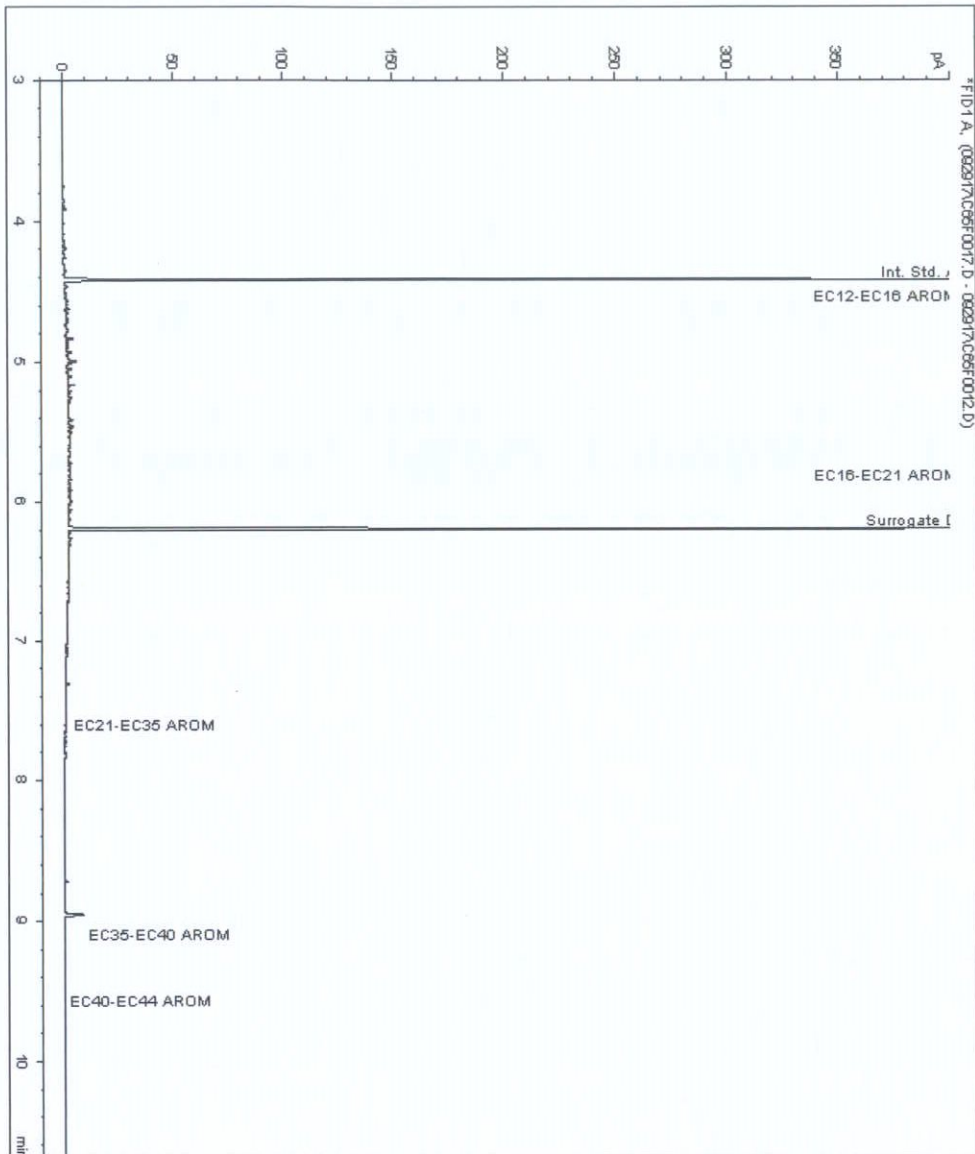
Analysis: EPH CWG (Aromatic) GC (S)

Sample No : 16257225
Sample ID : 2921-BH5-SS5

Depth : 5.90 - 7.60

Speciated TPH - AROM (C12 - C40)

Sample Identity: 15223240-
Date Acquired : 29/09/2017 11:40:15 PM
Units : ppb
Dilution: 2921-BH5-SS5[5.90 - 7.60] ->





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SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEI Order Number: Superseded Report:

Chromatogram

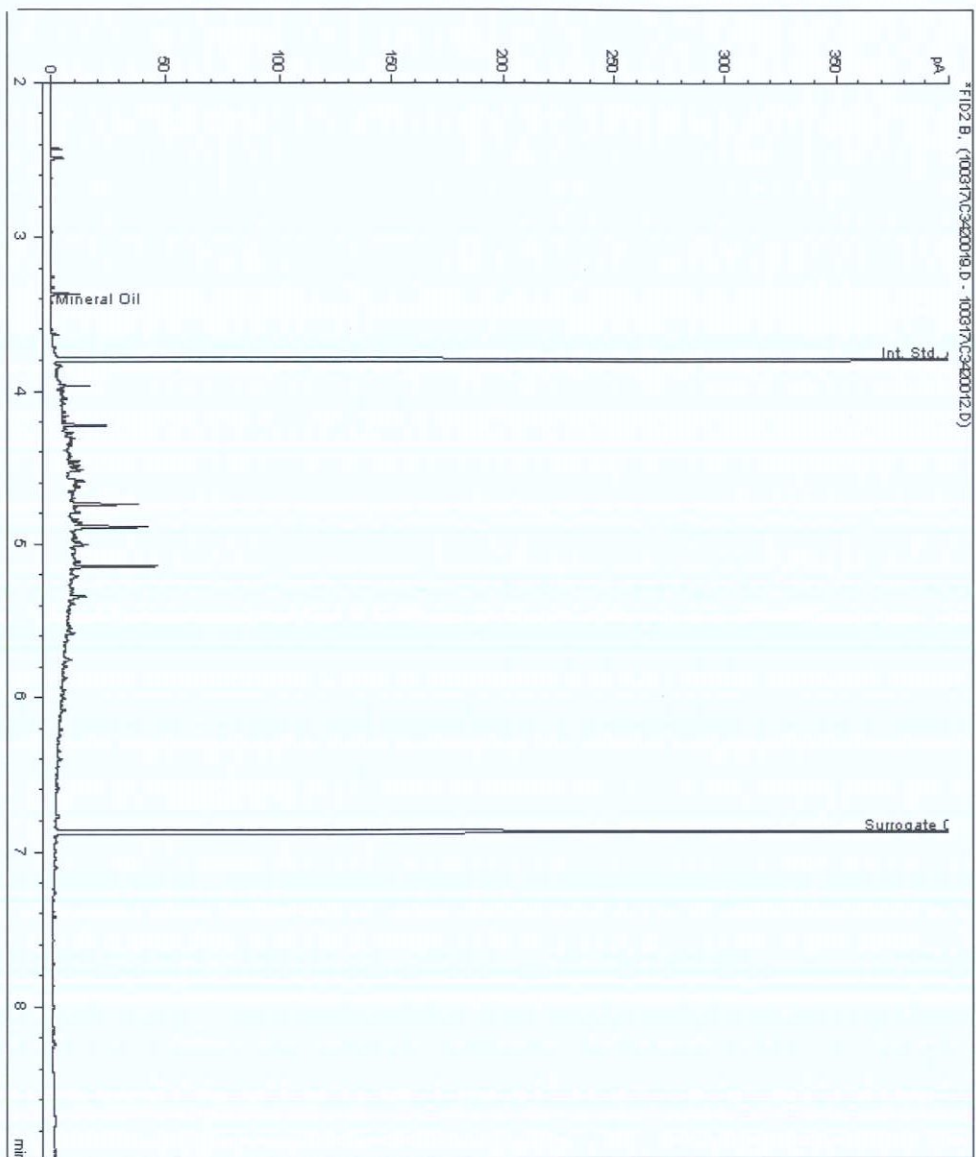
Analysis: Mineral Oil

Sample No : 16269274
Sample ID : 2921-BH5-SS5

Depth : 5.90 - 7.60

Mineral Oil Range Organics (C10 - C40)

Sample Identity : 15223242-
Date Acquired : 03/10/17 17:56:25 PM
Units : mg/kg
Sample Multiplier : 0.000
Dilution :





CERTIFICATE OF ANALYSIS

Validated

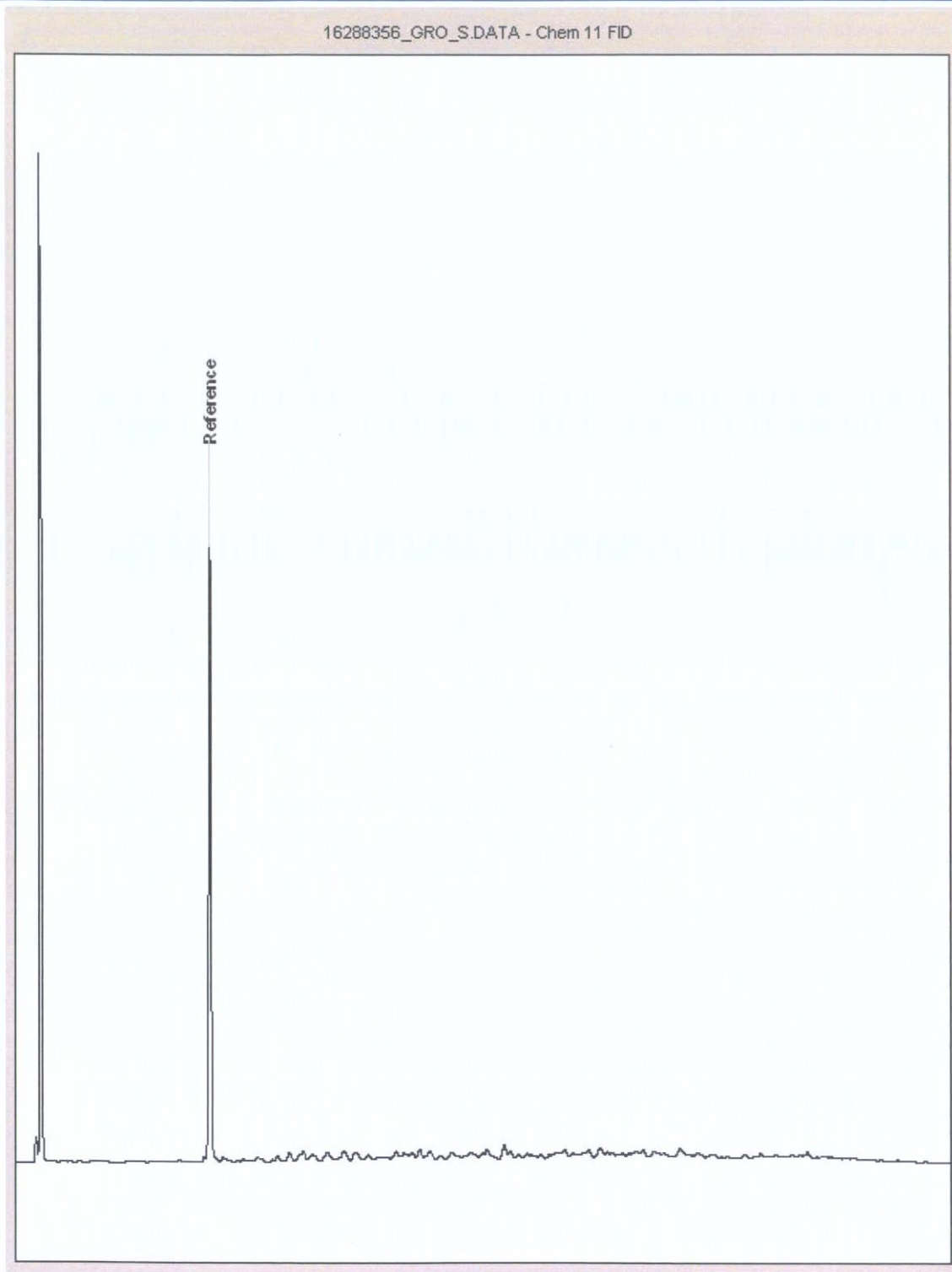
SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
Location: CHARTERED LAND - HEL Order Number: Superseded Report:

Chromatogram

Analysis: GRO by GC-FID (S)

Sample No : 16288356
Sample ID : 2921-BH5-SS5

Depth : 5.90 - 7.60





CERTIFICATE OF ANALYSIS

SDG: 170926-64 Client Reference: 2921-028 COC4-G Report Number: 427004
 Location: ED LAND - HEUSTON SOUTH Order Number: Superseded Report:

Appendix

General

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. As 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. **Spiked 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.

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.

References

No.	Title	Minerex Doc Ref.
1	Technical Guidance Technical Guidance WM3 Guidance on the classification and assessment of waste 1 st Ed. (Environment Agency UK, 2015)	F1856
2	British Standard (Investigation of potentially contaminated sites - Code of practice) BS10175:2011+A1:2013	F1726
3	Sampling and Testing of Waste for Landfill – EA UK, 2013	F1900
4	HazToolOnline, August 2016	Pers. Com. (Ian Bishop)
5	Commission Decision of 18 December 2014, amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European parliament and of the Council (2014/955/EEC)	F1857
6	Commission Regulation (EU) No 1357/2014 of 18 December 2014, replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives	F1858
7	COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (2003/33/EC)	F586

Appendix A

2000 and 2002 Site Investigation Data



Dames & Moore
O'Brien Kreitzberg
Thorburn Colquhoun

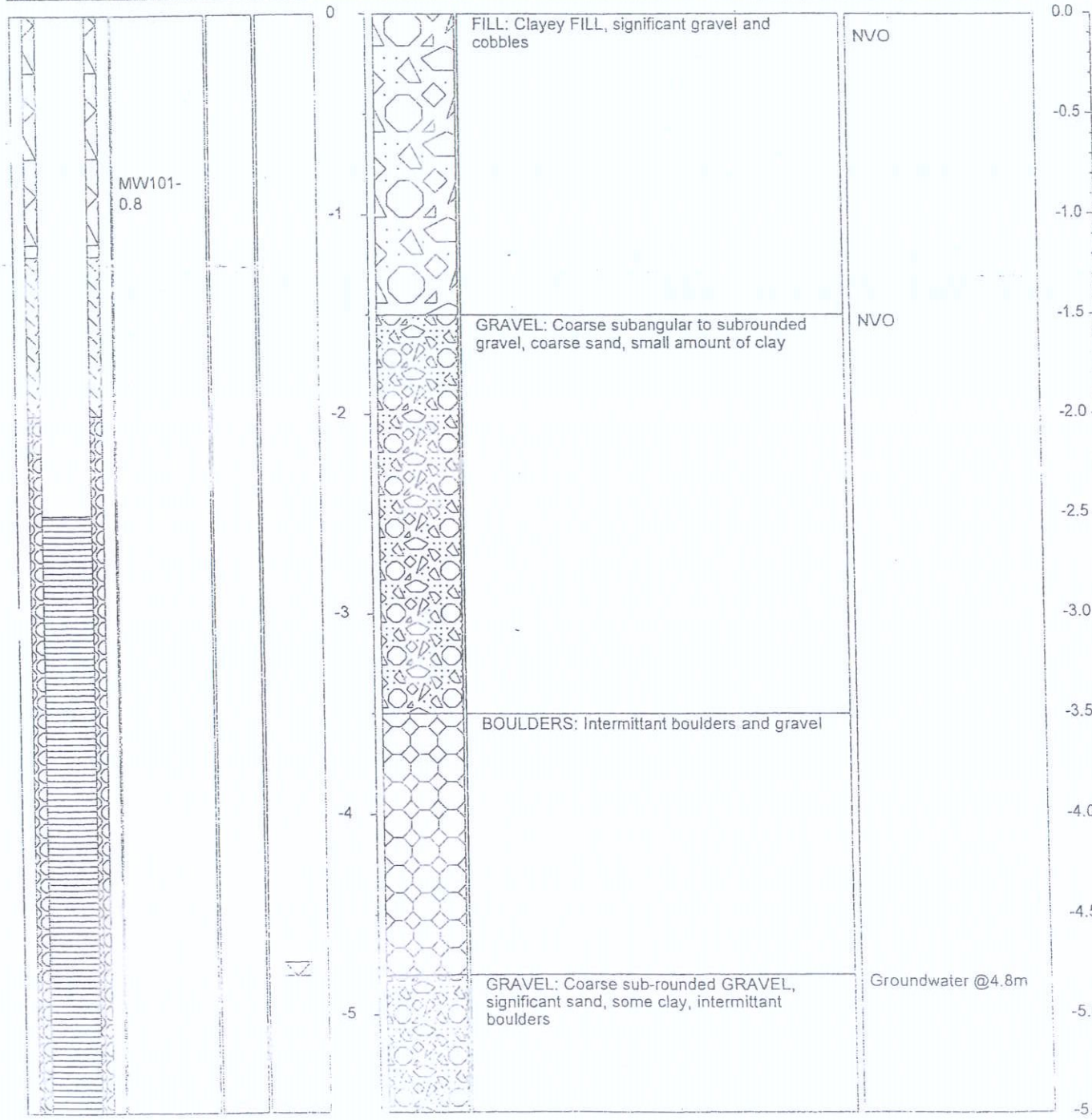
Dames & Moore
Iveagh Court, 4th Floor
6-8 Harcourt Road
Dublin 2
Ireland

BOREHOLE LOG

BOREHOLE NO. MW101
TOTAL DEPTH: 5.5m

PROJECT INFORMATION		DRILLING INFORMATION	
CLIENT:	Eircom	DRILLING CO.	Glovers Site Investigation
SITE NAME:	Kilmainham	DRILLER:	Danny Corscaden
SITE LOCATION:	North western corner of site	DRILLING METHOD/DIAMETER:	Shell & Auger
JOB NO.:	47792-002	DATE DRILLED	08/02/02 - 13/02/02
LOGGED BY:	Nicola O'Hara		
CHECKED BY:	Paul Heaney		
NOTES:		Water level during excavation	
Trenched and backfilled to 1m prior to drilling		NVO No visual or olfactory evidence of contamination	

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
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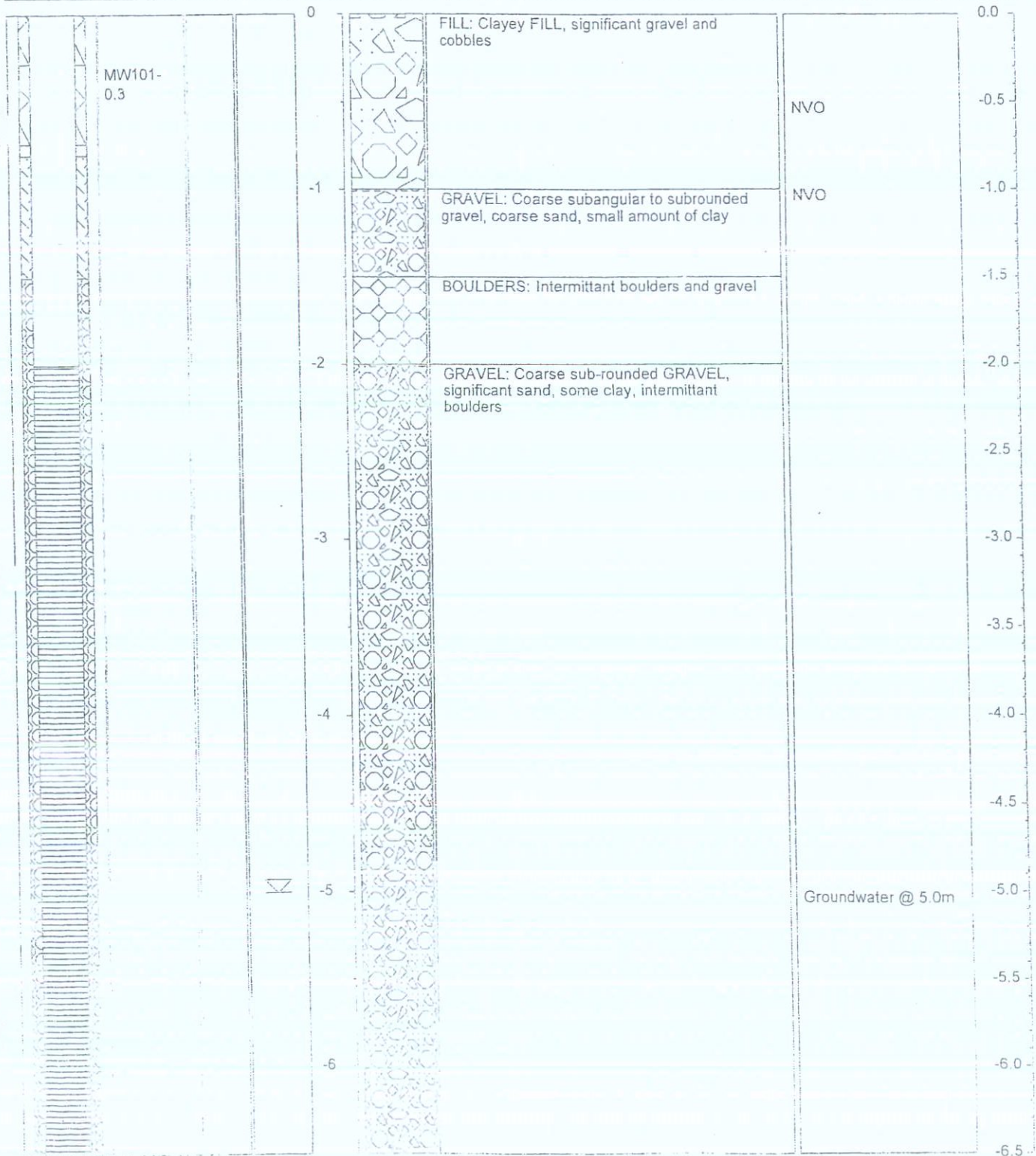
David J. Moran
 O'Brien Kreitzberg
 Thorburn Colquhoun

Dames & Moore
 Iveagh Court, 4th Floor
 6-8 Harcourt Road
 Dublin 2
 Ireland

BOREHOLE LOG

BOREHOLE NO. MW102
 TOTAL DEPTH: 6.7m

PROJECT INFORMATION				DRILLING INFORMATION				
CLIENT:	Eircom	DRILLING CO.:	Glovers Site Investigation					
SITE NAME:	Kilmainham	DRILLER:	Danny Corscaden					
SITE LOCATION:	North eastern corner of site	DRILLING METHOD/DIAMETER:	Shell & Auger					
JOB NO.:	47792-002	DATE DRILLED	13/02/02 - 14/02/02					
LOGGED BY:	Nicola O'Hara							
CHECKED BY:	Paul Heaney							
NOTES: Trenched and backfilled to 1m prior to drilling				Water level during excavation NVO No visual or olfactory evidence of contamination				
BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m





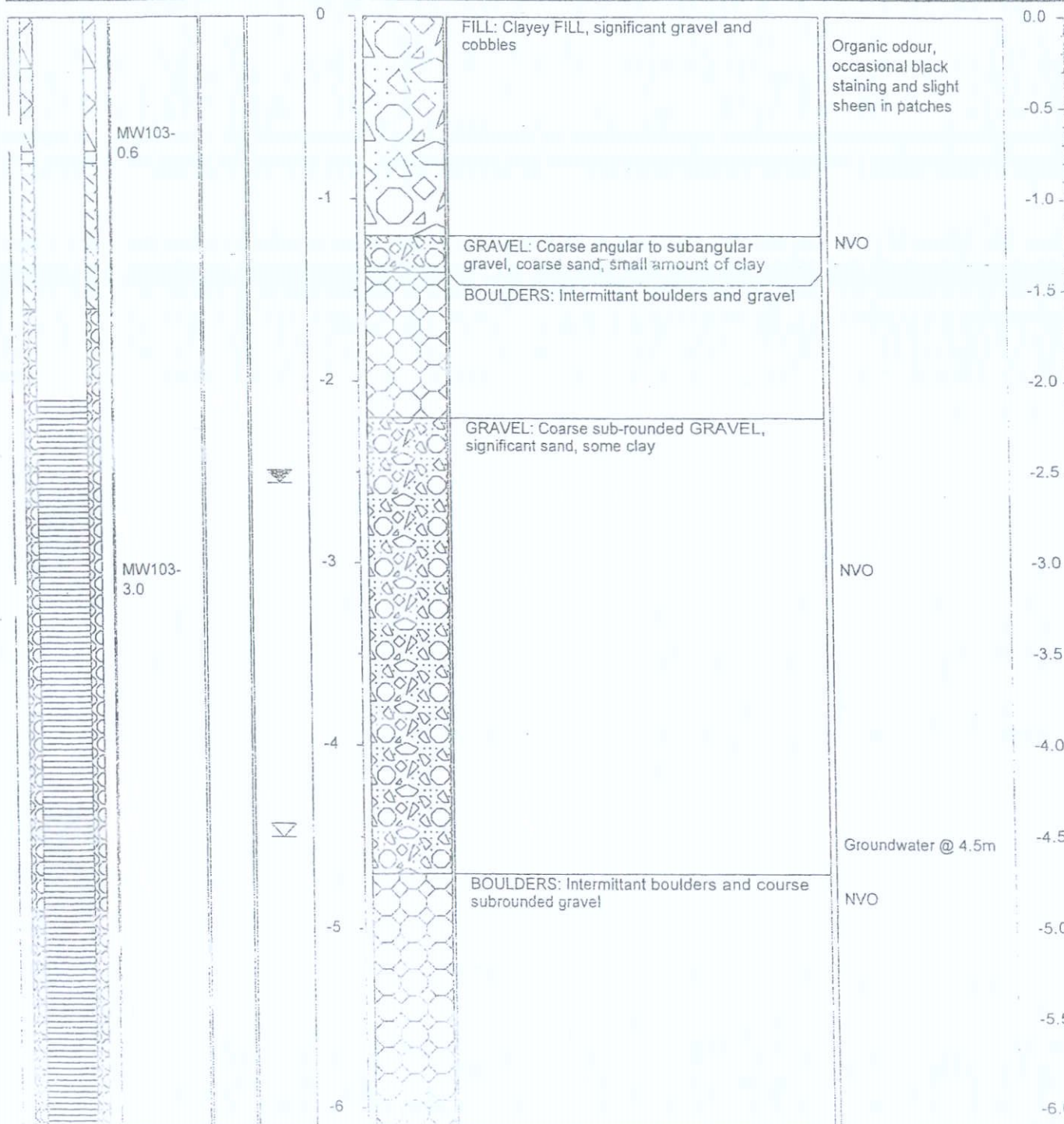
James F. Moore
O'Brien Kreitzberg
Thorburn Colquhoun

James & Moore
Iveagh Court, 4th Floor
6-8 Harcourt Road
Dublin 2
Ireland

BOREHOLE LOG

BOREHOLE NO MW103
TOTAL DEPTH: 6.1m

PROJECT INFORMATION				DRILLING INFORMATION			
CLIENT:	Eircom	DRILLING CO.:	Glovers Site Investigation				
SITE NAME:	Kilmainham	DRILLER:	Danny Corscaden				
SITE LOCATION:	Towards centre of site to west of warehousing	DRILLING METHOD/DIAMETER:	Shell & Auger				
JOB NO.:	47792-002	DATE DRILLED	06/02/02 - 07/02/02				
LOGGED BY:	Nicola O'Hara						
CHECKED BY:	Paul Heaney						
NOTES: Trenched and backfilled to 1m prior to drilling				Water level during excavation			
				NVO No visual or olfactory evidence of contamination			





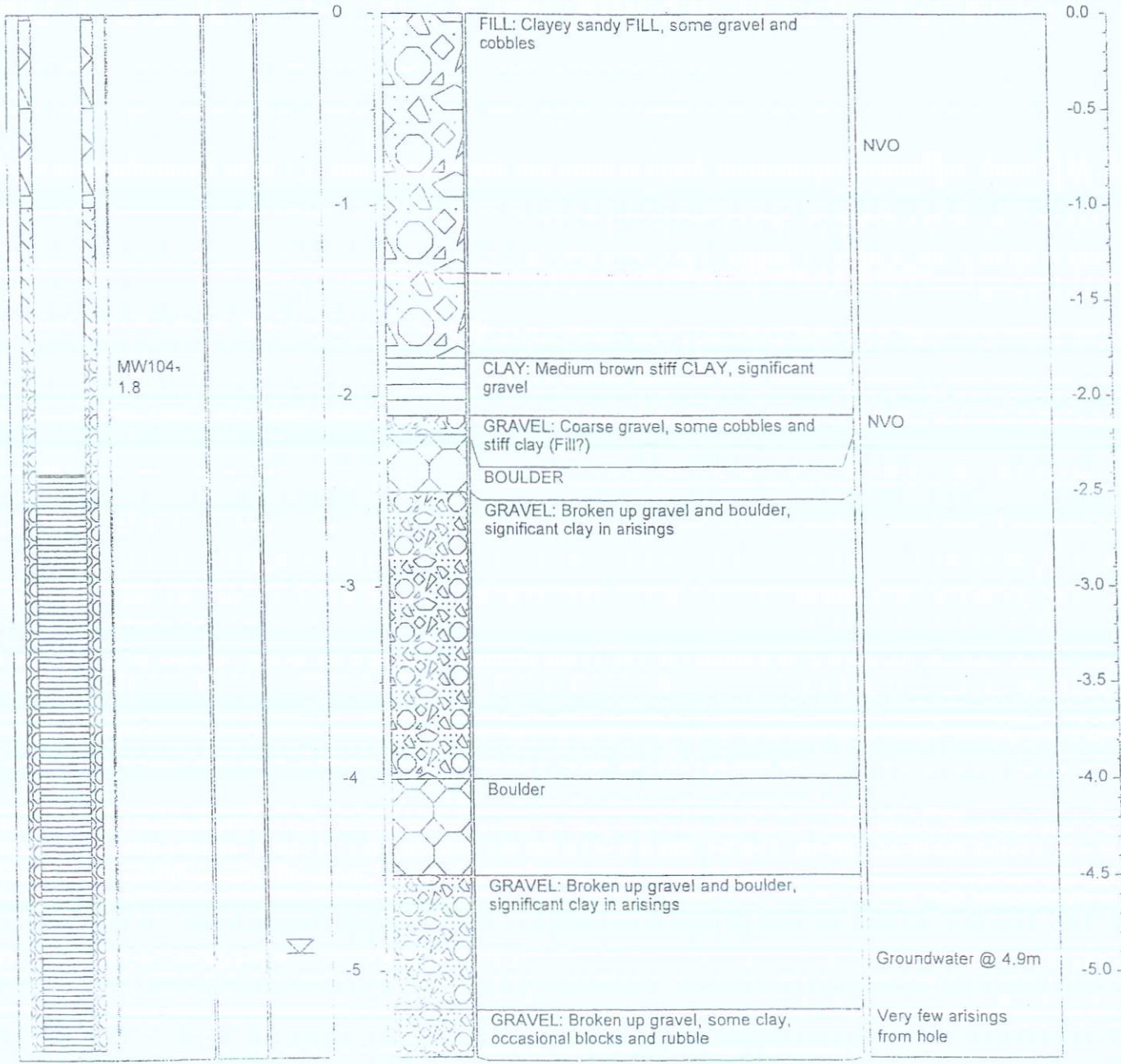
Dames & Moore
Gábor Kreitzberg
Therese Colquhoun

Dames & Moore
Iveagh Court, 4th Floor
6-8 Harcourt Road
Dublin 2
Ireland

BOREHOLE LOG

BOREHOLE NO. MW104
TOTAL DEPTH: 5.45m

PROJECT INFORMATION				DRILLING INFORMATION				
CLIENT:	Eircom	DRILLING CO.:	Glovers Site Investigation					
SITE NAME:	Kilmainham	DRILLER:	Danny Corscaden					
SITE LOCATION:	Midway along eastern boundary of site	DRILLING METHOD/DIAMETER:	Shell & Auger					
JOB NO.:	47792-002	DATE DRILLED	04/02/02 - 06/02/02					
LOGGED BY:	Nicola O'Hara							
CHECKED BY:	Paul Heaney							
NOTES: Trenched and backfilled to 1m prior to drilling				Water level during excavation				
				NVO No visual or olfactory evidence of contamination				
BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m



BOREHOLE NO. MW105
 TOTAL DEPTH: 15.5m

PROJECT INFORMATION

DRILLING INFORMATION

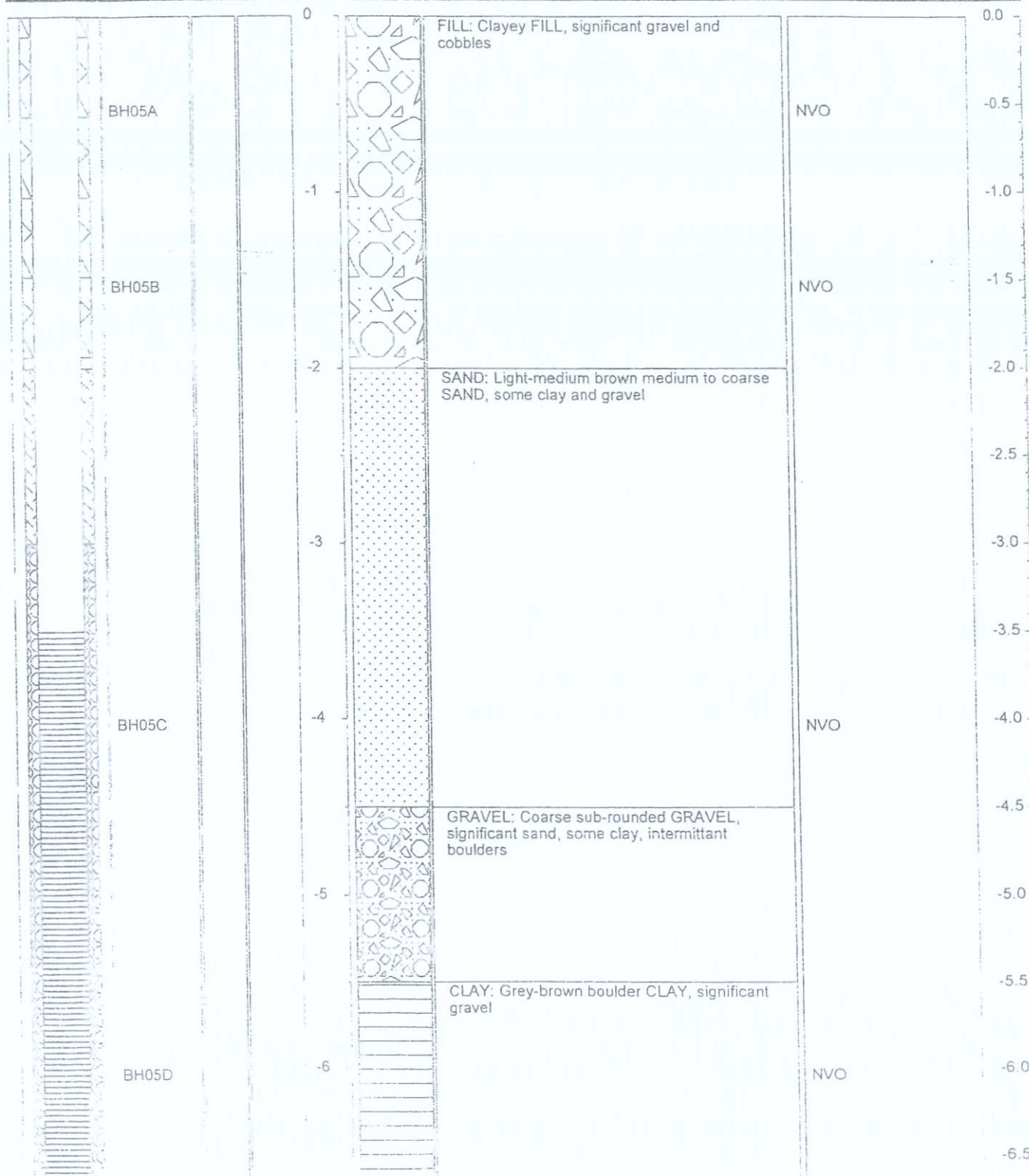
CLIENT: Eircom
 SITE NAME: Kilmainham
 SITE LOCATION: South eastern corner of site
 JOB NO.: 47792-002
 LOGGED BY: Caroline Enright
 CHECKED BY: Paul Heaney

DRILLING CO. Glovers Site Investigation
 DRILLER: Danny Corscaden
 DRILLING METHOD/DIAMETER: Rotary Drilling
 DATE DRILLED: 13/02/02 - 14/02/02

NOTES: Trenched and backfilled to 1m prior to drilling

Water level during excavation
 NVO No visual or olfactory evidence of contamination

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
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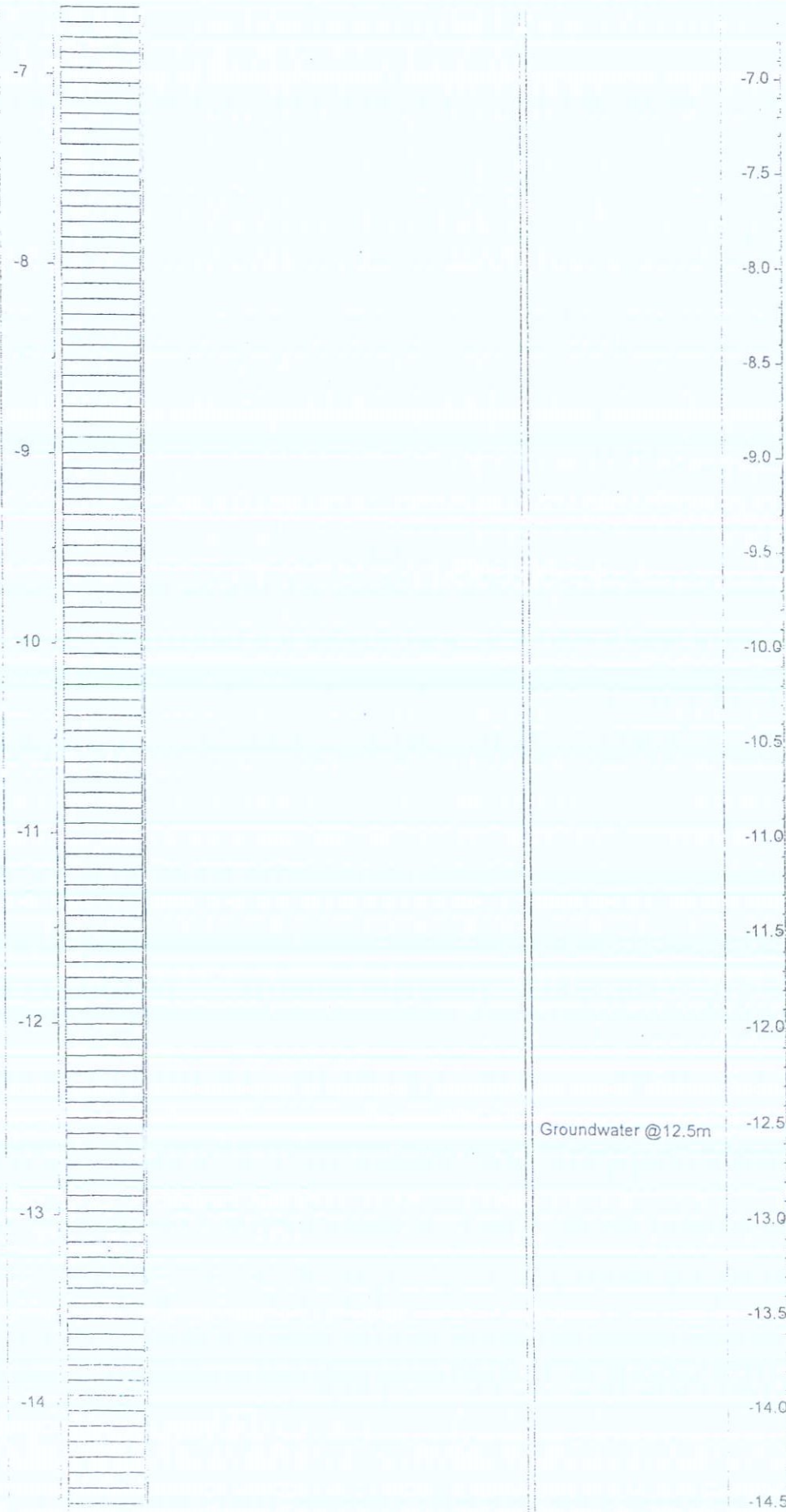
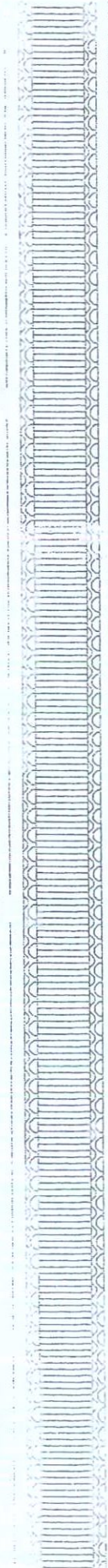
Dames & Moore
 O'Brien Kreitzberg
 Thorburn Colquhoun

Dames & Moore
 Iveagh Court, Harcourt
 6-8 Harcourt Road
 Dublin 2
 Ireland

BOREHOLE LOG

BOREHOLE NO.:
 TOTAL DEPTH: 15.5m

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
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Dames & Moore
O'Brien Kreitzberg
Thorburn Colquhoun

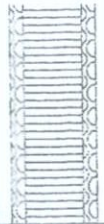
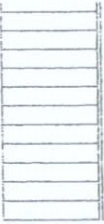
Dames & Moore
Leveagh Court, 4th Floor
6-6 Harcourt Road
Dublin 2
Ireland

BOREHOLE LOG

Page 3 of 3

BOREHOLE NO.:

TOTAL DEPTH: 15.5m

BOREHOLE COMPLETION	SAMP. #	PID ppm	WATER LEVEL	DEPTH m	GEOLOGY	DESCRIPTION	COMMENTS	DEPTH m
				-15				-15.0 -15.5

BOREHOLE RECORD

CONTRACT: : Eircom Site
CLIENT: : Horgan Lynch & Partners
Site Address: : Military Road
Boring Commenced: 28/08/2000
Boring Completed: 28/08/2000
Type of Boring: Shell & Auger

HOLE ID: 1
Hole Diameter: 200 mm
EN
Drilled by: Peter Friel
Logged by: James Lombard
Ground Level: M.O.D.

Sheet 1 of 1

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Water Depth (m)
TARMAC	0.00								
HARDCORE (chiselling 1 hour).	0.15								
Firm brown sandy CLAY.	0.40			D C(18)	0.50 0.65	63488			
Stiff brown sandy gravelly CLAY.	1.10			D	1.10	63489			
	1.50		D C(37)	1.50 1.65	63490				
	2.50		D C(44)	2.50 2.65	63491				
	3.50		D C(45)	3.50 3.65	63492				
	4.50		D C(39)	4.50 4.65	63493				
	5.50		D C(45)	5.50 5.65	63494				
Presumed BOULDER (chiselling 1 1/2 hours).	6.40						6.20	29/08/2000	Nil
	6.20	Hole End							

Remarks:
 Chiselling 2 1/2 hours.
 Installed gas monitoring pipe to 6.2mBGL with pea gravel surround, bentonite seal and stopcock cover at ground level.

Key to Symbols			
B	Bulk Disturbed Sample	U	Undisturbed Sample
J	Jar Sample (small disturbed)	C(9)	Cone Penetration Test (N value)
S(9)	Standard Penetration Test (N value)	C(*)	Cone Penetration Test (refusal)
S(*)	Standard Penetration Test (refusal)	⊥	Waterstrike
W	Water Sample	∇	Water level (20mins after strike)

Site Investigations Ltd

STANDARD BOREHOLE 2010BH.GPJ COREHOLE.GDT 29/09/00

BOREHOLE RECORD

CONTRACT: : Elrcorn Site
CLIENT: : Morgan Lynch & Partners
Site Address: : Military Road
Boring Commenced: 24/08/2000
Boring Completed: 24/08/2000
Type of Boring: Shell & Auger

HOLE ID 2
Hole Diameter: 200 mm
EN
Drilled by: Peter Friel
Logged by: James Lombard
Ground Level: M.O.D.

Sheet 1 of 1

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Water Dept (m)
CONCRETE	0.0	XXXX							
Firm brown sandy gravelly CLAY.	0.15			D C(14)	0.50 0.65	63483			
Stiff brown sandy gravelly CLAY with cobbles.	1.50			D C(41)	1.50 1.65	63484			
	2.50		D C(47)	2.50 2.65	63485				
	3.50		D C(49)	3.50 3.65	63486				
	4.50		D C(49)	4.50 4.65	63487				
	4.80		W	4.80	62151				
Presumed BOULDER	5.60 5.70	Hole End		C(*)	5.65		5.60 5.70	24/08/2000 27/09/2000	Nil 4.80()

STANDARD BOREHOLE 2B108H.GPJ COREHOLE GDT 2B109/000

Remarks:

Chiselling 1 1/2 hours.
 Installed 110mm diameter plastic pipe to 5.7mBGL
 Broke out concrete with jackhammer.
 At 5.65 55 blows to 10mm refusal.

Key to Symbols

- | | |
|---|-------------------------------------|
| B Bulk Disturbed Sample | U Undisturbed Sample |
| J Jar Sample (small disturbed) | C(9) Cone Penetration Test(N v) |
| S(9) Standard Penetration Test(N value) | C(*) Cone Penetration Test(refus.) |
| S(*) Standard Penetration Test(refusal) | ≡ Waterstrike |
| W Water Sample | ⊕ Water level (20mins after strike) |

BOREHOLE RECORD

CONTRACT: : Eircom Site

HOLE ID 3

CLIENT: : Horgan Lynch & Partners

Hole Diameter: 200 mm

Site Address: : Military Road

EN

Boring Commenced: 21/08/2000

Drilled by: Peter Friel/Mick Tully

Boring Completed: 29/08/2000

Logged by: James Lombard

Type of Boring: Shell & Auger

Sheet 1 of 2

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water				
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Water Dep. (m)		
CONCRETE	0.00										
FILL	0.15										
Firm brown sandy CLAY.	0.50			D	0.50	63466					
				C(9)	0.65						
Firm brown sandy gravelly CLAY with cobbles and boulders (chiselling 1 1/4 hours).	1.00			D	1.10	63467					
					C(37)		1.50	63468			
							D		2.50	63469	
							C(29)	2.65			
							D	3.50	63470		
							C(34)	3.65			
							D	4.50	63471		
							C(32)	4.65			
							D	5.50	63472		
							C(38)	5.65			
				D	6.50	63473					
				C(43)	6.65						
Presumed BOULDER (chiselling 1 1/4 hours). Brown sandy gravelly CLAY.	7.00 7.10			C(*)	7.10		7.10	22/08/2000	Nil		

Remarks:

Broke out concrete with jackhammer.
At 7.1 60 blows to 5mm refusal.
Chiselling 2 1/2 hours.
Installed 110mm diameter plastic pipe to 7.1mBGL.
open hole drilling from 7.1 to 8.8 and and 11.00 to 14.00mBGL.
Cored from 8.8 to 11.00mBGL and 14.0 to 18.0mBGL.

Key to Symbols

- | | | | |
|------|-------------------------------------|------|-----------------------------------|
| B | Bulk Disturbed Sample | U | Undisturbed Sample |
| J | Jar Sample (small disturbed) | C(9) | Cone Penetration Test (N value) |
| S(9) | Standard Penetration Test (N value) | C(*) | Cone Penetration Test (refusal) |
| S(*) | Standard Penetration Test (refusal) | z | Watershrike |
| W | Water Sample | W | Water level (20mins after strike) |

STANDARD BOREHOLE 2810BH.GPJ COREHOLE GDT 28/09/00

BOREHOLE RECORD

CONTRACT: : Elrecom Site

HOLE ID 3

CLIENT: : Morgan Lynch & Partners

Hole Diameter: 200 mm

Site Address: : Military Road

E N

Boring Commenced: 21/08/2000

Drilled by: Peter Friel/Mick Tully




Boring Completed: 29/08/2000

Logged by: James Lombard

Type of Boring: Shell & Auger

Ground Level: M.O.D.

Sheet 2 of 2

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Water Depth (m)
as previous	10.0								
Sandy GRAVEL with cobbles.	11.00 12.0 13.0								
Brown sandy gravelly CLAY.	13.60 14.0 15.0 16.0 17.0								
	18.0 19.0 20.0	Hole End							

STANDARD BOREHOLE 2810BH.GPJ COREHOLE.GDT 28/09/00

Remarks:

Broke out concrete with jackhammer.
At 7.1 60 blows to 5mm refusal.
Chiselling 2 1/2 hours.
Installed 110mm diameter plastic pipe to 7.1mBGL
open hole drilling from 7.1 to 8.8 and and 11.00 to 14.00mBGL
Cored from 8.8 to 11.00mBGL and 14.0 to 18.0mBGL

Key to Symbols

- | | |
|---|---|
| B Bulk Disturbed Sample | U Undisturbed Sample |
| J Jar Sample (small disturbed) | C(9) Cone Penetration Test(N v |
| S(9) Standard Penetration Test(N value) | C(*) Cone Penetration Test(refl |
| S(*) Standard Penetration Test(refusal) | W Waterstrike |
| W Water Sample | W(20) Water level (20mins after strike) |

BOREHOLE RECORD

CONTRACT: : Eircom Site

HOLE ID: 4

CLIENT: : Morgan Lynch & Partners

Hole Diameter: 200 mm

Site Address: : Military Road

EN

Boring Commenced: 23/08/2000

Drilled by: Peter Friel

Boring Completed: 23/08/2000

Logged by: James Lombard

Type of Boring: Shell & Auger

Ground Level: M.O.D.

Sheet 1 of 1

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Wat Dep (m)
TARMAC	0.00								
HARDCORE	0.15								
Firm brown sandy CLAY.	0.40			D C(18)	0.50 0.65	63474			
Stiff brown sandy gravelly CLAY.	1.10			D C(27)	1.50 1.65	63475			
	2.0			D C(30)	2.50 2.65	63476			
	3.0			D C(36)	3.50 3.65	63477			
	4.0			D C(43)	4.50 4.65	63478			
	5.0			D C(35)	5.50 5.65	63479			
	6.0			D C(41)	6.50 6.65	63480			
Stiff/hard grey sandy gravelly CLAY.	7.10			D	7.10	63481			
	8.0			D C(53)	7.50 7.65	63482			
Presumed BOULDER (chiselling 1 1/4 hours)	8.20 8.30		Hole End				8.30	23/08/2000	Nil()

STANDARD BOREHOLE 2810BH.GPJ COREHOLE.GDT 28/09/00

Remarks:
 Chiselling 1 1/4 hours.
 Installed gas monitoring pipe to 8.3mBGL with pea gravel surround, bentonite seal and stopcock cover at ground level.

Key to Symbols			
B	Bulk Disturbed Sample	U	Undisturbed Sample
J	Jar Sample (small disturbed)	C(9)	Cone Penetration Test (N value)
S(9)	Standard Penetration Test (N value)	C(*)	Cone Penetration Test (refusal)
S(*)	Standard Penetration Test (refusal)	Σ	Waterstrike
W	Water Sample	Σ(20)	Water level (20mins after strike)

BOREHOLE RECORD

CONTRACT: : Eircom Site
CLIENT: : Horgan Lynch & Partners
Site Address: : Military Road
Boring Commenced: 17/08/2000
Boring Completed: 31/08/2000
Type of Boring: Shell & Auger and Rotary Drill

MOLE ID 6
Hole Diameter: 200/TNW mm
EN
Drilled by: Peter Friel/Mick Tully
Logged by: James Lombard
Ground Level: M.O.D.

Sheet 1 of 2

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Water Depth (m)
FILL of tarmac and hardcore (chiselling 1 hour).	0.00								
	1.00			C(41)	0.85				
Firm brown sandy CLAY.	1.40			D	1.50	63460			
				C(16)	1.65				
Stiff brown sandy gravelly CLAY.	2.00			D	2.50	63461			
	1.90			C(39)	2.65				
	3.00			D	3.50	63462			
				C(48)	3.65				
	4.00			D	4.50	63463			
				C(57)	4.75	63464			
Stiff grey sandy gravelly CLAY.	4.70			D	5.50	63465			
	5.00			C(68)	5.65				
Presumed BOULDER (chiselling 2 hours). Sandy GRAVEL with cobbles.	6.40			C(*)	6.50		6.50	18/08/2000	Nil
	6.50								
	7.00								
	8.00								
	9.00								
	10.00								

STANDARD BOREHOLE 28108H.GPJ COREHOLE GDT 28/09/00

Remarks:
 Chiselling 3 hours.
 Installed 110mm diameter plastic pipe to 6.5mBGL.
 Open hole drilling from 6.5 to 14.0mBGL.
 At 6.50 50 blows to 10mm refusal.

Key to Symbols			
B	Bulk Disturbed Sample	U	Undisturbed Sample
J	Jar Sample (small disturbed)	C(9)	Cone Penetration Test(N
S(9)	Standard Penetration Test(N value)	C(*)	Cone Penetration Test(ref.
S(*)	Standard Penetration Test(refusal)	≡	Waterstrike
W	Water Sample	≡	Water level (20mins after strike)

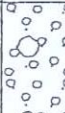
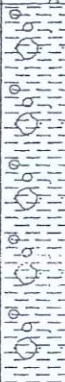
Site Investigations Ltd

BOREHOLE RECORD

CONTRACT: : Eircom Site
CLIENT: : Horgan Lynch & Partners
Site Address: : Military Road
Boring Commenced: 17/08/2000
Boring Completed: 31/08/2000
Type of Boring: Shell & Auger and Rotary Drill

HOLE ID: 5
Hole Diameter: 200/TNW mm
EN
Drilled by: Peter Friel/Mick Tully
Logged by: James Lombard
Ground Level: M.O.D.

Sheet 2 of 2

DESCRIPTION OF STRATA	Unit Depth (m)	Legend	Elevation (M.O.D.)	Samples/Tests			Progress/Water		
				Type	Depth (m)	Ref No.	Casing Depth (m)	Date	Wat Dep (m)
as previous	10.0								
Brown sandy gravelly CLAY with cobbles.	11.91.00								
	12.0								
	13.0								
	14.0	Hole End				14.00	31/08/2000	Nil()	
	15.0								
	16.0								
	17.0								
	18.0								
	19.0								
	20.0								

STANDARD BOREHOLE 2810BH.GPJ COREHOLE.GDT 28/09/00

Remarks:

Chiselling 3 hours.
 Installed 110mm diameter plastic pipe to 6.5mBGL.
 Open hole drilling from 6.5 to 14.0mBGL.
 At 6.50 50 blows to 10mm refusal.

Key to Symbols

- | | |
|---|---|
| B Bulk Disturbed Sample
J Jar Sample (small disturbed)
S(9) Standard Penetration Test (N value)
S(*) Standard Penetration Test (refusal)
W Water Sample | U Undisturbed Sample
C(9) Cone Penetration Test (N value)
C(*) Cone Penetration Test (refusal)
☼ Waterstrike
☼ 20mins Water level (20mins after strike) |
|---|---|

Appendix B

Rotary Corehole Logs

BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 25/11/2005


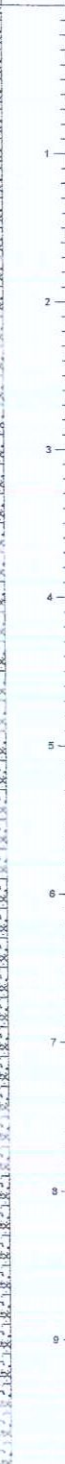
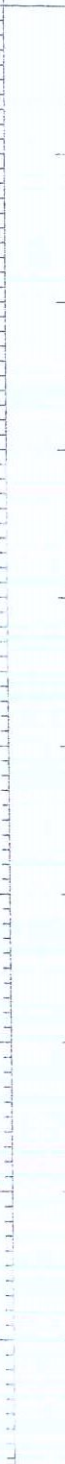





End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery.								
		4		SPT-C	4.15	N=31		
		7		SPT-C	7.15	50/215mm		

Continued next sheet

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring.
 Reduced to NQ size at 27.10mBGL because of sand.
 Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- Groundwater strike
- Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 25/11/2005

End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (MOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery.				SPT-C	10.15	50/295mm		
		11						
		12						
		13		SPT-C	13.15	N=48		
		14						
		15.00		SPT-C	14.65	50/275mm		
OVERBURDEN recovery consists of dark grey sandy gravelly CLAY with cobble fragments.		16						
		17						
		18						
		19						
OVERBURDEN recovery consists of Clay and gravel and cobble fragments.		19.15						
		20						

Continued next sheet

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring. Reduced to NQ size at 27.10mBGL because of sand. Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- GW Groundwater strike
- W Water level 20mins after strike.

Bulk disturbed sample.
Small disturbed sample
Undisturbed sample
Standard Penetration Test, split spoon.
Standard Penetration Test, solid cone.
Groundwater strike
Water level 20mins after strike.



BOREHOLE RECORD

Project Name: **Westgate**

Hole ID: **RC1**

Client: **J.J. Rhatigan & Co Ltd**

Co-ordinates: -

Consultant: **Byrne Looby,**

Elevation: -

Location:

Project no. **1032-11-05**

Start date: **25/11/2005**


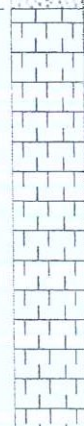
End date: **30/11/2005**

Drilled by: **P Sheils**

Type of drilling: **RO + RC**

Hole diameter: mm

Logged by: **F McNamara**

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN recovery consists of Clay and gravel and cobble fragments.		21						
OVERBURDEN recovery consists of sand, gravel and cobble fragments.		22	22.15					
OVERBURDEN recovery consists of brown sandy gravelly clay.		23	23.65					
OVERBURDEN recovery consists of coarse Sand and fine Gravel.		24	26.65					
Very strong to strong black silty LIMESTONE, fresh to slightly weathered.		25	27.10					
		26						
		27						
		28						
		29						

Continued next sheet

Remarks:

any openhole borehole to 15.00mBGL then continued by rotary coring.
 reduced to NQ size at 27.10mBGL because of sand.
 Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- ▽ Groundwater strike
- Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 25/11/2005


End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
<p>Very strong to strong black silty LIMESTONE, fresh to slightly weathered.</p>		<p>31</p> <p>30</p> <p>32.30</p> <p>33</p> <p>34</p> <p>35</p> <p>36</p> <p>37</p> <p>38</p> <p>39</p> <p>40</p>	<p>(mOD)</p>					
<p>End of Borehole at 32.30 m</p>								

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring. Reduced to NQ size at 27.10mBGL because of sand. Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

B
D
C
U
SPT-S
SPT-C
NA

Bulk disturbed sample.
Small disturbed sample
Undisturbed sample
Standard Penetration Test, split spoon.
Standard Penetration Test, solid cone.
Groundwater strike
Water level 20mins after strike.



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 25/11/2005

End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN no recovery.	[Pattern]								80
		1							
		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

Continued next sheet

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring.
 Reduced to NQ size at 27.10mBGL because of sand.
 Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

- TCR Total Core Recovery.
- SCR Solid Core Recovery
- RQD Rock Quality Designation
- FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 25/11/2005

End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level	mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN no recovery.		11								
		12								
		13								
OVERBURDEN recovery consists of dark grey sandy gravelly CLAY with cobble fragments.		15	15.00						13	15.00
		16								
		17								
OVERBURDEN recovery consists of Clay and gravel and cobble fragments.		18							15	17.85
		19								
		19.15								18

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring.
 Reduced to NQ size at 27.10mBGL because of sand.
 Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

TCR Total Core Recovery.
 SCR Solid Core Recovery
 RQD Rock Quality Designation
 FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 25/11/2005





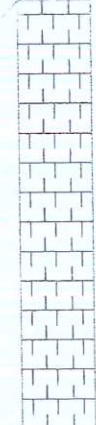
End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN		
OVERBURDEN recovery consists of Clay and gravel and cobble fragments.		-21						7	20.65		
OVERBURDEN recovery consists of sand, gravel and cobble fragments.		-22	22.15					32	22.15		
OVERBURDEN recovery consists of brown sandy gravelly clay.		-24	23.65					25	23.65		
OVERBURDEN recovery consists of coarse Sand and fine Gravel.		-27	26.65					92	26.65		
Very strong to strong black silty LIMESTONE, fresh to slightly weathered.		-28	27.10	Mostly non intact.	NI	18	44	69	27.10		
		-29		Fractures extremely closely spaced to medium spaced 15 to 20 degrees, smooth, planar, tight to open.				54	92	100	28.40

Continued next sheet

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring. Reduced to NQ size at 27.10mBGL because of sand. Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

- TCR Total Core Recovery.
- SCR Solid Core Recovery
- RQD Rock Quality Designation
- FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC1

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 25/11/2005

End date: 30/11/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
Very strong to strong black silty LIMESTONE, fresh to slightly weathered.	[Pattern]	31	31		10	41	41	88	30.80
					47	95	100	30.80	
End of Borehole Log at 32.30 m		32	32.30						
		33							
		34							
		35							
		36							
		37							
		38							
		39							
		40							

Remarks:

Rotary openhole borehole to 15.00mBGL then continued by rotary coring.
 Reduced to NQ size at 27.10mBGL because of sand.
 Standpipe inserted to 15.00mBGL with pea gravel surround, bentonite seal and cover.

KEY

TCR Total Core Recovery.
 SCR Solid Core Recovery
 RQD Rock Quality Designation
 FSI Fracture Spacing Index



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 30/11/2005



End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (MOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery.								
		4		SPT-C	4.15	50/240mm		
		7		SPT-C	7.15	50/215mm		

Continued next sheet

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- ☒ Groundwater strike
- ☒ Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 30/11/2005

End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery.				SPT-C	10.15	50/15mm		
OVERBURDEN recovery consists of cored cobbles and boulders.		10.65						
		11						
		12						
		13						
		14						
		15						
		16						
OVERBURDEN recovery consists of dark grey sandy gravelly clay		16.15						
		17						
		18						
		19						
OVERBURDEN recovery consists of brown sandy gravelly clay.		19.15						
		20						

Continued next sheet

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- GW Groundwater strike
- W Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 30/11/2005



End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (MOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN recovery consists of brown sandy gravelly clay.		21						
		22						
		23						
OVERBURDEN recovery consists of sand and cored cobbles and boulders.		23.65						
	24							
	25							
	26							
	27							
	28							
Weak black calcareous MUDSTONE, moderately to highly weathered.		28.15						
		29						
Continued next sheet	30							

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- ☒ Groundwater strike
- ☒ Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 30/11/2005

End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter:

mm

Logged by: F McNamara

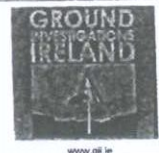
Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
Weak black calcareous MUDSTONE, moderately to highly weathered.	[Pattern]		31					
Very strong to strong dark grey silty LIMESTONE, fresh to slightly weathered.	[Pattern]		31.15					
End of Borehole at 33.65 m	[Pattern]		32					
			33					
			33.65					
			34					
			35					
			36					
			37					
			38					
			39					
			40					

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- ☒ Groundwater strike
- ☒ Water level 20mins after strike.



BOREHOLE RECORD (Rotary core)

Project Name: **Westgate**

Hole ID: **RC2**

Client: **J.J. Rhatigan & Co Ltd**

Co-ordinates: -

Consultant: **Byrne Looby,**

Elevation: -

Location:

Project no. **1032-11-05**

Start date: **30/11/2005**


End date: **05/12/2005**

Drilled by: **P Sheils**

Type of drilling: **RO + RC**

Hole diameter: _____ mm

Logged by: **F McNamara**

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN no recovery.		1 2 3 4 5 6 7 8 9 10							

Continued next sheet

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
Continued coring from 17.65 to 33.65mBGL.

KEY

TCR Total Core Recovery.
SCR Solid Core Recovery
RQD Rock Quality Designation
FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 30/11/2005




End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN no recovery.								13	10.15
OVERBURDEN recovery consists of cored cobbles and boulders.		10.65	11					7	11.05
			12						
			13					13	13.15
			14						
			15					11	14.05
			16						
OVERBURDEN recovery consists of dark grey sandy gravelly clay		16.15	17					57	16.15
			18						
			19						
OVERBURDEN recovery consists of brown sandy gravelly clay.		19.15	20					34	19.15

Continued next sheet

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL.

KEY

TCR Total Core Recovery.
 SCR Solid Core Recovery
 RQD Rock Quality Designation
 FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: **Westgate**

Hole ID: **RC2**

Client: **J.J. Rhatigan & Co Ltd**

Co-ordinates: -

Consultant: **Byrne Looby,**

Elevation: -

Location:

Project no. **1032-11-05**

Start date: **30/11/2005**




End date: **05/12/2005**

Drilled by: **P Sheils**

Type of drilling: **RO + RC**

Hole diameter: _____ mm

Logged by: **F McNamara**

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN recovery consists of brown sandy gravelly clay.		21						41	20.65
		22						74	22.15
		23							
OVERBURDEN recovery consists of sand and cored cobbles and boulders.		23.65						5	23.85
		24							
		25							
		26							
		27						11	25.15
		28							
		29						33	26.65
Weak black calcareous MUDSTONE, moderately to highly weathered.		28.15		Fractures extremely closely to medium spaced 30 to 35 degrees, smooth, planar, moderately open to open.		0	0	30	28.15
		29							
		30						NI	
		31						0	0
		32						33	26.05

Continued next sheet

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
Continued coring from 17.65 to 33.65mBGL

KEY

TCR Total Core Recovery.
SCR Solid Core Recovery
RQD Rock Quality Designation
FSI Fracture Spacing Index



BOREHOLE RECORD (Rotary core)

Project Name: Westgate

Hole ID: RC2

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 30/11/2005

End date: 05/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level	mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
Weak black calcareous MUDSTONE, moderately to highly weathered.	[Symbol]	31								
Very strong to strong dark grey silty LIMESTONE, fresh to slightly weathered.	[Symbol]	31.15					53	86	86	31.15
	[Symbol]	32				1				
	[Symbol]	33				8				
	[Symbol]	33.65				5	43	63	63	32.65
End of Borehole Log at 33.65 m		34								
		35								
		36								
		37								
		38								
		39								
		40								

Remarks:

Rotary openhole borehole to 10.15mBGL then continued by rotary coring to 17.65mBGL.
 Had to openhole from 10.15 to 17.65mBGL to progress and case hole.
 Continued coring from 17.65 to 33.65mBGL.

KEY

TCR Total Core Recovery
 SCR Solid Core Recovery
 RQD Rock Quality Designation
 FSI Fracture Spacing Index



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC3

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 05/12/2005

End date: 06/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery		1 2 3 4 5 6 7 8 9 10						
				SPT-C	4.15	50/235mm		
				SPT-C	7.15	50/65mm		

Continued next sheet

Remarks:

Rotary openhole borehole to 14.65mBGL then continued by rotary coring.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon
- SPT-C Standard Penetration Test, solid cone
- Groundwater strike
- Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC3

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 05/12/2005


End date: 06/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
OVERBURDEN no recovery				SPT-C	10.15	50/155mm		
			11					
			12					
			13	SPT-	13.15	50/15mm		
			14					
			14.65					
OVERBURDEN recovery consists of gravel fragments.			15					
			16					
			16.15					
OVERBURDEN recovery consists of grey sandy gravelly clay.			17					
			18					
			19					
			20					

Continued next sheet

Remarks:

Rotary openhole borehole to 14.65mBGL then continued by rotary coring.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone
- Groundwater strike
- Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC3

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Start date: 05/12/2005

End date: 06/12/2005

Project no. 1032-11-05

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description



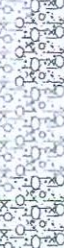
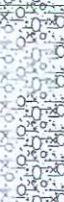





OVERBURDEN recovery consists of grey sandy gravelly clay.

OVERBURDEN recovery consists of brown sandy gravelly clay.

OVERBURDEN recovery consists of clay and cobble fragments

OVERBURDEN recovery consists of cored cobbles and gravel.

Strong dark grey and black silty LIMESTONE slightly weathered.

Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
			Type	Depth	Result		
	21						
	21.65						
	22						
	23						
	24						
	24.65						
	25						
	26						
	26.15						
	27						
	27.65						
	28						
	29						
	30						

Continued next sheet

Remarks:

Rotary openhole borehole to 14.65mBGL then continued by rotary coring.

KEY

- B Bulk disturbed sample.
- D Small disturbed sample
- U Undisturbed sample
- SPT-S Standard Penetration Test, split spoon.
- SPT-C Standard Penetration Test, solid cone.
- ▽ Groundwater strike
- ▽ Water level 20mins after strike.



BOREHOLE RECORD

Project Name: Westgate

Hole ID: RC3

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no.: 1032-11-05

Start date: 05/12/2005

End date: 06/12/2005


Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter:

mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level (mOD)	Samples / tests			Water Depth	Date
				Type	Depth	Result		
Strong dark grey and black silty LIMESTONE slightly weathered.		<div style="text-align: right; margin-bottom: 10px;">31</div> <div style="text-align: right; margin-bottom: 10px;">31.65</div> <div style="text-align: right; margin-bottom: 10px;">32</div> <div style="text-align: right; margin-bottom: 10px;">33</div> <div style="text-align: right; margin-bottom: 10px;">34</div> <div style="text-align: right; margin-bottom: 10px;">35</div> <div style="text-align: right; margin-bottom: 10px;">36</div> <div style="text-align: right; margin-bottom: 10px;">37</div> <div style="text-align: right; margin-bottom: 10px;">38</div> <div style="text-align: right; margin-bottom: 10px;">39</div> <div style="text-align: right;">40</div>						
End of Borehole at 31.65 m								

Remarks:

Rotary openhole borehole to 14.65mBGL then continued by rotary coring.

KEY

B
D
U
SPT-S
SPT-C
W

Bulk disturbed sample.
Small disturbed sample
Undisturbed sample
Standard Penetration Test, split spoon.
Standard Penetration Test, solid cone.
Groundwater strike
Water level 20mins after strike.



BOREHOLE RECORD (Rotary core)

Project Name: **Westgate**

Hole ID: **RC3**

Client: J.J. Rhatigan & Co Ltd

Co-ordinates: -

Consultant: Byrne Looby,

Elevation: -

Location:

Project no. 1032-11-05

Start date: 05/12/2005


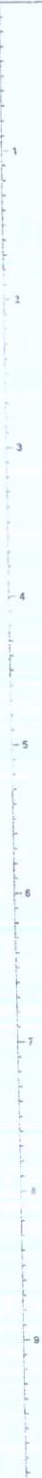

End date: 06/12/2005

Drilled by: P Sheils

Type of drilling: RO + RC

Hole diameter: mm

Logged by: F McNamara

Strata Description	Legend	Depth	Level mAOD	Discontinuities	FSI	RQD	SCR	TCR	CORE RUN
OVERBURDEN no recovery									

DCC PLAN NO: 4610/22
RECEIVED: 04/08/2022

Continued next sheet

Remarks:
Rotary openhole borehole to 14.65mBGL then continued by rotary coring

KEY
 TCR Total Core Recovery.
 SCR Solid Core Recovery
 RQD Rock Quality Designation
 FSI Fracture Spacing Index

