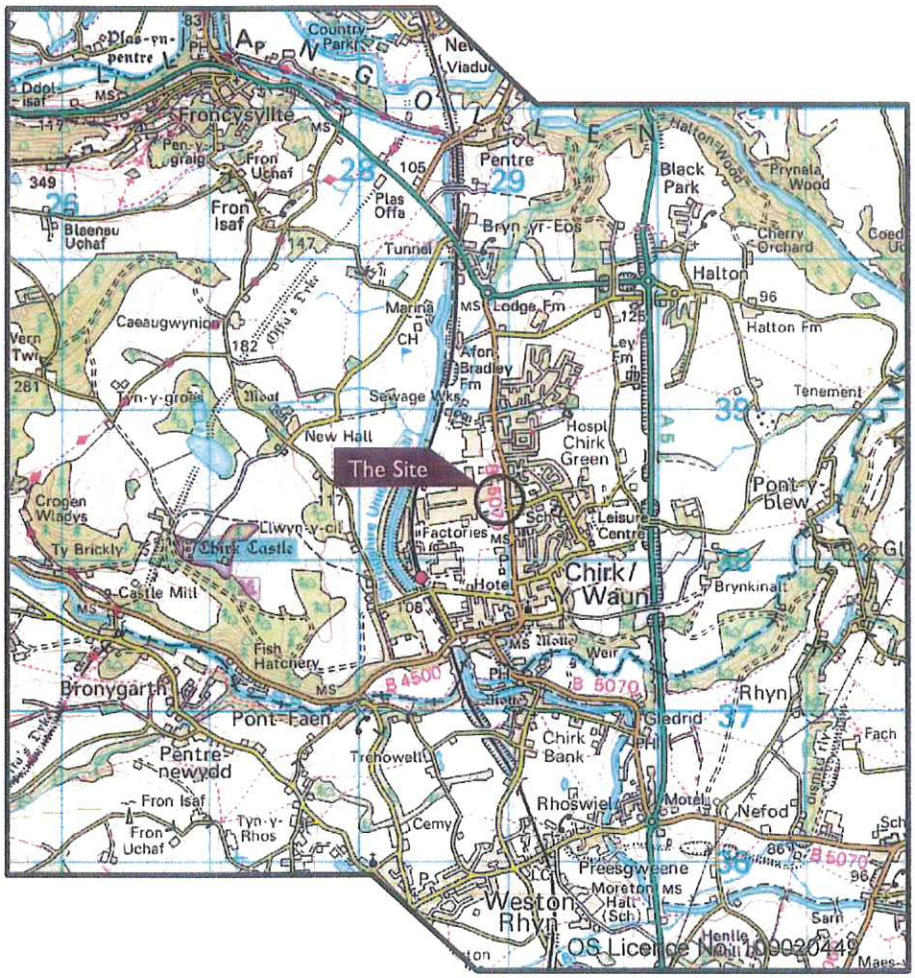
geotechnics

Ground Investigation Factual Report
for
PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
for
Kronospan Limited



Project No: PN071450
May 2007

Ground Investigation Factual Report
for
PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
for
Kronospan Limited

Project No: PN071450
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LIST OF CONTENTS

Ground Investigation
for
PROPOSED WAREHOUSE EXTENSION
KRONOSPAN, CHIRK

Factual Report

Project No: PN071450
May 2007

1.0 INTRODUCTION

A geotechnical and geo-environmental investigation was undertaken by Geotechnics Limited at the site of a proposed warehouse extension at the Kronospan factory in Chirk. The investigation was carried out to the instructions of the Client, Kronospan. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain information on ground and groundwater conditions relating to the design of the proposed works within the limitations posed by borehole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. A geotechnical and geo-environmental interpretation and evaluation of the data obtained were not commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 2 to 4 of this report.

Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 5 to aid an understanding of the procedures followed and the context in which the report should be read.

4.0 THE SITE

4.1 Location

The site is located approximately 700 metres north-east of Chirk Railway Station. The approximate Ordnance Survey National Grid Reference for the site is SJ 289 384 and an extract from the relevant 1:50,000 Scale O.S. Map is included as Appendix 1.

4.2 Description

The site lies within the existing factory premises of Kronospan to the west of the B5070 in Chirk. The works were undertaken within the existing auxiliary loading area and adjacent earth bund situated just inside the factory's main entrance.

The site is roughly square and covers an area of approximately 290m². The loading area is approximately level and the surface comprises concrete. The adjacent earth bund is covered by grass and rises up to approximately 5.0m above the loading area with steep slopes of approximately 30° to 35° to the horizontal.

The northern and western boundaries are formed by the existing warehouse/factory building. The eastern boundary is formed by the B5070. The southern boundary is formed by a grassed area adjacent to the main factory access road and car parks.

5.0 PROCEDURE

5.1 General

The procedures followed in this site investigation are based on *BS 5930 (1999) - Code of Practice for Site Investigations*.

The approximate positions of the investigation points are shown on the Exploratory Hole Location Plan in Appendix 4.

The depths quoted on the Window Sample Borehole Records are in metres below ground level.

5.2 Window Sample Boreholes

Seven (7 No.) Window Sample Boreholes were undertaken at the site to depths between 4.00m and 7.00m below ground level. The work was carried out on 14th and 19th February 2007. The Window Sample Borehole locations were specified by the

Client.

The Window Samples were taken using the Dynamic Probe apparatus which effectively drives lined steel tubes into the ground in 1m lengths. Samples are retrieved in the plastic liners. The hole is not cased and progress depends on the nature of the strata penetrated. Standard Penetration Tests were undertaken at one metre intervals to allow an assessment of the strength or relative density of the soil materials to be made.

The Window Sample Borehole Records are presented in Appendix 2.

Written By: .....
Mark Davies BSc
Graduate Engineer

Checked By: .....
Colin Dodd, BSc (Hons), MSc, CEng, MICE
Principal Engineer
for GEOTECHNICS LIMITED - North West Office

6.0 LABORATORY TESTING

6.1 Geotechnical

No geotechnical laboratory testing was commissioned.

6.2 Chemical/Contamination

Selected samples of soil were tested in external laboratories for a number of determinands in order to check on any potential site contamination. The determinands were selected by Geotechnics Limited and approved by the Client. The following were analysed:-

Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Zinc
Soil Organic Matter
pH
Soluble Sulphate

Tests were also carried out on selected samples from the earth bund for the Waste Acceptance Criteria (WAC) suite in order to classify these materials for possible off-site disposal.

The results of the chemical analyses are included in Appendix 3.

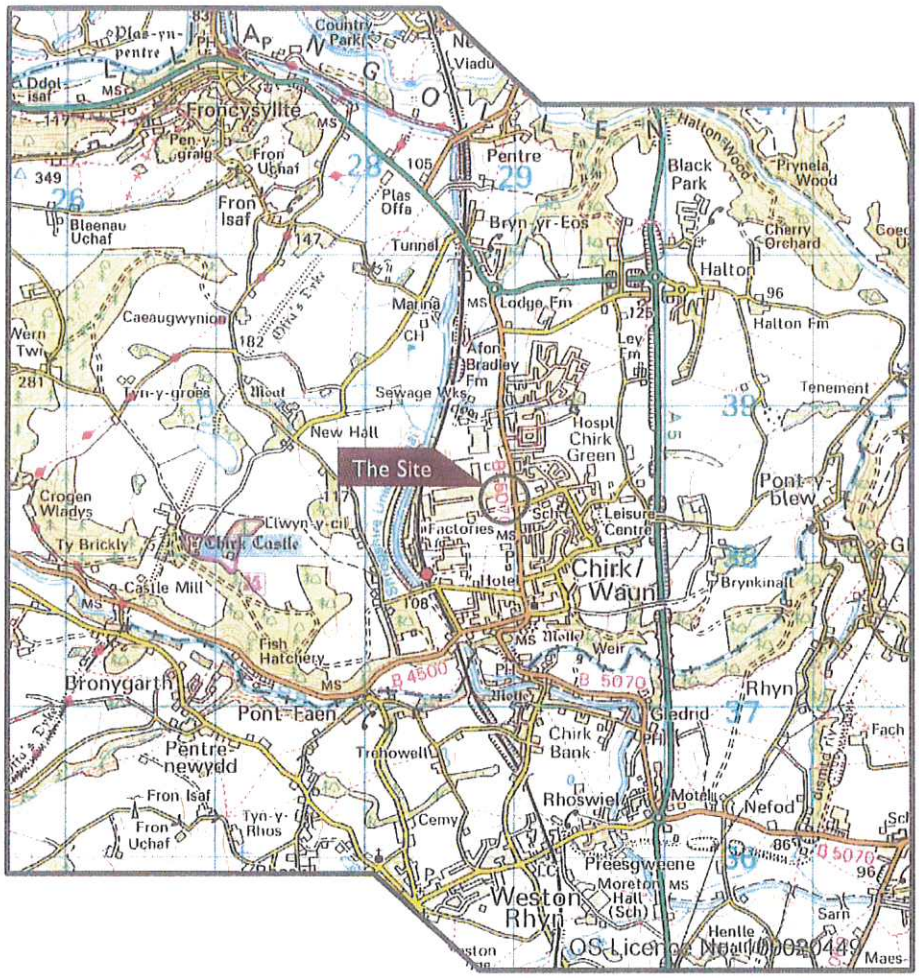
APPENDIX I

SITE LOCATION PLAN

DATA SHEET – Site Location Plan

Project : **PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK**

Project No : **PN071450**



SITE LOCATION PLAN

GEOTECHNICS LIMITED

The Geotechnical Centre

Unit 1, Borders Industrial Estate

River Lane, Saltney, Chester

CH4 8RJ

APPENDIX 2

WINDOW SAMPLE BOREHOLE RECORDS

DATA SHEET - Symbols and Abbreviations used on Records

Samples

B	Bulk disturbed sample
BLK	Block sample
C	Core sample
D	Small disturbed sample (tub/jar)
E	Environmental test sample
ES	Environmental soil sample
EW	Environmental water sample
G	Gas sample
L	Liner sample
P	Piston sample (PF - failed piston sample)
TW	Thin walled push in sample
U -	Open Tube - 102mm diameter with blows to take sample. (UF - failed U sample)
V	Vial sample
W	Water sample

Insitu Testing / Properties

S	Standard Penetration Test (SPT)
C	SPT with cone
VN	Strength from Insitu Vane
HV	Strength from Hand Vane
PP	Strength from Pocket Penetrometer
	(All other strengths from undrained triaxial testing)
w%	Water content
N	SPT Result
-/-	Blows/penetration (mm) after 150mm seating.
-*/-	Total blows/penetration (mm)
( )	Extrapolated value

Rotary Core

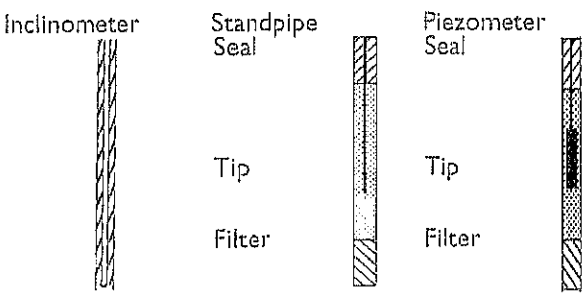
RQD	Rock Quality Designation (% of intact core >100mm)
FRACTURE INDEX	Fractures/metre
FRACTURE SPACING (mm)	Maximum Minimum

Groundwater

Water Strike

Highest recorded standing water level

Instrumentation



Strata

Made Ground Type 1

Type 2

Topsoil

Cobbles and Boulders

Gravel

Sand

Silt

Clay

Peat

Note: Composite soil types shown by combined symbols

Chalk

Limestone

Sandstone

Coal

Mudstone

Siltstone

Metamorphic Rock

Igneous Rock

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK

Engineer KRONOSPAN LTD

Borehole WS 1
Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling			Properties			Strata		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
						CONCRETE	0.25	
						Medium dense brown slightly silty sandy fine to coarse subangular to rounded GRAVEL of various lithologies. Between 0.25-0.70m: No recovery.		
0.80	E							
1.00	D							
1.20- 1.65					C10			
2.00	D					At 2.00m: Becoming loose.		
2.00- 2.45					C7			
2.50	D							
3.00	D							
3.00- 3.45					C9			
4.00	D						4.00	
						End of Borehole		

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
4.00		Windowless Sampler	JJ	G.L. 4.00			14/02/07 14/02/07	08:00 18:00						None encountered during boring.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

Window sampler stopped at 4.00m due to collapse back to 1.70m.
Window Sample Borehole backfilled with arisings/cement-bentonite grout on completion.

Logged by MD

Figure 1 of 1

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
Engineer KRONOSPAN LTD
Borehole WS 2
Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling			Properties			Strata		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
0.20	D					TOPSOIL: Brown slightly sandy slightly gravelly silt with rootlets. Gravel is fine to medium subangular to rounded of various lithologies.	0.20	
0.50	D					Brown-grey slightly silty gravelly fine to coarse SAND. Gravel is fine to medium subangular to rounded of various lithologies.		
0.50	E							
1.00	B							
1.00	D							
1.20- 1.65					C30		1.20	
1.50	B					Medium dense brown slightly silty sandy fine to coarse subangular to rounded GRAVEL of various lithologies.		
2.00- 3.00	B					At 2.00m: Becoming clayey.		
2.00	D							
2.00- 2.45					C15			
2.50	D							
3.00	D							
3.00- 3.45					C14			
4.00	D							
						End of Borehole	4.20	

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
4.20		Windowless Sampler	JJ	G.L. 4.20			14/02/07 14/02/07	08:00 18:00						None encountered during boring.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

Concrete core carried out at an adjacent position on loading yard but abandoned at 0.25m due to the possible presence of a service pipe. WS2 carried out through grass verge at eastern edge of loading yard.
Inspection pit hand excavated to 1.20m depth.
Window sampler stopped at 4.20m due to collapse of hole back to 2.20m.
Window Sample Borehole backfilled with arisings/cement-bentonite grout on completion.

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Figure 1 of 1
16/05/2007

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BOREHOLE RECORD - Cable Percussion

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
Engineer KRONOSPAN LTD
Borehole WS 3
Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling			Properties			Strata		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
0.10	D					TOPSOIL: Brown slightly gravelly slightly sandy silt. Gravel is fine to coarse subangular to subrounded of various lithologies.	0.20	
0.10	E							
0.50	B					Loose brown slightly silty sandy fine to coarse subangular to rounded GRAVEL of various lithologies.		
0.50	D							
0.50	E							
1.00	D							
1.50	B							
2.00	D							
2.00- 2.45					C7	Between 2.20-2.80m: No recovery.		
							2.80	
3.00	D					Soft to firm brown slightly sandy slightly gravelly CLAY with silt partings. Gravel is fine to medium subangular to subrounded of various lithologies. Between 3.20-3.50m: No recovery.		
3.00- 3.45					C7			
							3.50	
3.60	B					Loose brown slightly silty sandy fine to coarse subangular to rounded GRAVEL of various lithologies.		
4.00	D						4.00	
4.00- 4.45					C5	End of Borehole		

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
4.00		Windowless Sampler	JJ	G.L.			14/02/07	08:00						None encountered during boring.
				4.00			14/02/07	18:00						

Remarks

Inspection pit hand excavated to 1.20m depth.
Window sampler stopped due to collapse of hole back to 2.00m.
Window Sample Borehole backfilled with arisings/cement-bentonite grout on completion.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

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Figure 1 of 1

15/05/2007

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
Engineer KRONOSPAN LTD
Borehole WS 4
Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling			Properties			Strata		
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
0.20	D					MADE GROUND: Brown slightly gravelly slightly sandy silt.	0.20	
0.50 0.50	D E					Grey slightly silty gravelly fine to coarse SAND. Gravel is fine to medium subangular to rounded of various lithologies.		
1.00	D							
1.20- 2.20 1.20- 1.65	B				C31	Medium dense brown slightly silty sandy fine to coarse subangular to rounded GRAVEL of various lithologies.	1.20	
2.00 2.00- 2.45	D				C18	Between 2.20-2.50m: No recovery.		
2.50- 3.20	B					At 2.50m: Becoming clayey.		
3.00- 3.45					C9	Between 3.00-3.45m: Locally loose.		
3.20- 4.00	B							
4.00 4.00- 4.45	D				C10	End of Borehole	4.00	

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
4.00		Windowless Sampler	JJ	G.L. 4.00			14/02/07 14/02/07	08:00 18:00						None encountered during boring.

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

Inspection pit hand excavated to 1.20m depth.
Window sampler stopped due to collapse of hole back to 1.20m.
Window Sample Borehole backfilled with arisings/cement-bentonite grout on completion.

Logged by MD

Figure 1 of 1

15/05/2007

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
Engineer KRONOSPAN LTD
Borehole WS 5
Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling			Properties			Strata		
Depth	Sample Type	Depth Cased & Into Water	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
0.50	B					MADE GROUND: Brown slightly sandy gravelly silt. Gravel is fine to coarse subangular to rounded of various lithologies including brick.		
1.00	D						1.00	
1.20- 1.65					C11	MADE GROUND: Firm brown mottled red slightly sandy slightly gravelly silt. Gravel is fine to coarse subangular to rounded of various lithologies including coal and brick.		
1.50	E							
2.00- 3.00	B							
2.00	D							
2.00- 2.45					C14			
2.50	E							
3.00- 4.00	B							
3.00	D							
3.00- 3.45					C16			
3.50	E							
3.80	D							
4.00	D					At 4.00m: Becoming stiff.		
4.00- 4.45					C35			
4.50	E							
5.00	D						5.00	
5.00- 5.38					C50/ 230	End of Borehole		

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	In Mins	Depth Sealed	Remarks on Groundwater
0.00		Windowless Sampler	JJ	G.L. 5.00			19/02/07 19/02/07	08:00 18:00						None encountered during boring.

Remarks

Inspection pit hand excavated to 1.20m depth.
Window Sample Borehole backfilled with arisings on completion.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

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Figure 1 of 1

15/05/2007

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK
Engineer KRONOSPAN LTD
Borehole WS 6
Project No PN071450

Client KRONOSPAN LTD

Sampling			Properties			Strata	Scale 1:50	
Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT	Description	Depth	Legend
							G.L.	
0.50	B					MADE GROUND: Firm brown slightly sandy slightly gravelly silt. Gravel is fine to coarse subangular to rounded of various lithologies including brick.		
						Between 1.00-1.80m: No recovery.		
1.20- 1.65					C10			
1.80	D							
2.00- 2.45					C13	Between 2.00-3.00m: No recovery.		
3.00- 3.45					C6	Between 3.00-3.40m: No recovery. At 3.00m: Becoming soft.		
							3.40	
3.50	D					MADE GROUND: Firm to stiff brown slightly sandy slightly gravelly clay/silt. Gravel is fine angular to subrounded of various lithologies including wood.		
4.00	E							
4.00- 4.45					C16			
4.30- 5.00	D							
5.00- 5.45					C28			
5.70- 6.01					C50/ 160	End of Borehole	5.70	

Boring				Progress					Groundwater					
Depth	Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.00		Windowless Sampler	JJ	G.L. 5.70			19/02/07 19/02/07	08:00 18:00						None encountered during boring.

Remarks
Inspection pit hand excavated to 1.20m depth.
Window Sample Borehole backfilled with arisings on completion.

Symbols and abbreviations are explained on the accompanying key sheet.
All dimensions

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Figure 1 of 1
15/05/2007

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BOREHOLE RECORD - Window Sampling

Project PROPOSED WAREHOUSE EXTENSION, KRONOSPAN, CHIRK | Engineer KRONOSPAN LTD | Borehole WS 7 | Project No PN071450

Client KRONOSPAN LTD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT	Strata Description	Depth	Legend
							G.L.	
0.50	B					MADE GROUND: Brown slightly sandy slightly gravelly silt. Gravel is fine to coarse subangular to rounded of various lithologies. Occasional cobbles present.		
1.00	D						1.00	
1.20- 1.65					C15	MADE GROUND: Firm brown slightly sandy gravelly clay/silt. Gravel is fine to coarse subangular to subrounded of various lithologies and brick.		
1.50	E							
2.00- 3.00	B					At 2.00m: Becoming mottled grey.		
2.00	D							
2.00- 2.45					C19			
2.50	E					At 2.50m: Becoming soft with wood material.		
3.00- 4.00	B					At 3.00m: Becoming firm.		
3.00	D							
3.00- 3.45					C18			
3.50	E							
4.00	D							
4.00- 4.45					C23			
4.50	E					At 4.50m: Occasional coal traces.		
5.00	D					Between 5.00-5.30m: No recovery.		
5.00- 5.45					C19			
5.40	E						5.50	
						Stiff brown slightly sandy SILT. At 5.50m: Becoming light brown.		
6.00	D							
6.00- 6.45					C36			
							6.70	
7.00- 7.45					C39	Dense grey slightly silty fine to coarse SAND.	7.00	
						End of Borehole		

Boring

Depth	Dia	Technique	Crew
0.00		Windowless Sampler	JJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			19/02/07	08:00
7.00			19/02/07	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered during boring.

Remarks

Inspection pit hand excavated to 1.20m depth.
Window Sample Borehole backfilled with arisings on completion.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions

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Figure 1 of 1

15/05/2007

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APPENDIX 3

LABORATORY TESTING - CHEMICAL/CONTAMINATION

ALcontrol Geochem

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: mkt@alcontrol.co.uk
website: www.alcontrol.co.uk

Geotechnics Ltd
The Geotechnical Centre
Unit 1
Borders Industrial Estate
River Lane
Saltney, Chester
CH4 8RJ ATTN: Mark Davies

CERTIFICATE OF ANALYSIS

Date:	12 March, 2007
Our Reference:	07/03610/02/01
Your Reference:	PNO 71450
Location:	KRONOSPAN 2

A total of 10 samples was received for analysis on Monday, 26 February 2007 and completed on Thursday, 08 March 2007. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

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

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

Signed

Diane Whittlestone	**Jane Seymour**	**David O'Hare**	**Caroline Suttie**
Customer Services	Customer Services	Customer Services	Customer Services

Valid if signed by any of the above signatories.

Compiled By

David O'Hare

MCERTS
UKAS TESTING
1291
GROUP

ALcontrol Geochem
TEST SCHEDULE

JOB NUMBER : 07/3610/02
CLIENT : Geotechnics Ltd
CONTACT : Mark Davies
DATE OF RECEIPT : 26/02/07
LOCATION : KRONOSPAN 2

BATCH NUMBER : 1
CLIENT REF/CODE : PNO 71450
ORDER NUMBER :
TURNAROUND : 8 days

Numeric values indicate additional scheduling

* indicates test subcontracted

Sample Number	Sample Identity	P / V	Depth	Sample Type	UKAS Accredited ?	✓	✓	✓	✓	✓	✓		✓	✓			✓													
						Metals ICP, 9 (S)	pH (S)	Soil Organic Matter (S)	Sulphate Soluble Kone BRE 2:1 (S)	TOC (S)	pH (S)	PCB 7 Congeners (S)	GRO BTEX MTBE GC (S)	Mineral Oil C10-40 (S)	Acid Neutralising Capacity (S)	PAH Total 17 GC-EZ (S)	Loss on Ignition (S)	CEN Leach 2:1	CEN Leach 8:1	Metals ICP-MS 9 (CEN 2:1)	Metals ICP-MS 9 (CEN 8:1)	Metals ICP-MS 9 (CEN 10:1C)	Barium (CEN 2:1) (ICP-MS)	Barium (CEN 8:1) (ICP-MS)	Barium (CEN 10:1C) (ICP-MS)	Molybdenum (CEN 2:1) (ICP-MS)	Molybdenum (CEN 8:1) (ICP-MS)	Molybdenum (CEN 10:1C) (ICP-MS)	Mercury (CEN 2:1) (CVAA)
1	WS 2	JAR 250g	0.50	SOLID		X	X	X	X																					
2	WS 5	BAG	3.50	SOLID																										
3	WS 5	JAR 250g	3.50	SOLID						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	WS 5	1KGTub	4.00	SOLID																										
5	WS 5	JAR 250g	4.50	SOLID		X	X	X	X																					
6	WS 6	1KGTub	4.30-5.00	SOLID																										
7	WS 6	JAR 250g	4.30-5.00	SOLID		X	X	X	X																					
8	WS 7	BAG	2.50	SOLID																										
9	WS 7	JAR 250g	2.50	SOLID						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	WS 7	1KGTub	6.00	SOLID		X	X	X	X																					
					Total Number of Tests	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Printed : 12/03/07 10:01:09

ALcontrol Geochem
TEST SCHEDULE

JOB NUMBER : 07/3610/02
CLIENT : Geotechnics Ltd
CONTACT : Mark Davies
DATE OF RECEIPT : 26/02/07
LOCATION : KRONOSPAN 2

BATCH NUMBER : 1
CLIENT REF/CODE : PNO 71450
ORDER NUMBER :
TURNAROUND : 8 days

Numeric values indicate additional scheduling

* indicates test subcontracted

Sample Number	Sample Identity	UKAS Accredited ? P / V	Depth	Sample Type	Mercury (CEN 8:1) (CVAAA)	Mercury (CEN 10:1C) (CVAAA)	Antimony (CEN 2:1) (ICP-MS)	Antimony (CEN 8:1) (ICP-MS)	Antimony (CEN 10:1C) (ICP-MS)	Chloride Kone (CEN 2:1)	Chloride Kone (CEN 8:1)	Chloride Kone (CEN 10:1C)	Fluoride Kone (CEN 2:1)	Fluoride Kone (CEN 8:1)	Fluoride Kone (CEN 10:1C)	Sulphate Kone (CEN 2:1)	Sulphate Kone (CEN 8:1)	Sulphate Kone (CEN 10:1C)	Phenols HPLC (CEN 2:1)	Phenols HPLC (CEN 8:1)	Phenols HPLC (CEN 10:1C)	DOC (CEN 2:1)	DOC (CEN 8:1)	DOC (CEN 10:1C)	TDS (CEN 2:1)	TDS (CEN 8:1)	TDS (CEN 10:1C)	
1	WS 2	JAR 250g	0.50	SOLID																								
2	WS 5	BAG	3.50	SOLID	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	WS 5	JAR 250g	3.50	SOLID																								
4	WS 5	1KGTub	4.00	SOLID																								
5	WS 5	JAR 250g	4.50	SOLID																								
6	WS 6	1KGTub	4.30-5.00	SOLID																								
7	WS 6	JAR 250g	4.30-5.00	SOLID																								
8	WS 7	BAG	2.50	SOLID	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	WS 7	JAR 250g	2.50	SOLID																								
10	WS 7	1KGTub	6.00	SOLID																								
	Total Number of Tests				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	

Printed : 12/03/07 10:01:09

ALcontrol Geochem Analytical Services
Sample Descriptions

Job Number: 07/03610/02/01
Client: Geotechnics Ltd
Client Ref : PNO 71450

Grain sizes

<0.063mm	Very Fine
0.1mm - 0.063mm	Fine
0.1mm - 2mm	Medium
2mm - 10mm	Coarse
>10mm	Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
WS 2	0.50	Brown	<0.063mm	Sandy Clay with some Stones	1
WS 5	3.50	Brown	<0.063mm	Clay with some Stones	1
WS 5	4.50	Brown	<0.063mm	Clay with some Stones	1
WS 6	4.30-5.00	Brown	<0.063mm	Clay with some Stones	1
WS 7	2.50	Brown	<0.063mm	Clay with some Stones	1
WS 7	6.00	Brown	<0.063mm	Clay with some Stones	1

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

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

Validated ✓
Preliminary

ALcontrol Geochem Analytical Services
Table Of Results

ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/03610/02/01 **Matrix:** SOLID
Client: Geotechnics Ltd **Location:** KRONOSPAN 2
Client Ref. No.: PNO 71450 **Client Contact:** Mark Davies

Sample Identity	WS 2	WS 5	WS 5	WS 6	WS 7	WS 7				Method Code	LoD/Units
Depth (m)	0.50	3.50	4.50	4.30-5.00	2.50	6.00					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07					
Sample Received Date	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07					
Batch	1	1	1	1	1	1					
Sample Number(s)	1	2-3	5	6-7	8-9	10					
Arsenic	<3	-	15	3	-	<3				TM129#M	<3.0 mg/kg
Cadmium	<0.3	-	<0.3	<0.3	-	<0.3				TM129	<0.3 mg/kg
Chromium	8.0	-	28	12	-	14				TM129*M	<4.5 mg/kg
Copper	20	-	6	28	-	19				TM129#M	<6 mg/kg
Lead	14	-	16	57	-	23				TM129#M	<2 mg/kg
Mercury	<0.6	-	<0.6	<0.6	-	<0.6				TM129#M	<0.6 mg/kg
Nickel	28	-	26	24	-	28				TM129#M	<0.9 mg/kg
Selenium	<3	-	<3	<3	-	<3				TM129#M	<3 mg/kg
Zinc	100	-	78	130	-	96				TM129#M	<2.5 mg/kg
ANC at pH4	-	<0.03	-	-	<0.03	-				TM159	<0.03 mol H+/kg
ANC at pH7	-	<0.03	-	-	<0.03	-				TM159	<0.03 mol H+/kg
Soil Organic Matter	<0.35	-	1.2	2.0	-	<0.35				TM050#	<0.35 %
Total Organic Carbon	-	0.6	-	-	1.9	-				TM050#	<0.2 %
Loss on Ignition	-	3.1	-	-	8.6	-				TM018#M	<0.3 %
pH Value	7.97	7.79	7.72	7.58	7.81	7.99				TM133#M	<1.00 pH Units
Soluble Sulphate 2:1 Extract as SO4 BRE	0.012	-	0.025	0.039	-	<0.003				TM098#	<0.003 g/l
Mineral Oil	-	45	-	-	300	-				TM061#	<1 mg/kg
GRO (C4-C10)	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
GRO (C10-C12)	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
Benzene	-	<10	-	-	<10	-				TM089*M	<10 ug/kg
Toluene	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
Ethyl benzene	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
m & p Xylene	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
o Xylene	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
Sum m&p and o Xylene	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
Sum of BTEX	-	<10	-	-	<10	-				TM089#M	<10 ug/kg
MTBE	-	<10	-	-	<10	-				TM089#	<10 ug/kg
PAH Total 17 (inc Coronene)	-	<10	-	-	<10	-				TM154	<10 mg/kg
PCB 7 Congeners											
PCB congener 28	-	<1	-	-	<1	-				TM070	<1 ug/kg

All results expressed on a dry weight basis.

Date 12.03.2007

Validated ☑
Preliminary ☐

ALcontrol Geochem Analytical Services
Table Of Results

\# ISO 17025 accredited
M MCERTS accredited
* Subcontracted test
» Shown on prev. report

Job Number: 07/03610/02/01 **Matrix:** SOLID
Client: Geotechnics Ltd **Location:** KRONOSPAN 2
Client Ref. No.: PNO 71450 **Client Contact:** Mark Davies

Sample Identity	WS 2	WS 5	WS 5	WS 6	WS 7	WS 7				Method Code	Lod/Units
Depth (m)	0.50	3.50	4.50	4.30-5.00	2.50	6.00					
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID					
Sampled Date	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07					
Sample Received Date	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07	26.02.07					
Batch	1	1	1	1	1	1					
Sample Number(s)	1	2-3	5	6-7	8-9	10					
PCB 7 Congeners (cont)											
PCB congener 52	-	<1	-	-	<1	-				TM070	<1 ug/kg
PCB congener 101	-	<1	-	-	<1	-				TM070	<1 ug/kg
PCB congener 118	-	<1	-	-	<1	-				TM070	<1 ug/kg
PCB congener 153	-	<1	-	-	<1	-				TM070	<1 ug/kg
PCB congener 138	-	<1	-	-	<1	-				TM070	<1 ug/kg
PCB congener 180	-	<1	-	-	<1	-				TM070	<1 ug/kg
Total of 7 Congener PCBs	-	<1	-	-	<1	-				TM070	<1 ug/kg

All results expressed on a dry weight basis.

Date 12.03.2007

ALcontrol Geochem Analytical Services

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

AC ANALYTICAL RESULTS

REF:CEN12457-3

Mass Sample taken (kg) =	0.20329	Moisture Content Ratio (%) =	16.27
Mass of dry sample (kg) =	0.175	Dry Matter Content Ratio (%) =	86.01
Particle Size <4mm =	>95%		

Job Number	**200703610**
Batch	**1**
Sample Number(s)	**2-3**
Sampled Date	**26/02/07**
Sample Identity	**WS 5**
Depth (m)	**3.50**

Solid Waste Analysis

Total Organic Carbon (%)	0.6
Loss on Ignition (%)	3.1
. of BTEX (mg/kg)	<0.01
Sum of 7 PCBs (mg/kg)	<0.001
Mineral Oil (mg/kg)	45
PAH Sum of 17(mg/kg)	<10
pH (pH Units)	7.72
ANC to pH 7 (mol/kg)	<0.03
ANC to pH 4 (mol/kg)	<0.03

Eluate Analysis	Conc^n in 2:1 eluate	Conc^n in 8:1 eluate	2:1 conc^n leached	Cumulative conc^n leached
	C_2	C_8	A_2	$A_{2\text{-}10}$
	mg/l		mg/kg	
Arsenic	<0.001	0.003	<0.002	0.03
Barium	0.020	0.005	0.04	0.07
Cadmium	<0.0004	<0.0004	<0.0008	<0.004
Chromium	<0.001	<0.001	<0.002	<0.01
Copper	0.001	0.007	<0.002	0.06
Mercury	<0.00005	<0.00005	<0.0001	<0.0005
Molybdenum	0.010	0.003	0.02	0.04
Nickel	<0.001	<0.001	<0.002	<0.01
Lead	<0.001	<0.001	<0.002	<0.01
mony	<0.005	<0.005	<0.01	<0.05
Selenium	<0.001	0.007	<0.002	0.06
Zinc	<0.003	<0.003	<0.006	<0.03
Chloride	3	<1	6	<10
Fluoride	<0.5	<0.5	<1	<5
Sulphate as SO_4	27	4	54	74
Total Dissolved Solids	150	71	300	830
Phenols Monohydric	<0.01	<0.01	<0.02	<0.1
Dissolved Organic Carbon	15	5	30	65

Leach Test Information

Date Prepared	28/02/07	03/03/07
pH (pH Units)	8.00	8.3
Conductivity (µS/cm)	340	140
Temperature (°C)	19.6	19.6
Volume Leachant (Litres)	0.322	1.4
Volume of Eluate VE1 (Litres)	0.26	

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

Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepencies with current legislation

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
6	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	to be evaluated	to be evaluated
-	to be evaluated	to be evaluated

Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg

0.5	2	25
20	100	300
0.04	1	5
0.5	10	70
2	50	100
0.01	0.2	2
0.5	10	30
0.4	10	40
0.5	10	50
0.06	0.7	5
0.1	0.5	7
4	50	200
800	15000	25000
10	150	500
1000	20000	50000
4000	60000	100000
1	-	-
500	800	1000

ALcontrol Geochem Analytical Services

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

AC ANALYTICAL RESULTS — REF:CEN12457-3

Mass Sample taken (kg) =	0.21024	Moisture Content Ratio (%) =	19.77
Mass of dry sample (kg) =	0.175	Dry Matter Content Ratio (%) =	83.49
Particle Size <4mm =	>95%		

Job Number	200703610
Batch	1
Sample Number(s)	8-9
Sampled Date	26/02/07
Sample Identity	WS 7
Depth (m)	2.50

Solid Waste Analysis		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	1.9	3	5	6
Loss on Ignition (%)	8.6	-	-	10
Sum of BTEX (mg/kg)	<0.01	6	-	-
Sum of 7 PCBs (mg/kg)	<0.001	1	-	-
Mineral Oil (mg/kg)	300	500	-	-
PAH Sum of 17(mg/kg)	<10	100	-	-
pH (pH Units)	7.99	-	>6	-
ANC to pH 7 (mol/kg)	<0.03	-	to be evaluated	to be evaluated
ANC to pH 4 (mol/kg)	<0.03	-	to be evaluated	to be evaluated

Eluate Analysis	Conc^n in 2:1 eluate	Conc^n in 8:1 eluate	2:1 conc^n leached	Cumulative conc^n leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	C_2	C_8	A_2	A_{2-10}			
	mg/l		mg/kg				
Arsenic	0.003	0.002	0.01	0.02	0.5	2	25
Barium	0.064	0.016	0.13	0.22	20	100	300
Cadmium	<0.0004	<0.0004	<0.0008	<0.004	0.04	1	5
Chromium	<0.001	<0.001	<0.002	<0.01	0.5	10	70
Copper	<0.001	0.002	<0.002	0.02	2	50	100
Mercury	<0.00005	<0.00005	<0.0001	<0.0005	0.01	0.2	2
Molybdenum	0.013	0.006	0.03	0.07	0.5	10	30
Nickel	0.003	0.003	0.01	0.03	0.4	10	40
Lead	<0.001	<0.001	<0.002	<0.01	0.5	10	50
Antimony	<0.005	<0.005	<0.01	<0.05	0.06	0.7	5
Selenium	0.003	0.003	0.01	0.03	0.1	0.5	7
Zinc	<0.003	<0.003	<0.006	<0.03	4	50	200
Chloride	4	<1	8	<10	800	15000	25000
Fluoride	0.8	0.8	2	8	10	150	500
Sulphate as SO_4	6	<3	12	<30	1000	20000	50000
Total Dissolved Solids	160	75	320	860	4000	60000	100000
Phenols Monohydric	<0.01	<0.01	<0.02	<0.1	1	-	-
Dissolved Organic Carbon	29	10	58	130	500	800	1000

Leach Test Information		
Date Prepared	28/02/07	03/03/07
pH (pH Units)	8.20	8.3
Conductivity (µS/cm)	350	140
Temperature (°C)	20.0	19.5
Volume Leachant (Litres)	0.315	1.4
Volume of Eluate VE1 (Litres)	0.23	

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

Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepencies with current legislation

ALcontrol Geochem Analytical Services

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

'AC ANALYTICAL RESULTS REF:CEN12457-3

Mass Sample taken (kg) =	0.20329	Moisture Content Ratio (%) =	16.27
Mass of dry sample (kg) =	0.175	Dry Matter Content Ratio (%) =	86.01
Particle Size <4mm =	>95%		

Job Number	200703610
Batch	1
Sample Number(s)	2-3
Sampled Date	26/02/07
Sample Identity	WS 5
Depth (m)	3.50

Solid Waste Analysis	
Total Organic Carbon (%)	-
Loss on Ignition (%)	-
n of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	-
Mineral Oil (mg/kg)	-
PAH Sum of 17(mg/kg)	-
pH (pH Units)	-
ANC to pH 7 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Landfill Waste Acceptance Criteria Limits		
Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Eluate Analysis	Conc^n in 2:1 eluate	Conc^n in 8:1 eluate	2:1 conc^n leached	Cumulative conc^n leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	C_2	C_8	A_2	$A_{2\text{-}10}$			
	mg/l		mg/kg				
Boron Dissolved (CEN 10:1C) (ICP-MS)	0.01	0.15	<0.02	1.3	-	-	-
					-	-	-
					-	-	-
					-	-	-
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					-	-	-

Leach Test Information		
Date Prepared	28/02/07	03/03/07
pH (pH Units)	8.00	8.3
Conductivity (µS/cm)	340	140
Temperature (°C)	19.6	19.6
Volume Leachant (Litres)	0.322	1.4
Volume of Eluate VE1 (Litres)	0.26	

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

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Supplemental Report

ALcontrol Geochem Analytical Services

CEN 10:1 CUMULATIVE TWO STAGE BATCH TEST

AC ANALYTICAL RESULTS REF:CEN12457-3

Mass Sample taken (kg) =	0.21024	Moisture Content Ratio (%) =	19.77
Mass of dry sample (kg) =	0.175	Dry Matter Content Ratio (%) =	83.49
Particle Size <4mm =	>95%		

Job Number	200703610
Batch	1
Sample Number(s)	8-9
Sampled Date	26/02/07
Sample Identity	WS 7
Depth (m)	2.50

Solid Waste Analysis		Landfill Waste Acceptance Criteria Limits		
		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	-	-	-	-
Loss on Ignition (%)	-	-	-	-
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	-	-	-	-
Mineral Oil (mg/kg)	-	-	-	-
PAH Sum of 17(mg/kg)	-	-	-	-
pH (pH Units)	-	-	-	-
ANC to pH 7 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	Conc^{n} in 2:1 eluate	Conc^{n} in 8:1 eluate	2:1 conc^{n} leached	Cumulative conc^{n} leached	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	C_2	C_8	A_2	$A_{2\text{-}10}$			
	mg/l		mg/kg				
Boron Dissolved (CEN 10:1C) (ICP-MS)	<0.01	0.10	<0.02	0.9	-	-	-
					-	-	-
					-	-	-
					-	-	-
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					-	-	-
					-	-	-

Leach Test Information		
Date Prepared	28/02/07	03/03/07
pH (pH Units)	8.20	8.3
Conductivity (µS/cm)	350	140
Temperature (°C)	20.0	19.5
Volume Leachant (Litres)	0.315	1.4
Volume of Eluate VE1 (Litres)	0.23	

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

Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepencies with current legislation

Supplemental Report

ALcontrol Geochem Analytical Services
Table Of Results - Appendix

Job Number: 07/03610/02/01
Client: Geotechnics Ltd
Client Ref. No.: PNO 71450

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03×10^{-7}

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample [1]	Surrogate Corrected
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition	✓	✓	WET	
TM050	Method 5310B, AWWA/APHA, 20th Ed., 1999 / DIN EN 13137	Total Organic Carbon determination by combustion method	✓		DRY	
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)	✓		DRY	
TM062	MEWAM BOOK 124 1988.HMSO/ Method 17.7, Second Site property, March 2003	Determination of Phenolic compounds by HPLC with electro-chemical detection			NA	
TM070	Modified: US EPA Method 8250 & 625	Determination of Total Polychlorinated Biphenyls (PCB's) as Aroclor 1254 and the ICE 7 Congeners by GC-MS			DRY	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓		WET	
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	✓	✓	WET	
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			NA	
TM097	Modified: US EPA Method 325.1 & 325.2	Determination of Chloride using the Kone Analyser			NA	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser			NA	
TM098	Method 4500E, AWWA/APHA, 20th Ed., 1999	Determination of Sulphate using the Kone Analyser	✓		DRY	
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser			NA	
TM123	BS 2690: Part 121:1981	The Determination of Total dissolved Solids in Water			NA	
TM127	Method 3112B, AWWA/APHA, 20th Ed., 1999	The Determination of Trace Level Mercury in Aqueous Media and Soil Extracts by Atomic Absorption Spectroscopy			NA	

[1] Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. NA = not applicable.

ALcontrol Geochem Analytical Services
Table Of Results - Appendix

Job Number: 07/03610/02/01
Client: Geotechnics Ltd
Client Ref. No.: PNO 71450

Report Key :

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03×10^{-7}

NDP	No Determination Possible	*	Subcontracted test
NFD	No Fibres Detected	»	Result previously reported (Incremental reports only)
#	ISO 17025 accredited	M	MCERTS Accredited
PFD	Possible Fibres Detected	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample [1]	Surrogate Corrected
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer			DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓	✓	DRY	
TM133	BS 1377: Part 3 1990	Determination of pH in Soil and Water using the GLpH pH Meter	✓	✓	WET	
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS			NA	
TM154	In - house Method	Determination of Petroleum Hydrocarbons by EZ Flash GC-FID in the Carbon range C6- C40			WET	
TM159	EANEN 7371:2004 (Dutch translated EA method) version 1.0	Determination of the Acid Neutralisation Capacity			WET	

[1] Applies to Solid samples only. **DRY** indicates samples have been dried at 35°C. NA = not applicable.

ALcontrol Geochem Analytical Services
Table Of Results - Appendix

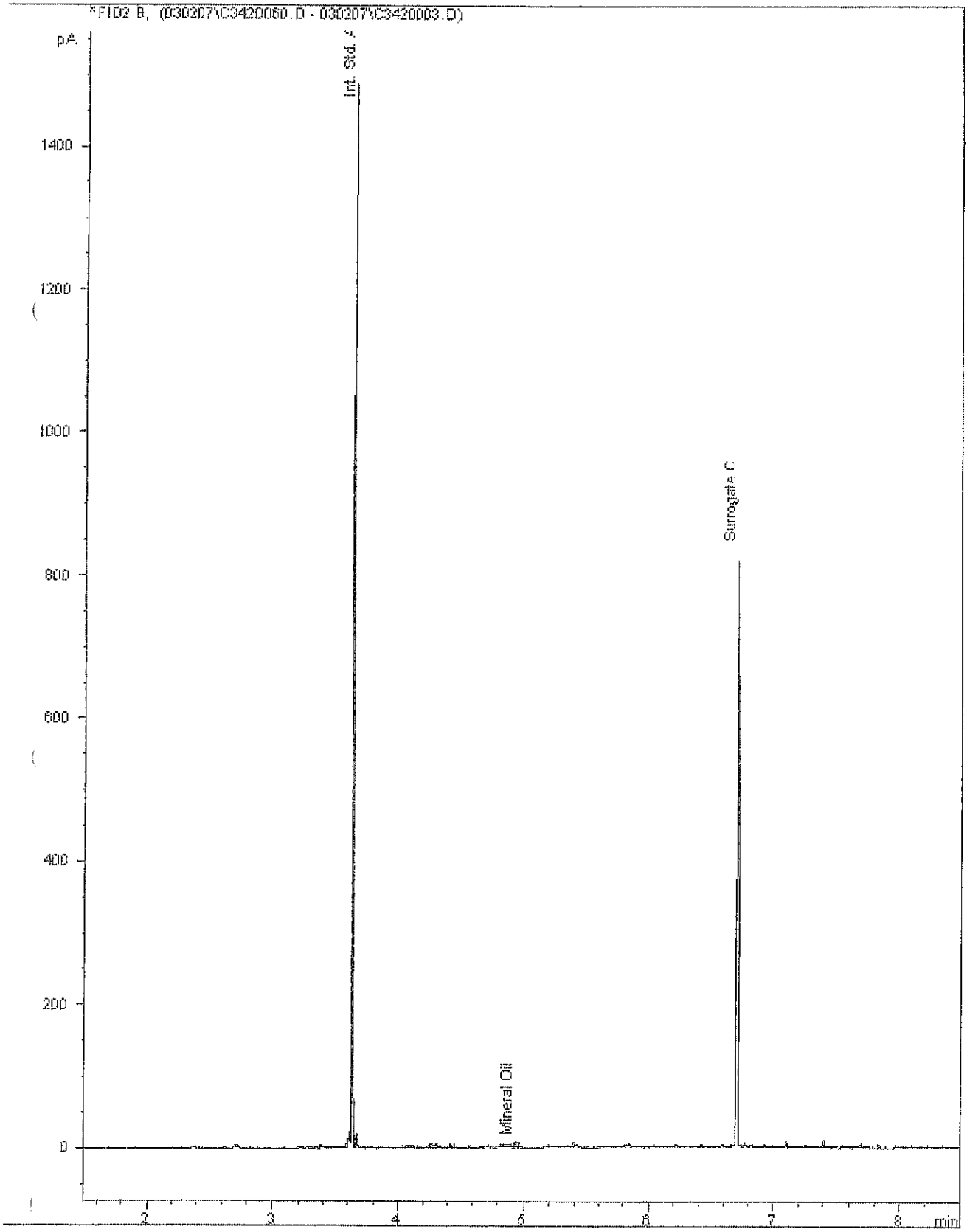
Job Number: 07/03610/02/01
Client: Geotechnics Ltd
Client Ref. No.: PNO 71450

Summary of Coolbox temperatures

Batch No.	Coolbox Temperature (°C)
1	14

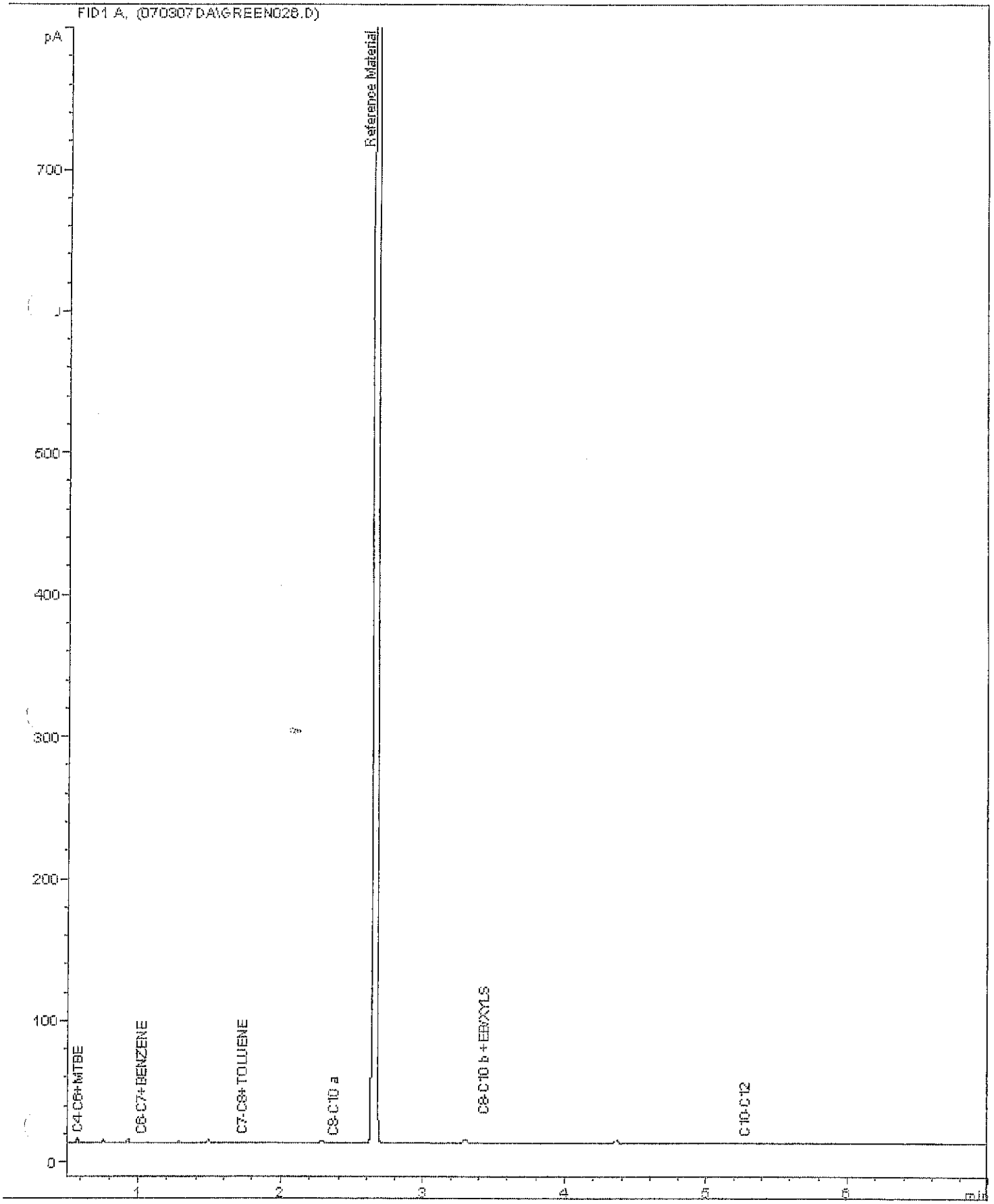
Alcontrol/Geochem Analytical Services
Mineral Oil Range Organics (C10 - C40)

Sample Identity	:	200703610-3/s
Date Acquired	:	05/03/07 14:53:06 PM
Units	:	mg/kg
Sample Multiplier	:	1.002
Dilution	:	



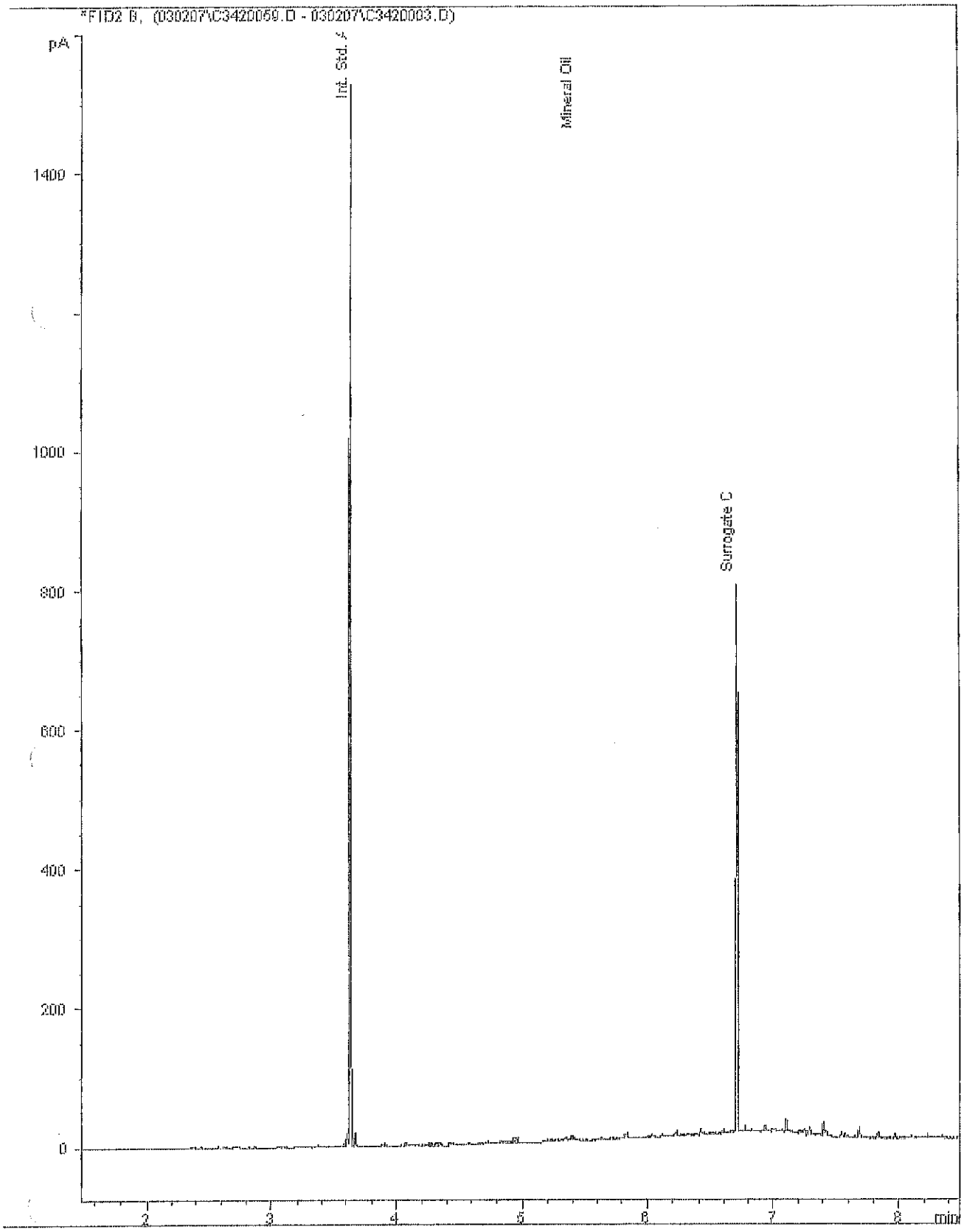
ALcontrol Geochem Analytical Services
Gasoline Range Organics

Sample Identity : 200703610-3/S
Date Acquired : 07/03/07 18:07:47 PM
Units : ppb
Dilution : 1



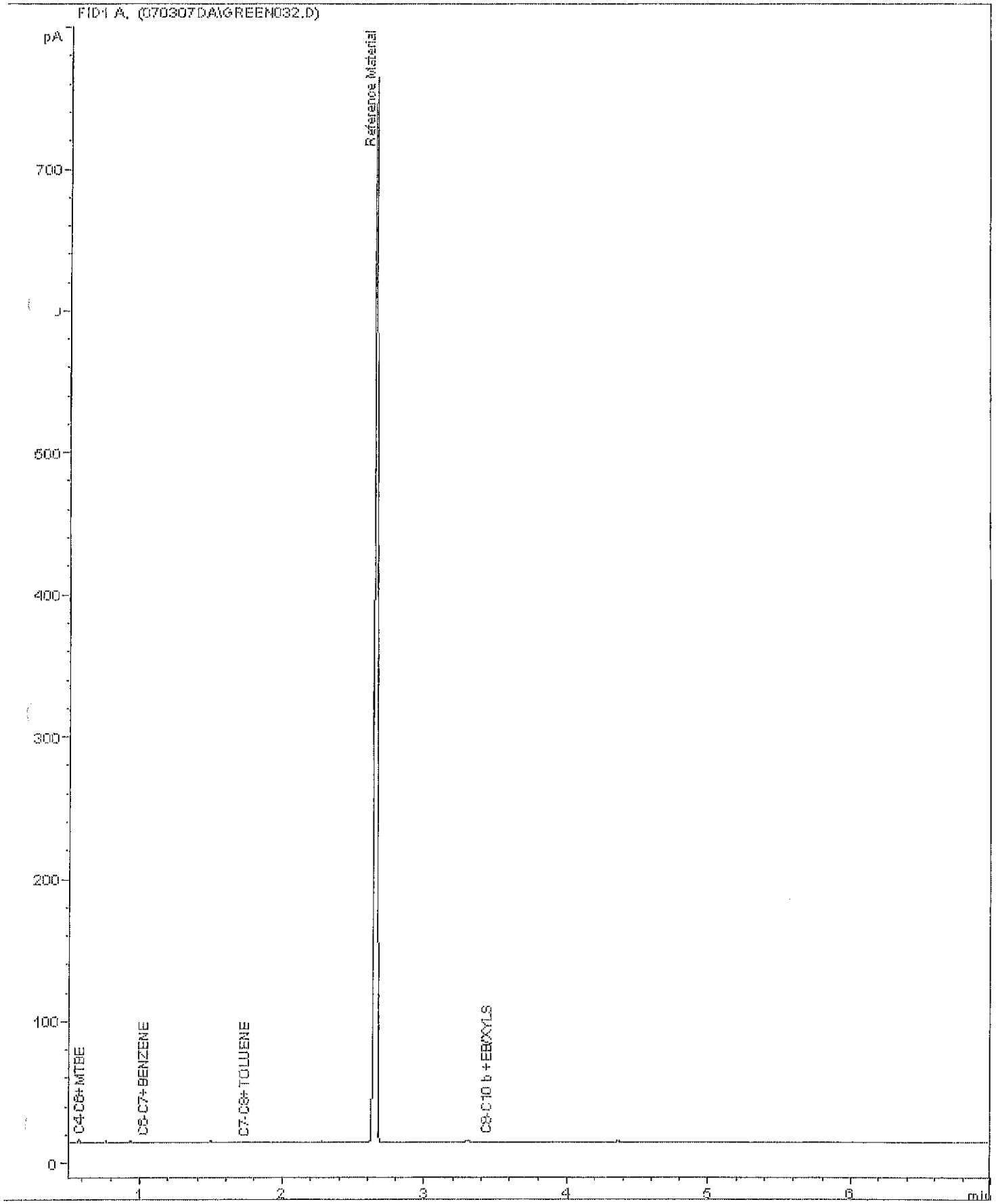
Alcontrol/Geochem Analytical Services
Mineral Oil Range Organics (C10 - C40)

Sample Identity	:	200703610-9/s
Date Acquired	:	05/03/07 14:31:18 PM
Units	:	mg/kg
Sample Multiplier	:	1.001
Dilution	:	



ALcontrol Geochem Analytical Services
Gasoline Range Organics

Sample Identity : 200703610-9/S
Date Acquired : 07/03/07 19:32:13 PM
Units : ppb
Dilution : 1



APPENDIX

APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:
   NRA Leach tests, flash point, ammonium as NH_4 by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS 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 one month after analysis is completed (e-mailed) for both soil jars and tubs. All waters, volatile jars and vials will be discarded after one month 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. ALcontrol Geochem 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, an asbestos screen is done in-house on soils and if no fibres are found will be reported as NFD – no fibres detected. If asbestos is detected, then identification is carried out by ALcontrol Shuttler. If a sample is suspected of containing asbestos, then further preparation and analysis will be suspended on that sample until the asbestos result is known. If asbestos is present, then no further analysis will be undertaken.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. NDP – No determination possible due to insufficient/unsuitable sample.
9. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
10. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
11. **Surrogate recoveries** – Currently the only analyses, which are surrogate corrected, are EPH and PAHs on soils.
12. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
13. 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 Dimethyphenol, 3,5 Dimethylphenol).
14. Total of 8 speciated phenols by HPLC includes Resorcinol, Catechol, Phenol, Napthol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, cresols and xylenols (as detailed in 13).
15. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
16. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
17. 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.
18. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
19. 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.
20. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

MCERTS

1. 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.

2. It should be noted that for a particular set of data some of the data may not always meet the precision and bias criteria as prescribed by MCERTS. This is because whilst criteria were met when the method was originally validated, specific criteria for ongoing AQC were not set by the Environment Agency, so that the point of reference becomes the criteria used for the original validation. The precision and bias data for the certified reference material (CRM), used in the method may itself fall outside these criteria and as a result the samples associated with the batch in question do not strictly meet the MCERTS criteria. This issue is common to all UK laboratories although in practice this is not always reported as such. However in the interest of maintaining strict conformance with both MCERTS and UKAS ISO17025 such data are flagged by Alcontrol as not claiming MCERTS, but still meets the requirements of ISO17025. This should not detract from the usability of such data in terms of their application to the existing project.

Table 1 - Performance characteristics (metals and organometallics)	UKAS	MCERTS
Antimony	yes	yes
Arsenic	yes	yes
Barium	yes	yes
Beryllium	yes	yes
Boron (water soluble)	yes	yes
Cadmium	yes	yes
Cobalt	yes	yes
Copper	yes	yes
Chromium	yes	yes
Iron	yes	yes
Lead	yes	yes
Manganese	yes	yes
Mercury	yes	yes
Molybdenum	yes	yes
Nickel	yes	yes
Organolead compounds	no	no
Organotin compounds	no	no
Selenium	yes	yes
Thallium	yes	p
Vanadium	yes	yes
Zinc	yes	yes

Table 2 - Performance characteristics (inorganics)	UKAS	MCERTS
Easily liberated cyanide	yes	yes
Complex cyanide	yes	yes
pH	yes	yes
LOI	yes	yes
Sulphide	yes	p
Sulphate	yes	yes
Sulphur	yes	yes
Thiocyanate	yes	yes
Exchangeable Ammonium	yes	yes

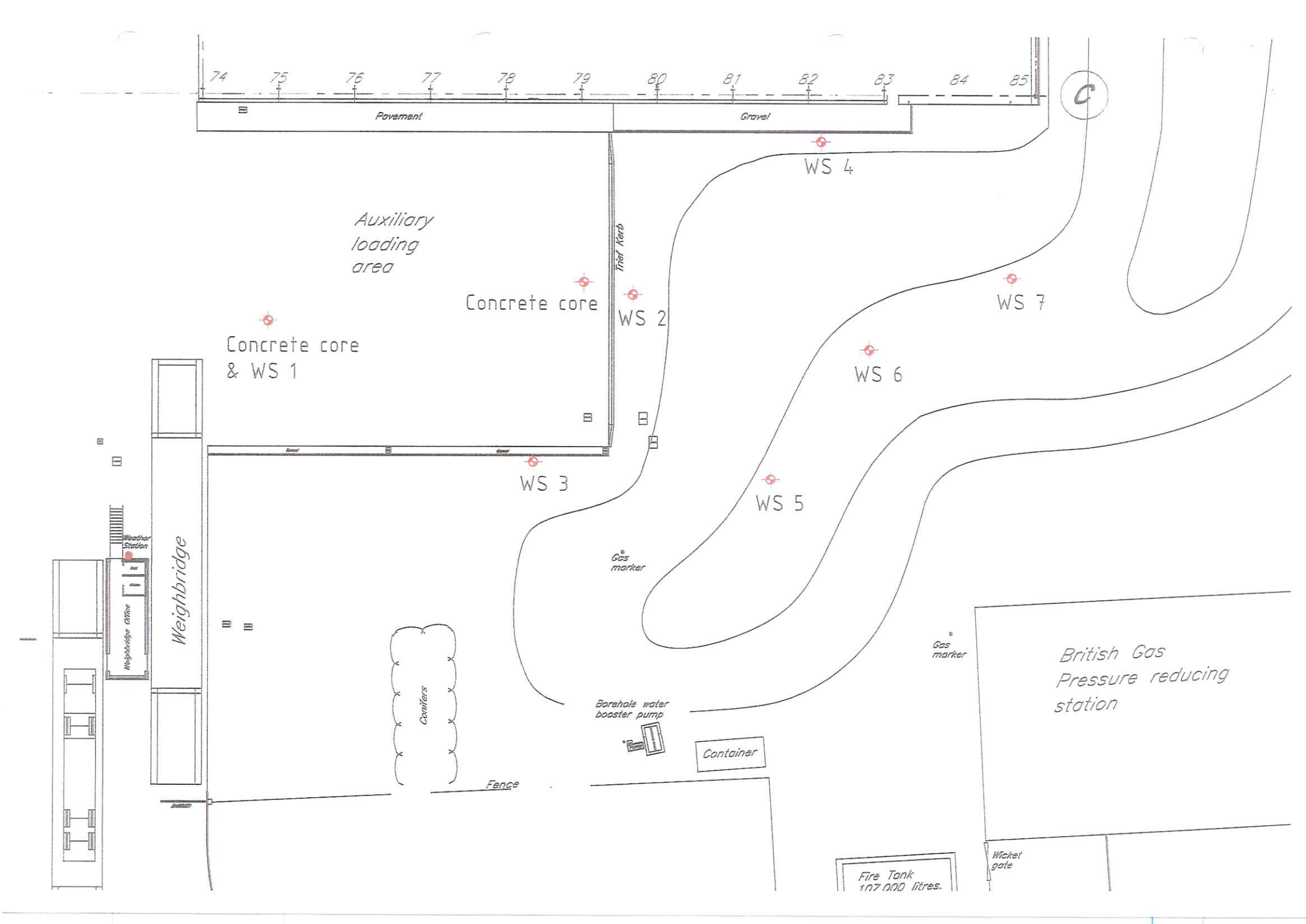
Tabel 3 - Performance characteristics (organics)	UKAS	MCERTS
Benzene (GC- FID & GC-MS)	yes	yes
Benzo[a]pyrene (GC-MS)	yes	yes
Chlorobenzene	yes	yes
Chloromethane	yes	p
Chlorophenol (2-chlorophenol)	yes	yes
Chlorotoluene(2-chlorotoluene, 4-chlorotoluene)	yes	p
1,2-dichloroethane	yes	p
Dichloromethane	yes	p
"Dioxins"	no	no
Ethylbenzene	yes	p
"Furans"	no	no
Hexachlorobutadiene (SVOC)	yes	yes
"Hydrocarbons"	yes	yes
"Nitroaromatics"	yes	no
Pentachlorophenol	p	p
"Phenols" - Phenol by HPLC	yes	yes
"Phthalate esters"	p	p
"Polyaromatic hydrocarbons" by GC-MS	yes	yes, exc naphthalene when Kerosene
"Polychlorinated biphenyls" (Aroclors)	yes	yes
Tetrachloroethane (1,1,1,2)	yes	yes
Tetrachloroethene	yes	p
Tetrachloromethane (carbon tetrachloride)	yes	yes
Toluene (GC-FID)	yes	yes
Trichloroethane	yes	yes
Trichloroethene	yes	yes
Trichloromethane (chloroform)	yes	yes
Vinyl chloride	yes	yes
Xylene (GC-FID)	yes	yes

Last updated February 2007

yes - accreditation awarded
p = pending - data meeting MCERTS criteria submitted to UKAS - awaiting certification
no = not being submitted in the near future

APPENDIX 4

EXPLORATORY HOLE LOCATION PLAN


74
75
76
77
78
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80
81
82
83
84
85
Pavement
Gravel
WS 4
Auxiliary loading area
Trief Kerb
Concrete core
WS 2
WS 7
Concrete core & WS 1
WS 6
WS 3
WS 5
Gas marker
Weighbridge
Weather Station
Weighbridge office
Conifers
Borehole water booster pump
Container
Fence
Gas marker
British Gas Pressure reducing station
Wicket gate
Fire Tank 107 000 litres.

APPENDIX 5

INVESTIGATION TECHNIQUES AND GENERAL NOTES

INVESTIGATION TECHNIQUES

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the U.K., summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the most simple yet effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a backacting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the Trial Pits will not have been provided with temporary side support during their construction. Under such circumstances ground conditions to some 1.2 metres can be closely inspected, subject to stability assessment, but below this depth, entrance into the pit is not permitted in the absence of shoring and hence observations will have been made from ground surface and samples taken from the excavator bucket.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of insitu test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

Light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for backfilling. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.1 metre.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, insitu Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in more dense strata. Small disturbed samples are obtained throughout.

The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core can be subjected to test in the field or laboratory. Core recovery depends upon rock type and/or techniques used. Where open hole rotary drilling is employed, descriptions of strata result from examination at surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained. Small scale plant can be used for auger drilling to limited depth where access is constrained.

Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

WINDOW SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This has now been superseded by the use of a thin-walled plastic liner within a sampler which has a solid wall. Diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine-mounted and the drive tubes are typically in 1m lengths. The hole formed is not cased, however, and hence the success of this technique is limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 8m can be achieved in suitable circumstances but depths of 4m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Window Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, insitu test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the TRL to provide a profile of CBR values over a range of depths of up to 1.50m.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dipmeter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

GENERAL NOTES

1. The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.

2. Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.

3. The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.

4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and his Engineer and/or Advisers in the preparation of their designs.

5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.

6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.

7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.

8. The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses of BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.

9. Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.

10. Any unavoidable variations from specified procedures are identified in the report.

11. Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated.

12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.

13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.

14. Classification of materials as Made Ground is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for fill materials that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.

15. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.

16. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

17. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. The foundations should be designed in accordance with the good practice embodied in BS 8004:1986 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.

18. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.

19. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.

geotechnics

α. 07000 GEOTECHNICS
Web. www.geotechnics.co.uk

HEAD OFFICE

Geotechnics Limited
The Geotechnical Centre,
203 Torrington Avenue,
Tile Hill,
Coventry CV4 9AP
T: 024 7669 4664
F: 024 7669 4642
email: mail@geotechnics.co.uk

SOUTH WEST OFFICE

Geotechnics Limited
The Geotechnical Centre,
8 Orchard Court,
Heron Road, Sowton,
Exeter, Devon EX2 7LL
T: 01392 412446
F: 01392 362159
email: mail@exeter.geotechnics.co.uk

NORTH WEST OFFICE

Geotechnics Limited
Unit 1,
Borders Industrial Park,
River Lane, Saltney,
Chester CH4 8RJ
T: 01244 671117
F: 01244 671122
email: mail@chester.geotechnics.co.uk

SCOTTISH OFFICE

Geotechnics Limited
The Geotechnical Centre,
Block 1, Unit 8,
Duckburn Business Park,
Dunblane FK15 0EW
T: 01786 823328
F: 01786 823345
email: mail@dunblane.geotechnics.co.uk