

**IGSL Limited**  
**Ground Investigation**  
**O'Devaney Gardens Dublin ( Phase 2 )**  
**Project No. 10009**  
**On Behalf Of**  
**Arup**  
**Consulting Engineers**

## **FOREWORD**

### **Notes on Site Investigation Procedure**

The following notes should be read in conjunction with the report. Any modifications to the procedures outlined below are indicated in the main text.

#### **GENERAL**

The recommendations made and opinions expressed in the Report are based on the "Boring Records, an examination of samples and results of the site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the boreholes, for example, between borehole positions. Whilst the report may express an opinion on a possible configuration of strata both between borehole positions and below the maximum depth of the investigation, this is for guidance only and no liability can be accepted for its accuracy.

#### **BORING TECHNIQUE**

Unless otherwise stated the 'Shell and Auger' technique of soft ground boring has been employed. Whilst this technique allows the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils, (e.g. thin layers of coarse and fine granular material) is inevitable. Specific attention is drawn to this factor where evidence of such a condition is available.

#### **GROUND WATER**

The ground water conditions entered on the Boring Records are those appertaining at the time of the investigation. The normal rate of boring does not usually permit the recording of an equilibrium water level for any one water strike. Moreover, ground water levels are subject to variations caused by seasonal effects or changes in local drainage conditions. The table of each Boring Record shows the ground water level at the quoted borehole and casing depths, usually at the start of the day's work. The word "none" indicates that ground water was sealed off by the borehole casing.

#### **GAS MONITORING**

Unless otherwise stated gas monitoring is carried out using a GA2000 infra red gas detector. The gases monitored for and levels noted are recorded and plotted on the relevant test data sheets. Unless stated otherwise no monitoring is carried out for gas pressure or to calculate gas flow rates.

#### **ROUTINE SAMPLING**

Undisturbed samples of predominantly cohesive soils are obtained in a 102mm diameter open-drive sampler, complying with the requirements of the British Standard Code of Practice B.S. 5930. Large disturbed samples of granular soils, or of soils in which undisturbed sampling is not possible or appropriate, are taken from the boring tools and sealed into polythene bags. Small disturbed samples are taken at frequent intervals and sealed into 0.5 kg glass jars or polythene bags for subsequent visual classification. Where encountered in sufficient quantity, samples of groundwater are taken.

Unless otherwise stated in the main text, disturbed soil samples may not be at their natural water content.

**REPORT ON A GROUND INVESTIGATION  
FOR  
PROPOSED RESIDENTIAL RE-DEVELOPMENT WORKS  
AT  
O'DEVANEY GARDENS / ST. BRICINS HOSPITAL , DUBLIN  
ON BEHALF OF  
ARUP,  
CONSULTING ENGINEERS**

**REPORT NO. 10009**

**OCTOBER 2004**

**INTRODUCTION**

The proposed development site is located in the O'Devaney Gardens and St. Bricins Hospital areas which are situated off the North Circular Road in Dublin.

It is proposed to redevelop this site and construct new multi storey residential developments along with associated commercial and community areas.

An investigation of sub-soil conditions was ordered by the projects consulting engineers, Arup Ireland, on behalf of their clients, Dublin City Council. The ground investigation was completed over two phases of works with phase 1 completed in April 2004 and reported on in IGSL report no. 9606 ( May 2004 ).

The programme of the investigation completed in Phase 2 included,

- ✓ The construction of five exploratory boreholes to establish stratification. During the course of boring in-situ tests were performed at regular intervals and representative soil samples were recovered for visual examination and laboratory analysis.
- ✓ The drilling of seven rotary coreholes to establish the depth to, type of and quality of the underlying bedrock.
- ✓ The installation of groundwater monitoring standpipes at selected borehole and corehole locations.
- ✓ The carrying out of laboratory soils testing ( Geotechnical ) as specified by the projects engineers.

This report has contains the factual information pertaining to the works completed during the Phase 2 works.

## **II. FIELDWORK**

The site is referred to as the O'Devaney Gardens development and the locations of all of the investigation points are shown on the detailed site plan enclosed in Appendix V to this report.

Site works were supervised by a representative of the consulting engineers and by an IGSL geotechnical engineer. The methods utilised during the course of the field investigations are outlined in the following sections.

### *Cable Tool Boreholes.*

Conventional cable tool techniques ( shell and auger ) were employed at five locations across the site . All field work was carried out in accordance with BS5930.

Sampling and in - situ testing were performed to BS1377. Disturbed and undisturbed soil samples were taken at regular intervals or at changes in stratification while standard penetration tests ( SPT's ) were also carried out to establish relative in - situ soil strength.

Full details of stratification, testing, sampling, comments on groundwater and notes on any obstructions to normal boring encountered are given in the detailed borehole records enclosed in Appendix I to this report.

Groundwater monitoring standpipes were installed at each of the cable tool boreholes in accordance with the specifications of the projects engineers. Installations comprised a 50mm standpipe slotted in its lower section with a filter sock and gravel pack installed around the slotted section. The installation was completed with a 50mm riser pipe attached to the slotted section around which an impermeable bentonite seal was placed to prevent surface water migration into the standpipe. Each installation was then capped with a protective steel lockable cover which was then concreted into place.

### *Rotary Coring*

A total of seven rotary coreholes were constructed at six locations across the site. The results of these are enclosed in the detailed coring records enclosed in Appendix II to this report.

Rotary core drilling was undertaken using a top drive lorry mounted Casagrande rotary coring rig

The coring operation utilised HQ coring techniques which open a 90mm hole and recover a 75mm core of rock. Air mist flush was used in the drillhole and the cores were packed in 3m core boxes and returned to I.G.S.L.'s laboratory in Newbridge, County Kildare.

The rock cores were then logged by I.G.S.L.'s engineering geologist and detailed core logs are presented in the relevant appendix. These logs include descriptions and the standard mechanical indices ( TCR, SCR and RQD ). In addition, a graphic fracture spacing log has been prepared, and this is incorporated as part of the engineering geological core records.

It should be noted that considerable difficulty was encountered while completing the drilling works in the O'Devaney Gardens section of the site. During the drilling of RC5 the drill crew were attacked by the residents of the adjoining developments and were forced to abandon the drillhole for health & safety reasons. Following consultation with the client the drill rig was demobilized while the local authority carried out discussions with the residents of the area. The drill rig was then remobilised to site but was restricted to working from 8.00am to 2.30 pm daily at which time the rig was stood down for the remainder of the day and moved off site to a secure area. Considerable delays and standing time were incurred by IGSL as a result of the above working conditions.

Groundwater monitoring standpipes were installed at selected rotary coreholes locations. As with the cable tool boreholes all standpipes were installed in accordance with the specifications of the projects engineers.

### **III. TESTING**

During the course of the investigation samples of the sub soils were taken from the boreholes and samples of the rock cores were recovered from the coreholes. The disturbed soil samples were returned to IGSL's laboratory where a programme of testing was scheduled by the projects engineers.

#### **In Situ Tests – SPT Tests**

The relative in-situ strength of the sub-soils was established at intervals in both the boreholes and coreholes by cone penetration test.

A solid conical point is hammered into the soil and the blow count for 300mm of penetration is recorded in four 75mm increments. Results are presented in the right - hand column of the boring records and in the central section of the relevant coring records.

#### **Geotechnical Testing – Soils**

All of the geotechnical test data is included in Appendix III to this report.

Tests carried out included

- ✓ Moisture Content Tests
- ✓ Atterburg Limits ( Classification tests ).
- ✓ Moisture Condition Value ( MCV ) Tests
- ✓ Particle Size Distribution Tests ( Wet Sieve )
- ✓ Sedimentation Analysis ( by Hydrometer ).
- ✓ pH and Sulphate Tests
- ✓ CBR Tests

#### **Environmental Testing – Soils**

At the request of the projects engineers, Arup Ireland, selected samples were dispatched to an environmental analytical laboratory for specialist testing.

The carrying out of the environmental laboratory soils testing was completed at the STL testing facilities in Dublin in accordance with the test schedules and specifications issued by Arup.

**Appendix I**  
**Cable Tool Borehole Records**

REPORT NO: 10009		GEOTECHNICAL BORING RECORD				IGSL Ltd.				
CONTRACT : O'Devaney Gardens Phase 2						BOREHOLE NO: 12 Sheet 1 of 1				
CLIENT : ENGINEER : Arup		GROUND LEVEL (mOD)		12.93		DATE STARTED: 24/08/2004 DATE COMPLETED: 24/08/2004				
CO-ORDINATES : E 234758.52 N 313730.13		BOREHOLE DIAMETER (mm)		200		BORED BY: J. McDonnell				
		BOREHOLE DEPTH (m)		7.50						
		CASING DEPTH (m)		7.50						
DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS	
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)			
0	MADE GROUND (consisting of firm, black, sandy, gravelly, CLAY, with red brick, ash, and glass).		11.43	1.50	3222	B D	1.00	N=14		
1										
2	Firm, brown, sandy, gravelly, CLAY, with cobbles.				3223	B D	2.10	N=17		
3	Stiff, black, sandy, gravelly, CLAY, with cobbles.				3224	B D	3.10	N=38		
4	Very stiff, black, sandy, gravelly, CLAY, with cobbles.				9.43	3.50				
5										
6										
7										
8	OBSTRUCTION. End of Borehole at 7.50 m		5.53 5.43	7.40 7.50						
9										
10										

#### Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
3.70	4.00	1.00	
6.30	6.60	1.00	
7.40	7.50	2.00	

#### Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
3.00	3.00	3.50	2.60	-	Medium

#### Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
24/08/2004	7.50	1.00	7.50	SP

#### Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
24/08/2004	7.50	0.00	-	Dry at end of boring

Remarks: Samples - B = Geotechnical bulk sample, D = Chemical Sample



<b>REPORT NO: 10009</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL Ltd.</b>	
CONTRACT : O'Devaney Gardens Phase 2					BOREHOLE NO: 13 Sheet 1 of 1		
CLIENT : ENGINEER : Arup		GROUND LEVEL (mOD) 15.18 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 7.10 CASING DEPTH (m) 7.10			DATE STARTED: 25/08/2004 DATE COMPLETED: 25/08/2004 BORED BY: J. McDonnell		
CO-ORDINATES : E 234782.91 N 313757.45							

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
0	MADE GROUND (consisting of brown, sandy, CLAY, with red brick, and ash).								
1	Firm, brown, sandy, gravelly, CLAY, with cobbles.		14.68	0.50	3229	B D	1.00	N=11	
2					3230	B D	2.00	N=12	
	Grey/ brown, coarse, sandy, GRAVEL.		12.88	2.30	3231	B D	2.50		
3	Very stiff, black, sandy, gravelly, CLAY, with cobbles and boulders.		12.38	2.80	3232	B D	3.00	N=49	
4					3233	B D	4.00	N=51	
5					3234	B D	5.00	N=36/ 140mm	
6	Very stiff to hard, black, sandy, very gravelly, CLAY, with cobbles.		9.88	5.30	3235	B D	6.00	N=54	
7	OBSTRUCTION. End of Borehole at 7.10 m		8.18 8.08	7.00 7.10	3236	B D	7.00	N=R	
8									
9									
10									

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
5.30	5.40	0.50		2.30	2.30	2.80	1.40	-	Fast
7.00	7.10	2.00		5.30	5.30	-	4.90	-	Medium

Standpipe Installation Details					Groundwater Observations			
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water
25/08/2004	7.10	1.00	7.10	SP	25/08/2004	7.10	0.00	5.00
					At end of boring			

Remarks: Samples - B = Geotechnical bulk sample, D = Chemical Sample

<b>REPORT NO: 10009</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL Ltd.</b>	
CONTRACT : O'Devaney Gardens Phase 2					BOREHOLE NO: 14 Sheet 1 of 1		
CLIENT : ENGINEER : Arup		GROUND LEVEL (mOD) 17.20 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 7.00 CASING DEPTH (m) 7.00		DATE STARTED: 27/08/2004 DATE COMPLETED: 27/08/2004 BORED BY: J. McDonnell			
CO-ORDINATES : E 234824.06 N 313736.58							

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
0	MADE GROUND (consisting of brown, sandy, CLAY, with red brick).								
1	Firm, brown, sandy, gravelly, CLAY, with cobbles.		16.60	0.60	3237	B D	1.00	N=20	
2					3238	B D	2.00	N=17	
3								N=40	
4	Very stiff, black, sandy, gravelly, CLAY, with cobbles.		14.00	3.20	3239 3240 3241	B D	3.30		
5	Dense black clayey fine to coarse GRAVEL.		12.40	4.80					
6	Very stiff to hard, black, sandy, very gravelly, CLAY, with cobbles and boulders.		12.10	5.10	3241	B	5.00	N=43	
7	OBSTRUCTION.								
7	End of Borehole at 7.00 m		10.50	6.70					
8					3242	B D	6.00	N=66	
9									
10			10.20	7.00	3243	B D	7.00	N=R	

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
3.40	3.60	0.75		2.50	2.50	-	2.50	-	Seepage
5.40	5.70	0.50		4.50	4.50	-	4.20	-	Slow
6.70	7.00	2.00		4.80	4.80	-	4.50	-	Slow

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
27/08/2004	7.00	1.00	7.00	SP	27/08/2004	7.00	0.00	6.00	At end of boring

Remarks: Samples - B = Geotechnical bulk sample, D = Chemical Sample

REPORT NO: 10009		GEOTECHNICAL BORING RECORD				IGSL Ltd.	
CONTRACT : O'Devaney Gardens Phase 2					BOREHOLE NO: 15 Sheet 1 of 1		
CLIENT : ENGINEER : Arup		GROUND LEVEL (mOD) 17.72 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 5.50 CASING DEPTH (m) 5.50			DATE STARTED: 30/08/2004 DATE COMPLETED: 30/08/2004		
CO-ORDINATES : E 234865.11 N 313754.96		BORED BY: J. McDonnell					

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
0	MADE GROUND (consisting of brown, sandy, CLAY, with red brick).	X							
1	Firm, brown, sandy, gravelly, CLAY, with cobbles.	X	17.22	0.50	3244	B D	1.00	N=11	
2		X			3245	B D	2.00	N=17	
3	Hard, black, sandy, gravelly, CLAY, with cobbles and boulders.	X	15.22	2.50	3246	B D	3.00	N=83	
4		X			3247	B D	4.00	N=61/ 210mm	
5		X			3248	B D	5.00	N=66/ 215mm	
5.5	OBSTRUCTION.	X	12.42	5.30					
5.5	End of Borehole at 5.50 m	X	12.22	5.50				N=R	
6									
7									
8									
9									
10									

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
2.60	2.90	1.00							
4.30	4.40	1.25							
5.30	5.50	2.00							

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
30/08/2004	5.50	1.00	5.50	SP	30/08/2004	5.50	0.00	-	Dry at end of boring

Remarks: Samples - B = Geotechnical bulk sample, D = Chemical Sample

<b>REPORT NO: 10009</b>		<b>GEOTECHNICAL BORING RECORD</b>				<b>IGSL Ltd.</b>	
CONTRACT : O'Devaney Gardens Phase 2						BOREHOLE NO: 16 Sheet 1 of 1	
CLIENT :		GROUND LEVEL (mOD)		18.49		DATE STARTED: 31/08/2004	
ENGINEER : Arup		BOREHOLE DIAMETER (mm)		200		DATE COMPLETED: 31/08/2004	
CO-ORDINATES : E 234872.54 N 313723.49		BOREHOLE DEPTH (m)		6.00		BORED BY: J. McDonnell	
		CASING DEPTH (m)		6.00			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
0	MADE GROUND (consisting of brown, sandy, CLAY, with red brick).								
1	Firm, brown, sandy, gravelly, CLAY, with cobbles.		17.99	0.50	3249	B D	1.00	N=17	
2					3250	B D	2.00	N=19	
3	Very stiff to hard black sandy gravelly CLAY with cobbles and boulders		15.49	3.00	3251	B D	3.10	N=50	
4					3252	B D	4.00	N=38	
5					3253	B D	5.00	N=63	
6	OBSTRUCTION. End of Borehole at 6.00 m		12.69 12.49	5.80 6.00	3254	B D	6.00	N=27/ 25mm	
7									
8									
9									
10									

Hard Strata Boring / Chiselling				Water Strike Details					
From (m)	To (m)	Hours	Comments	Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.60	4.80	1.25	.	2.50	2.50	-	2.50	-	Seepage
5.80	6.00	2.00	.	3.80	3.80	-	3.80	-	Seepage

Standpipe Installation Details					Groundwater Observations				
Date	Tip Depth	RZ Top	RZ Base	Type	Date	Hole Depth	Casing Depth	Depth to Water	Comments
31/08/2004	6.00	1.00	6.00	SP	31/08/2004	6.00	0.00	5.00	At end of boring

Remarks: Samples - B = Geotechnical bulk sample, D = Chemical Sample

**Appendix II**  
**Rotary Corehole Records**

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC1					
								SHEET: Sheet 1 of 2					
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 30/09/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 15.26				DATE COMPLETED:30/09/2004					
CO-ORDINATES: 234757.19				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313756.69				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of clay and gravel
2													
3		0	0	0									
4									11.06	4.20			SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of stiff black sandy gravelly SILT/CLAY
5	5.50								9.76	5.50			Stiff black/brown sandy very gravelly SILT/CLAY with many sub-angular cobbles
6													
7													
8													
REMARKS: Second standpipe installed at 10.0m, gravel 10.0-1.0m, seal 1.0-0.0m, headworks.							INSTALLATION DETAILS Installation Type : SP Depth to Response Zone top (m) : 1.00 Depth to Response Zone bottom (m) : 10.00 Comments : Gravel 17.6-15.0m, seal 15.0-10.0m, headworks.						

Continued next sheet

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC1 SHEET: Sheet 2 of 2					
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 15.26				DATE STARTED: 30/09/2004 DATE COMPLETED:30/09/2004					
CO-ORDINATES: 234757.19 313756.69				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9		100	0	0									Stiff black/brown sandy very gravelly SILT/CLAY with many sub-angular cobbles
10													
11													
12	12.30								2.96	12.30			
		100	0	0									
	12.70												
13	13.10	100	25	25									
		100	26	0									
14													
	14.60												
15		100	45	22									
16	16.10												
		100	63	29									
17	17.60								-2.34	17.60			
													End of Borehole at 17.60 m
REMARKS: Second standpipe installed at 10.0m, gravel 10.0-1.0m, seal 1.0-0.0m, headworks.							INSTALLATION DETAILS Installation Type : SP Depth to Response Zone top (m) : 1.00 Depth to Response Zone bottom (m) : 10.00 Comments : Gravel 17.6-15.0m, seal 15.0-10.0m, headworks.						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC2		SHEET: Sheet 1 of 3			
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 17.95				DATE STARTED: 01/10/2004 DATE COMPLETED: 01/10/2004					
CO-ORDINATES: 234889.57 313752.00				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of clay and gravel
2													
3													
4													
5													
6		0	0	0							N=38		SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of stiff black sandy gravelly silt/clay
7									10.75	7.20	N=41		
8									9.25	8.70	N=53		
Continued next sheet													
REMARKS: Standpipe slotted 22.0-16.0, solid 16.0-14.5m, fill 13.0-0.0m.							<b>INSTALLATION DETAILS</b> Installation Type : SP Depth to Response Zone top (m) : 16.00 Depth to Response Zone bottom (m) : 22.00 Comments : Gravel 14.5m-22.0m, seal 22.0m-23.5m & 14.5-13.0m, headworks.						



REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC2		SHEET: Sheet 2 of 3			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 01/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 17.95				DATE COMPLETED: 01/10/2004					
CO-ORDINATES: 234889.57				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313752.00				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of clay and gravel
10											N=43		
11													Strong, thin to medium bedded, dark grey/black, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to locally rough, planar to undulose, locally tight to open, possible clay infilled (at 13.31m-14.5m, 14.57m-18.0m) fractures dipping sub-45°
12											N=58		
13	13.00								4.95	13.00	N=66		Continued next sheet
14		20	15	15									
15	14.50												
16		20	6	0									
17	16.00												
18		10	0	0									
19	17.00												
20		10	0	0									

REMARKS: Standpipe slotted 22.0-16.0, solid 16.0-14.5m, fill 13.0-0.0m.

INSTALLATION DETAILS  
Installation Type : SP  
Depth to Response Zone top (m) : 16.00  
Depth to Response Zone bottom (m) : 22.00  
Comments : Gravel 14.5m-22.0m, seal 22.0m-23.5m & 14.5-13.0m, headworks.

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD										IGSL Ltd.			
CONTRACT: O' Devaneys Gardens												DRILLHOLE NO : RC2					
CLIENT: ENGINEER: Arup												CORE DIAMETER (mm): 74				SHEET: Sheet 3 of 3	
GROUND LEVEL (mOD): 17.95												DATE STARTED: 01/10/2004					
CO-ORDINATES: 234889.57												INCLINATION (Degrees): 90				DATE COMPLETED: 01/10/2004	
313752.00												FLUSH: AIR/MIST				DRILLED BY: Millennium	
LOGGED BY: Sean/Dan																	
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION				
18	18.00								-0.05	18.00	N=66		Strong, thin to medium bedded, dark grey/black, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to locally rough, planar to undulose, locally tight to open, possible clay infilled(at 13.31m-14.5m, 14.57m-18.0m) fractures dipping sub-45°				
19		0	0	0							N=64		Dark grey/black clays and mud-rich angular, fine grained, LIMESTONE gravels, moderately to highly weathered				
20	20.30	100	0	0					-2.35	20.30			Strong, thin to medium bedded, dark grey/black, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to locally rough, planar to undulose, locally tight to open, clay infilled(at 18.0m-21.0m) fractures dipping sub-45°				
21	21.00	100	59	49					-3.05	21.00			Strong, thin to medium bedded, dark grey/black, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to locally rough, planar to undulose, locally tight to open, possible clay infilled(at 21.45m-22.0m) fractures dipping sub-45° to locally horizontal				
22	22.50	100	57	44					-5.55	23.50			End of Borehole at 23.50 m				
23	23.50																
24																	
25																	

**REMARKS:** Standpipe slotted 22.0-16.0, solid 16.0-14.5m, fill 13.0-0.0m.



**INSTALLATION DETAILS**  
Installation Type : SP  
Depth to Response Zone top (m) : 16.00  
Depth to Response Zone bottom (m) : 22.00  
Comments : Gravel 14.5m-22.0m, seal 22.0m-23.5m & 14.5-13.0m, headworks.

<b>REPORT NO.</b>		10009		<b>GEOTECHNICAL CORE LOG RECORD</b>						<b>IGSL Ltd.</b>			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC3 SHEET: Sheet 1 of 3					
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 12/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 27.35				DATE COMPLETED: 12/10/2004					
CO-ORDINATES: 234747.41 313631.24				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
2													
3													
4													
5													
6													
7		0	0	0							N=55		
8											N=55		
							Continued next sheet						
<b>REMARKS:</b> Standpipe slotted 16m-18.9m, solid 10m-16mm, gravel fill 11m-14m, gravel 15.5m-18.9m, seal at 10m-11m & 14m-15.5m.							<b>INSTALLATION DETAILS</b> Installation Type : SP Depth to Response Zone top (m) : 10.00 Depth to Response Zone bottom (m) : 18.90 Comments : 7m-8.5m seal, 8.5m-10m gravel						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC3		SHEET: Sheet 2 of 3			
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 27.35				DATE STARTED: 12/10/2004 DATE COMPLETED: 12/10/2004					
CO-ORDINATES: 234747.41 313631.24				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
10											N=68		
11													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of angular fragments of moderately weathered limestone, possible rockhead
12											N=76		
13									14.45	12.90			Strong very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to slightly to locally moderately weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, clay infilled (at 5.31m-5.42m, 16.64m-16.67m), locally Fe oxide stained fractures dipping 45° to locally sub-horizontal
14	14.40								12.95	14.40			
15		100	69	41									Continued next sheet
16	15.90												
17		100	64	49									
18	17.40												

**REMARKS:** Standpipe slotted 16m-18.9m, solid 10m-16mm, gravel fill 11m-14m, gravel 15.5m-18.9m, seal at 10m-11m & 14m-15.5m.

**INSTALLATION DETAILS**  
Installation Type : SP  
Depth to Response Zone top (m) : 10.00  
Depth to Response Zone bottom (m) : 18.90  
Comments : 7m-8.5m seal, 8.5m-10m gravel


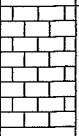
REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC3		SHEET: Sheet 3 of 3			
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 27.35				DATE STARTED: 12/10/2004 DATE COMPLETED: 12/10/2004					
CO-ORDINATES: 234747.41 313631.24				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
18	18.90	100	35	18					8.45	18.90			Strong very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to slightly to locally moderately weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, clay infilled (at 5.31m-5.42m, 16.64m-16.67m), locally Fe oxide stained fractures dipping 45° to locally sub-horizontal End of Borehole at 18.90 m
19													
20													
21													
22													
23													
24													
25													

<b>REMARKS:</b> Standpipe slotted 16m-18.9m, solid 10m-16mm, gravel fill 11m-14m, gravel 15.5m-18.9m, seal at 10m-11m & 14m-15.5m.	<b>INSTALLATION DETAILS</b> Installation Type : SP Depth to Response Zone top (m) : 10.00 Depth to Response Zone bottom (m) : 18.90 Comments : 7m-8.5m seal, 8.5m-10m gravel
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<b>REPORT NO.</b>		10009		<b>GEOTECHNICAL CORE LOG RECORD</b>						<b>IGSL Ltd.</b>			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC4		SHEET: Sheet 1 of 3			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 07/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 27.07				DATE COMPLETED: 08/10/2004					
CO-ORDINATES: 234893.83				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313554.05				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1					0 250 500								SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay with occasional cobbles
2													
3													
4													
5													
6													
7		0	0	0							N=51		
8											N=59		
<b>REMARKS:</b> Seal-0.0m-1m, Fill-1m-9.5, Seal-9.5m-10.5m							<b>INSTALLATION DETAILS</b> Installation Type : SPIE Depth to Response Zone top (m) : 10.50 Depth to Response Zone bottom (m) : 12.00 Comments : Fill Seal 12m-14m						

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REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC4		SHEET: Sheet 2 of 3			
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 27.07				DATE STARTED: 07/10/2004 DATE COMPLETED: 08/10/2004					
CO-ORDINATES: 234893.83 313554.05				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay with occasional cobbles
10											N=68		
11													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of angular fragments of moderately weathered limestone, possible rockhead
12											N=74		
13									14.27	12.80			Strong to very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, locally calcite filled (3mm-to 10mm) fractures dipping 45°
14	14.00								13.07	14.00			
15		100	70	45									Continued next sheet
16	15.50												
17		100	67	61									
18	17.00												
REMARKS: Seal-0.0m-1m, Fill-1m-9.5, Seal-9.5m-10.5m							INSTALLATION DETAILS Installation Type : SPIE Depth to Response Zone top (m) : 10.50 Depth to Response Zone bottom (m) : 12.00 Comments : Fill Seal 12m-14m						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC4		SHEET: Sheet 3 of 3			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 07/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 27.07				DATE COMPLETED: 08/10/2004					
CO-ORDINATES: 234893.83				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313554.05				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
18	18.60	100	82	66					8.47	18.60			Strong to very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to locally slightly weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, locally calcite filled (3mm-to 10mm) fractures dipping 45° End of Borehole at 18.60 m
19													
20													
21													
22													
23													
24													
25													

<b>REMARKS:</b> Seal-0.0m-1m, Fill-1m-9.5, Seal-9.5m-10.5m	<b>INSTALLATION DETAILS</b> Installation Type : SPIE Depth to Response Zone top (m) : 10.50 Depth to Response Zone bottom (m) : 12.00 Comments : Fill Seal 12m-14m
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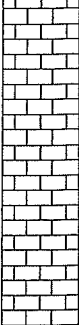


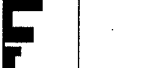


<b>REPORT NO.</b>		10009		<b>GEOTECHNICAL CORE LOG RECORD</b>						<b>IGSL Ltd.</b>			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC5		SHEET: Sheet 1 of 2			
CLIENT:				CORE DIAMETER (mm):				DATE STARTED: 22/09/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 26.81				DATE COMPLETED: 22/09/2004					
CO-ORDINATES: 235010.56				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313631.03				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of clay and gravel & black sandy gravelly clay
2													
3													
4													
5													
6											N=33		
7											N=54		
8											N=61		
							Continued next sheet						
REMARKS: Relocated borehole to 5A due to unsafe site conditions							<b>INSTALLATION DETAILS</b> Installation Type : Depth to Response Zone top (m) : Depth to Response Zone bottom (m) : Comments :						

<b>REPORT NO.</b>		10009		<b>GEOTECHNICAL CORE LOG RECORD</b>						<b>IGSL Ltd.</b>			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC5		SHEET: Sheet 2 of 2			
CLIENT:				CORE DIAMETER (mm):				DATE STARTED: 22/09/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 26.81				DATE COMPLETED: 22/09/2004					
CO-ORDINATES: 235010.56				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313631.03				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9					0 250 500								SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of clay and gravel & black sandy gravelly clay          End of Borehole at 12.00 m
10											N=58		
11													
12									14.81	12.00	N=69		
13													
14													
15													
16													
REMARKS: Relocated borehole to 5A due to unsafe site conditions							<b>INSTALLATION DETAILS</b> Installation Type : Depth to Response Zone top (m) : Depth to Response Zone bottom (m) : Comments :						

<b>REPORT NO.</b>		10009		<b>GEOTECHNICAL CORE LOG RECORD</b>						<b>IGSL Ltd.</b>			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC5A		SHEET: Sheet 1 of 3			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 06/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 26.83				DATE COMPLETED: 06/10/2004					
CO-ORDINATES: 235012.19				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313632.76				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
2													
3													
4													
5													
6													
7											N=66		
8		0	0	0							N=60		
Continued next sheet													
<b>REMARKS:</b> Standpipe slotted 15m-20m, solid 0.0m-15m, fill cover 0.0m-12mm, gravel 15m-20m							<b>INSTALLATION DETAILS</b> Installation Type : Depth to Response Zone top (m) : Depth to Response Zone bottom (m) : Comments :						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC5A		SHEET: Sheet 2 of 3			
CLIENT: ENGINEER: Arup				CORE DIAMETER (mm): 74 GROUND LEVEL (mOD): 26.83				DATE STARTED: 06/10/2004 DATE COMPLETED: 06/10/2004					
CO-ORDINATES: 235012.19 313632.76				INCLINATION (Degrees): 90 FLUSH: AIR/MIST				DRILLED BY: Millennium LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
10											N=70		
11													
12											N=68		
13											N=67		
14													
15	15.60								11.73	15.10			SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of angular fragments of moderately weathered limestone, possible rockhead
16		100	35	13					11.23	15.60			
	17.10												
		100	46	14									Strong to very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to slightly to locally moderately weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, locally clay infilled (at 15.6m-15.8m, 18.62m-18.74m, 18.82m-18.87m) fractures dipping sub-45° to sub-vertical
													Continued next sheet
REMARKS: Standpipe slotted 15m-20m, solid 0.0m-15m, fill cover 0.0m-12mm, gravel 15m-20m							INSTALLATION DETAILS Installation Type : Depth to Response Zone top (m) : Depth to Response Zone bottom (m) : Comments :						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC5A		SHEET: Sheet 3 of 3			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 06/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 26.83				DATE COMPLETED:06/10/2004					
CO-ORDINATES: 235012.19				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313632.76				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
18	18.20												Strong to very strong, medium to thickly bedded, grey/dark grey, fine grained mud-rich LIMESTONE, fresh to slightly to locally moderately weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, locally clay infilled (at 15.6m-15.8m, 18.62m-18.74m, 18.82m-18.87m) fractures dipping sub-45° to sub-vertical
19		100	37	27									
19.70													
20	20.00	100	13	0						6.83	20.00		
21													End of Borehole at 20.00 m
22													
23													
24													
25													
REMARKS: Standpipe slotted 15m-20m, solid 0.0m-15m, fill cover 0.0m-12mm, gravel 15m-20m							INSTALLATION DETAILS						
							Installation Type :						
							Depth to Response Zone top (m) :						
							Depth to Response Zone bottom (m) :						
							Comments :						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC6		SHEET: Sheet 1 of 2			
CLIENT:				CORE DIAMETER (mm): 74				DATE STARTED: 14/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 23.64				DATE COMPLETED: 14/10/2004					
CO-ORDINATES: 234875.49				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313655.77				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
1													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
2													
3													
4													
5													
6													
7		0	0	0							N=55		
8											N=64		
Continued next sheet													
<b>REMARKS:</b> Standpipe slotted 14m-17m, solid 0.0m-14m, fill 1m-11.5m, seal 0.0m-1m, 11.5m-13m, gravel 13m-17.4m.							<b>INSTALLATION DETAILS</b> Installation Type : SP Depth to Response Zone top (m) : 0.00 Depth to Response Zone bottom (m) : 20.00 Comments : Standpipe slotted 15m- 20m						

REPORT NO.		10009		GEOTECHNICAL CORE LOG RECORD						IGSL Ltd.			
CONTRACT: O' Devaneys Gardens								DRILLHOLE NO : RC6		SHEET: Sheet 2 of 2			
CLIENT: Arup				CORE DIAMETER (mm): 74				DATE STARTED: 14/10/2004					
ENGINEER: Arup				GROUND LEVEL (mOD): 23.64				DATE COMPLETED: 14/10/2004					
CO-ORDINATES: 234875.49				INCLINATION (Degrees): 90				DRILLED BY: Millennium					
313655.77				FLUSH: AIR/MIST				LOGGED BY: Sean/Dan					
DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R. %	S.C.R. %	R.Q.D. %	Fracture Spacing (mm)	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9													SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of black sandy gravelly clay
10											N=58		
11											N=71		
12													
13									10.64	13.00			SYMETREX: OPEN HOLE DRILLING - observed by driller as returns of angular fragments of moderately weathered limestone, possible rockhead
14													
14.40									9.24	14.40			Strong to very strong, medium to thickly bedded, grey/dark grey, fine to medium grained mud-rich LIMESTONE and MUDSTONE (at 15m-15.4, 16.55m-17.4m), slightly to locally moderately weathered, intersected by smooth to rough, planar to undulose to locally irregular, tight to open, clay infilled (at 14.4m-14.51m, 14.8m-15m, 15.6m-15.7m, 16.21m-16.56m), locally calcite filled, locally Fe oxide stained fractures dipping sub-45° to sub-vertical
15	100	21	9										
15.80													
16	100	48	44										
17													
17.40									6.24	17.40			End of Borehole at 17.40 m
REMARKS: Standpipe slotted 14m-17m, solid 0.0m-14m, fill 1m-11.5m, seal 0.0m-1m, 11.5m-13m, gravel 13m-17.4m.							INSTALLATION DETAILS Installation Type : SP Depth to Response Zone top (m) : 0.00 Depth to Response Zone bottom (m) : 20.00 Comments : Standpipe slotted 15m- 20m						

**Appendix III**

**Laboratory Test Records**  
**( Geotechnical )**



Determination of Moisture Content BS1377:Part 2:1990, clauses 3.2					
BH/TP No.	Sample No.	Depth (m)	Sample Type	Moisture Content %	Description
BH 12	3222	1.00	D	21.1	Brown slightly organic slightly sandy slightly gravelly SILT/CLAY
BH 12	3224	3.10	D	12.1	Mottled grey brown slightly sandy slightly gravelly SILT/CLAY
BH 12	3226	5.00	D	7.0	Black slightly sandy gravelly SILT/CLAY
BH 12	3227	6.00	D	8.7	Black slightly sandy slightly gravelly SILT/CLAY
BH 12	3228	7.00	D	13.9	Grey slightly sandy slightly gravelly SILT/CLAY
BH 13	3230	2.00	D	10.7	Brown slightly sandy slightly gravelly SILT/CLAY
BH 13	3231	2.50	D	9.4	Brown clayey/silty sandy GRAVEL
BH 13	3232	3.00	D	12.5	Grey slightly sandy slightly gravelly SILT/CLAY
BH 13	3234	5.00	D	5.2	Black grey slightly sandy slightly gravelly SILT/CLAY
BH 13	3235	6.00	D	10.9	Grey slightly sandy slightly gravelly SILT/CLAY
BH 13	3236	7.00	D	17.1	Grey slightly sandy slightly gravelly SILT/CLAY
BH 14	3237	1.00	D	6.8	Mottled grey brown slightly sandy gravelly SILT/CLAY with some cobbles
BH 14	3239	3.30	D	9.8	Black brown slightly sandy slightly gravelly SILT/CLAY
BH 14	3240	4.00	D	7.0	Black slightly sandy slightly gravelly SILT/CLAY
BH 14	3241	5.00	D	8.5	Black grey clayey/silty sandy GRAVEL with some cobbles
BH 14	3243	7.00	D	6.8	Black slightly sandy slightly gravelly SILT/CLAY
IGSL		Contract		O'Devaney Gardens Phase 2	
		Compiled By		D CONNOLLY	
		Contract No.		10009	
		Date		30/9/04	
		Page		1 of 2	

Determination of Moisture Content BS1377:Part 2:1990, clauses 3.2					
BH/TP No.	Sample No.	Depth (m)	Sample Type	Moisture Content %	Description
BH 15	3244	1.00	D	9.2	Brown slightly sandy slightly gravelly SILT/CLAY
BH 15	3246	3.00	D	8.7	Black grey slightly sandy slightly gravelly SILT/CLAY
BH 15	3248	5.00	D	15.4	Black slightly sandy slightly gravelly SILT/CLAY
BH 16	3250	2.00	D	9.2	Brown slightly sandy slightly gravelly SILT/CLAY
BH 16	3251	3.10	D	9.2	Black grey slightly sandy slightly gravelly SILT/CLAY
BH 16	3252	3.00	D	11.0	Grey slightly sandy gravelly SILT/CLAY
BH 16	3253	4.00	D	7.8	Black slightly sandy slightly gravelly SILT/CLAY
IGSL		Contract	O'Devaney Gardens Phase 2		
		Compiled By	D CONNOLLY		
		Date	30/9/04		
		Contract No.	10009		
		Page	2 of 2		



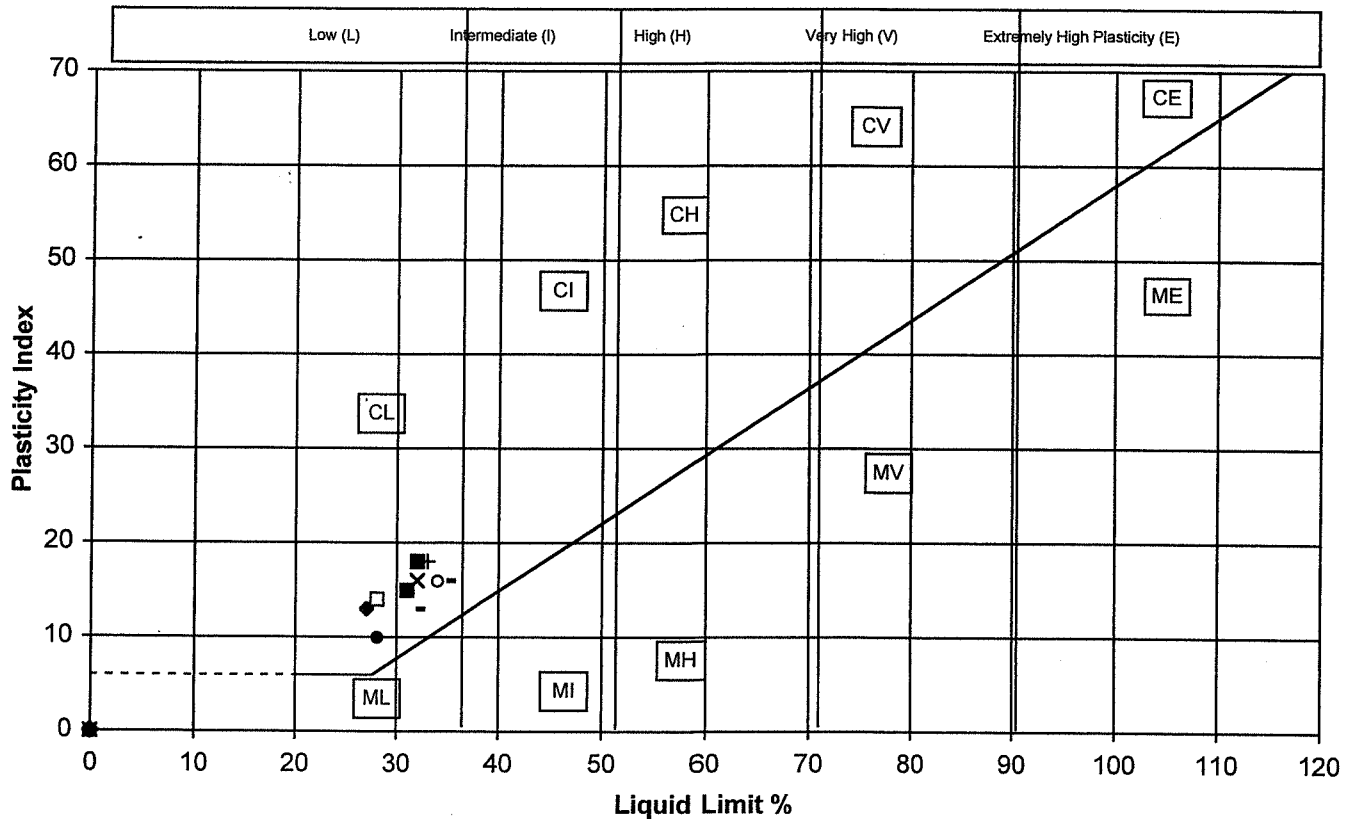
# Plasticity Chart - Summary of Liquid & Plastic Limit Tests

BS1377:Part 2:1990, clauses 3.2, 4 & 5

Chart in accordance with BS5930:1999, fig.18

Contract No. 10009

Contract: O'Devaney Gardens Phase 2



Code	BH/TP	Sample	Depth (m)	MC%	LL%	PL%	PI%	%<425µm	Description
-	BH 12	3223	2.10	14.7	32	19	13	59.1	Mottled grey brown slightly sandy slightly gravelly CLAY
■	BH 12	3225	4.00	8.1	32	14	18	42.9	Grey slightly sandy slightly gravelly CLAY
●	BH 13	3229	1.00	12.7	28	18	10	54.5	Brown slightly sandy slightly gravelly CLAY
◆	BH 13	3233	4.00	9.2	27	14	13	52.3	Grey black slightly sandy slightly gravelly CLAY
x	BH 14	3238	2.00	10.4	32	16	16	47.2	Brown slightly sandy slightly gravelly CLAY
+	BH 14	3242	6.00	9.1	33	15	18	60.1	Black slightly sandy slightly gravelly CLAY
○	BH 15	3245	2.00	10.2	34	18	16	45.3	Mottled grey brown slightly sandy slightly gravelly CLAY
□	BH 15	3247	4.00	6.8	28	14	14	51.1	Black slightly sandy slightly gravelly CLAY
-	BH 16	3249	1.00	17.4	35	19	16	51.2	Brown slightly sandy slightly gravelly CLAY
■	BH 16	3254	5.00	19.7	31	16	15	43	Grey slightly sandy slightly gravelly CLAY
●									
◆									
x									
+									
○									
□									

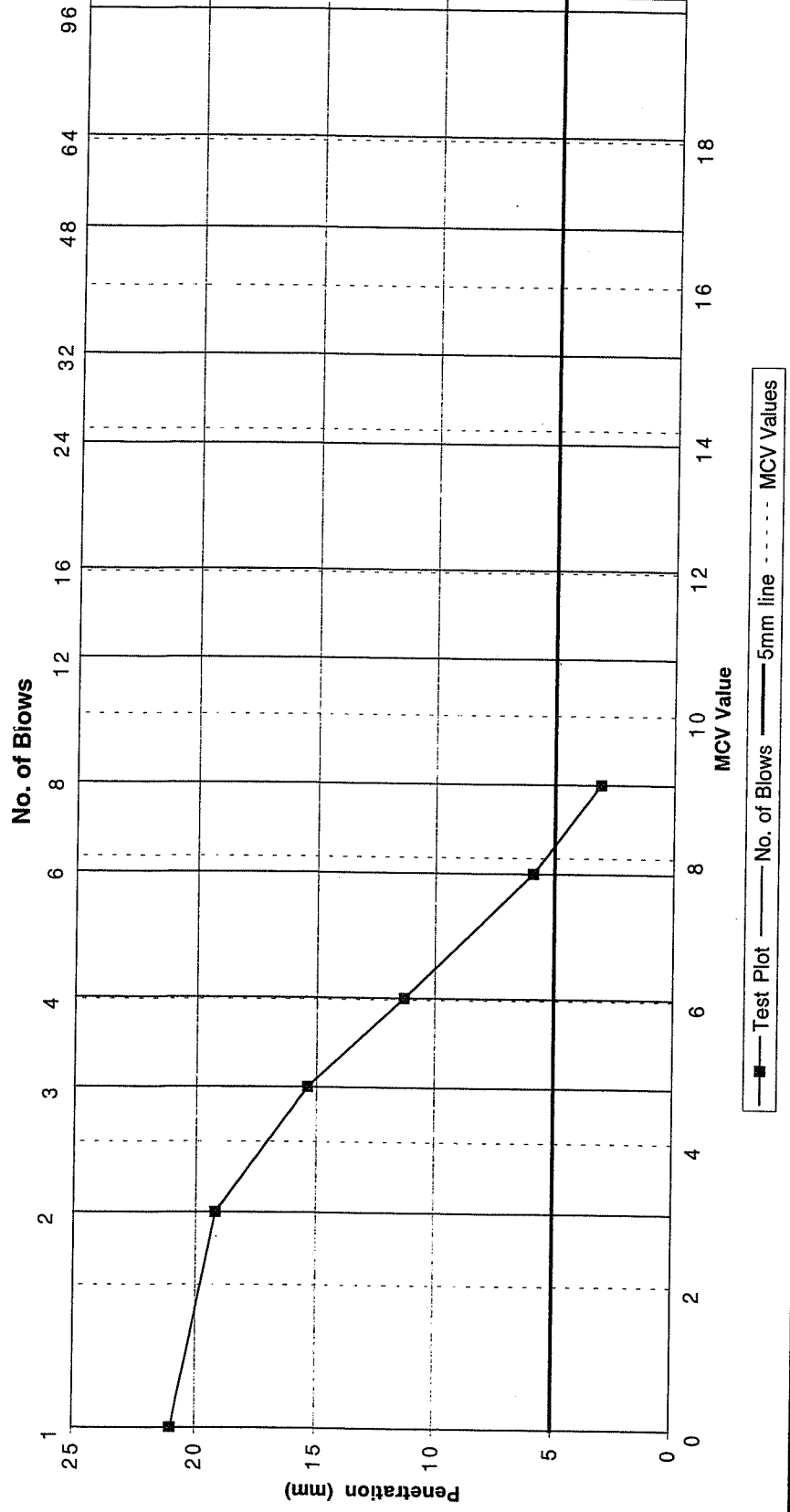
NP denotes specimen is non-plastic.

IGSL	Compiled by	Date	Checked by	Date	Page
	D CONNOLLY	30/9/04			

# Moisture Condition Value Test Report Sheet

I.G.S.L.

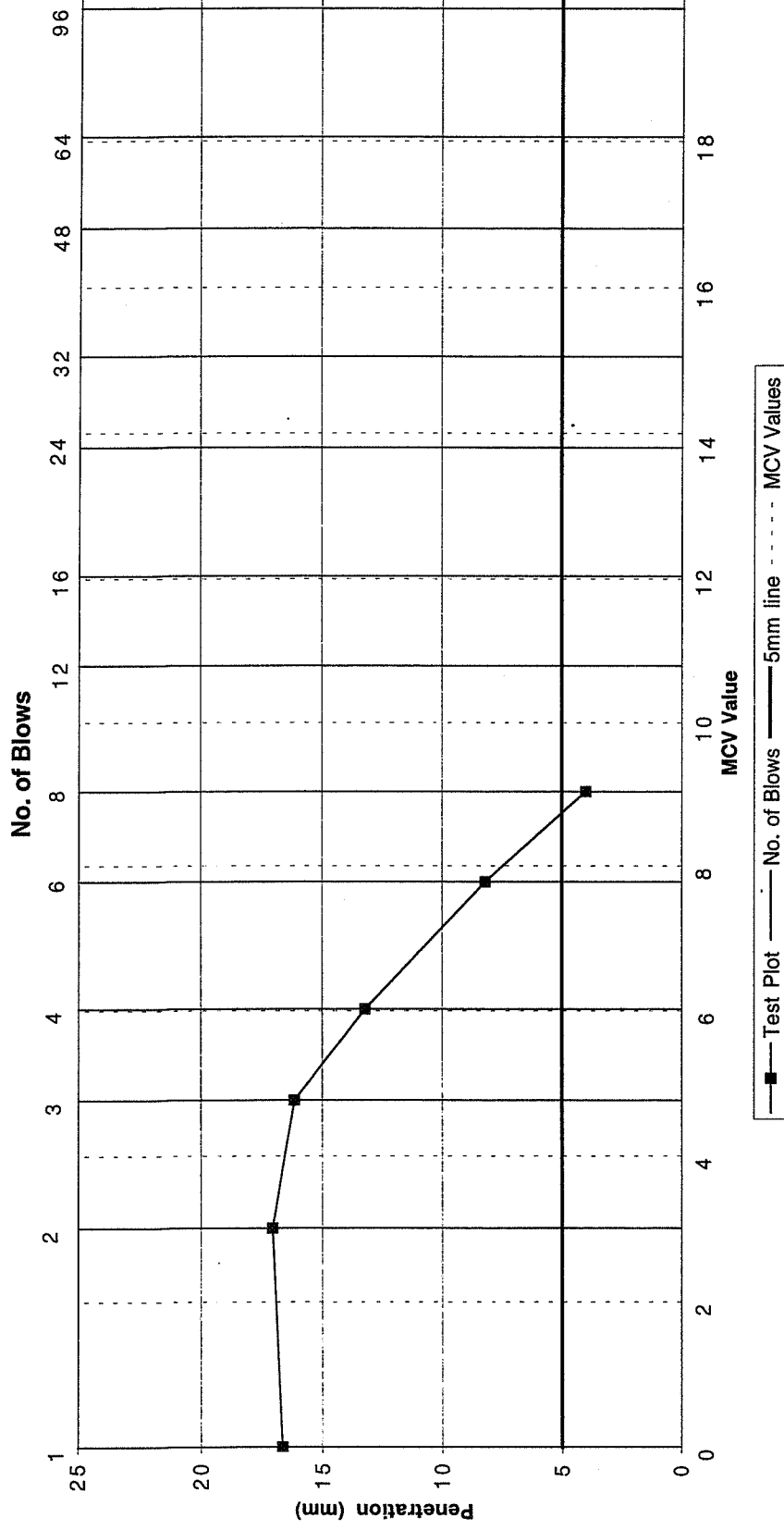
Contract Details		Test Summary	
Contract Name	O'Devaney Gardens Phase 2	Description: Brown slightly sandy slightly gravelly SILT/CLAY	No. Blows
Contract No.	10009		
Client Name	Engineer		
Sample Details		Moisture Content (%)	Penetration (mm)
BH/TP No.	BH 16	11.7	1
Depth (m)	2		2
Sample Type	D		3
Sample Reference	3250	% Passing 20mm Sieve	4
		Moisture Condition Value	6
		8.2	8
		Comments	12
			16
			24
			32
			48
			64
			100



# Moisture Condition Value Test Report Sheet

I.G.S.L.

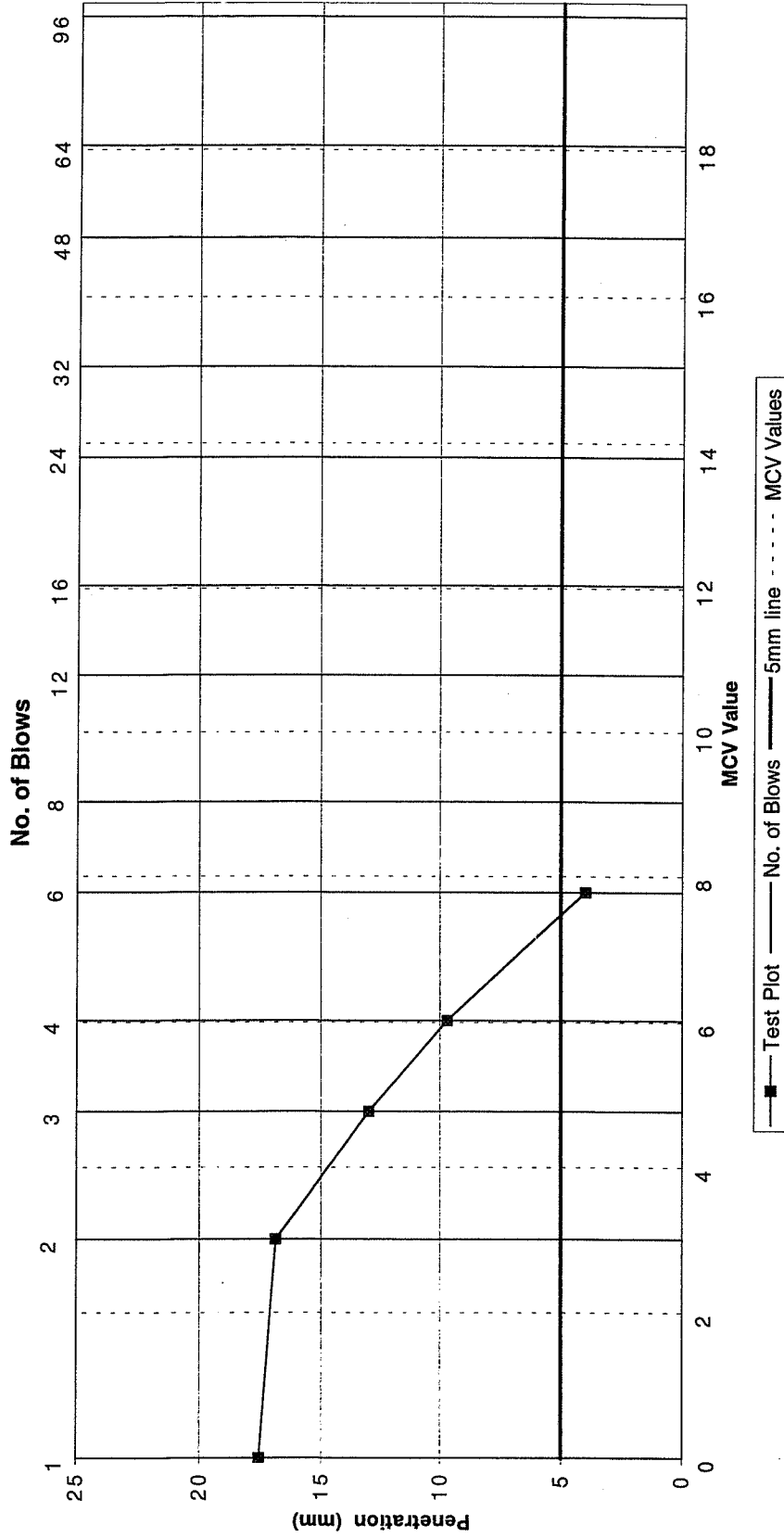
Contract Details		Test Summary		No. Blows	Penetration (mm)
Contract Name	O'Devaney Gardens Phase 2	Description: Black grey slightly sandy slightly gravelly SILT/CLAY	Moisture Content (%)	1	16.7
Contract No.	10009			2	17.1
Client Name				3	16.2
Engineer				4	13.2
Sample Details				6	8.2
BH/TP No.	BH 15			8	4
Depth (m)	3			12	
Sample Type	D			16	
Sample Reference	3246			24	
				32	
				48	
				64	
				100	



# Moisture Condition Value Test Report Sheet

I.G.S.L.

Contract Details		Test Summary	
Contract Name	O'Devaney Gardens Phase 2	No. Blows	Penetration (mm)
Contract No.	10009		
Client Name	Brown slightly sandy slightly gravelly CLAY		
Engineer			
Sample Details		1 2 3 4 6 8 12 16 24 32 48 64 100	17.6 16.9 13 9.7 4
BH/TP No.	BH 14		
Depth (m)	2		
Sample Type	D		
Sample Reference	3238	Moisture Content (%)	
		12.8	
		% Passing 20mm Sieve	
		64.7	
		Moisture Condition Value	
		7.5	
		Comments	



**I.G.S.L.**

The graph plots Penetration (mm) on the Y-axis (0 to 25) against No. of Blows on the X-axis (1 to 18). It includes a solid line for Test Plot data and a dashed line for 5mm Values.

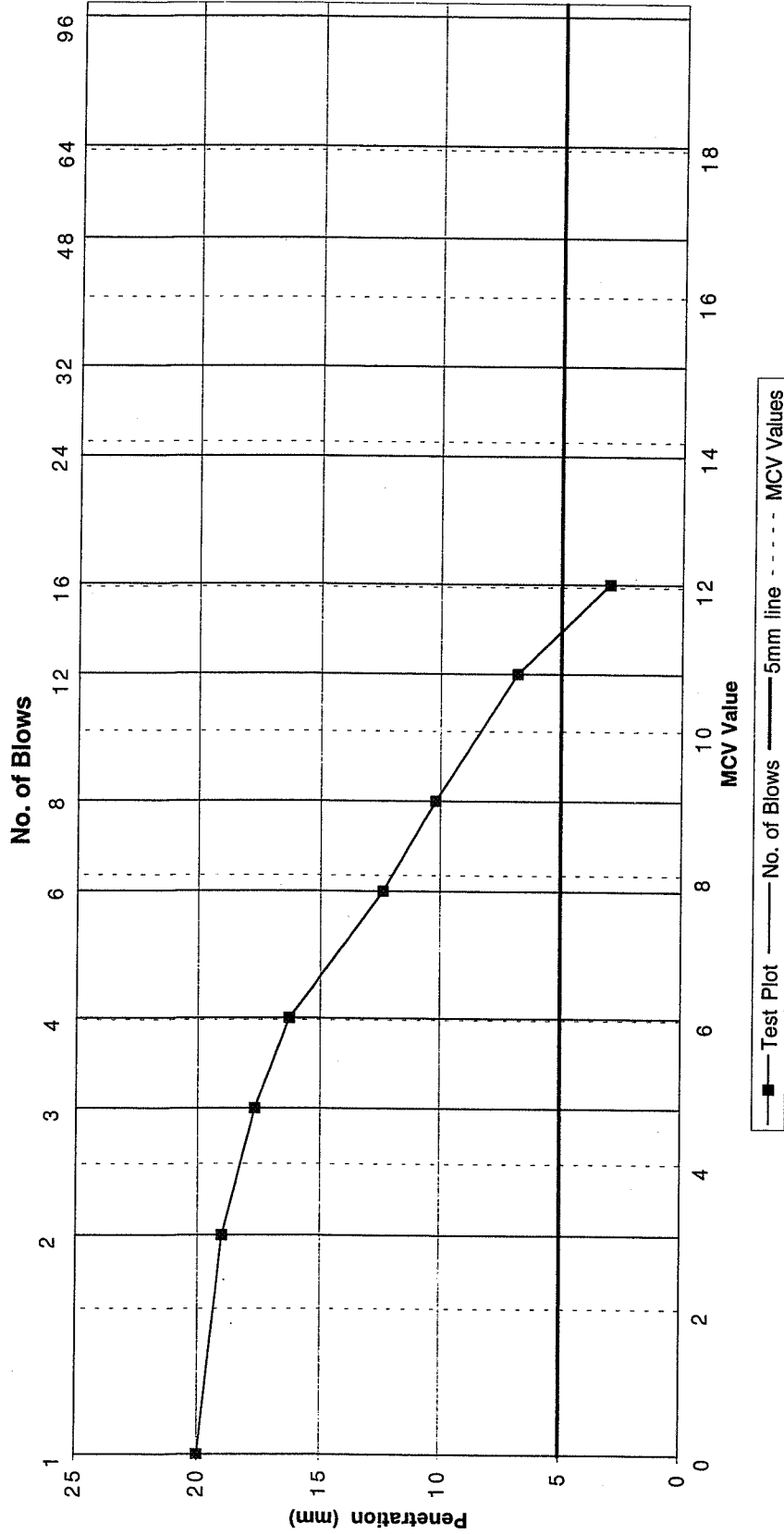
No. of Blows	Penetration (mm) - Test Plot	Penetration (mm) - 5mm Values
1	17.5	17.5
2	16.5	16.5
3	15.5	15.5
4	14.5	14.5
6	12.5	12.5
8	10.5	10.5
10	8.5	8.5
12	7.5	7.5
14	6.5	6.5
16	5.5	5.5
18	4.5	4.5



# Moisture Condition Value Test Report Sheet

I.G.S.L.

Contract Details		Test Summary	
Contract Name	O'Devaney Gardens Phase 2	No. Blows	Penetration (mm)
Contract No.	10009		
Client Name Engineer			
Sample Details		Description: Grey slightly sandy slightly gravelly CLAY	
BH/TP No.	BH 12	Moisture Content (%)	
Depth (m)	4	8.1	
Sample Type	D	% Passing 20mm Sieve	
Sample Reference	3225	84	
		Moisture Condition Value	
		11.4	
		Comments	

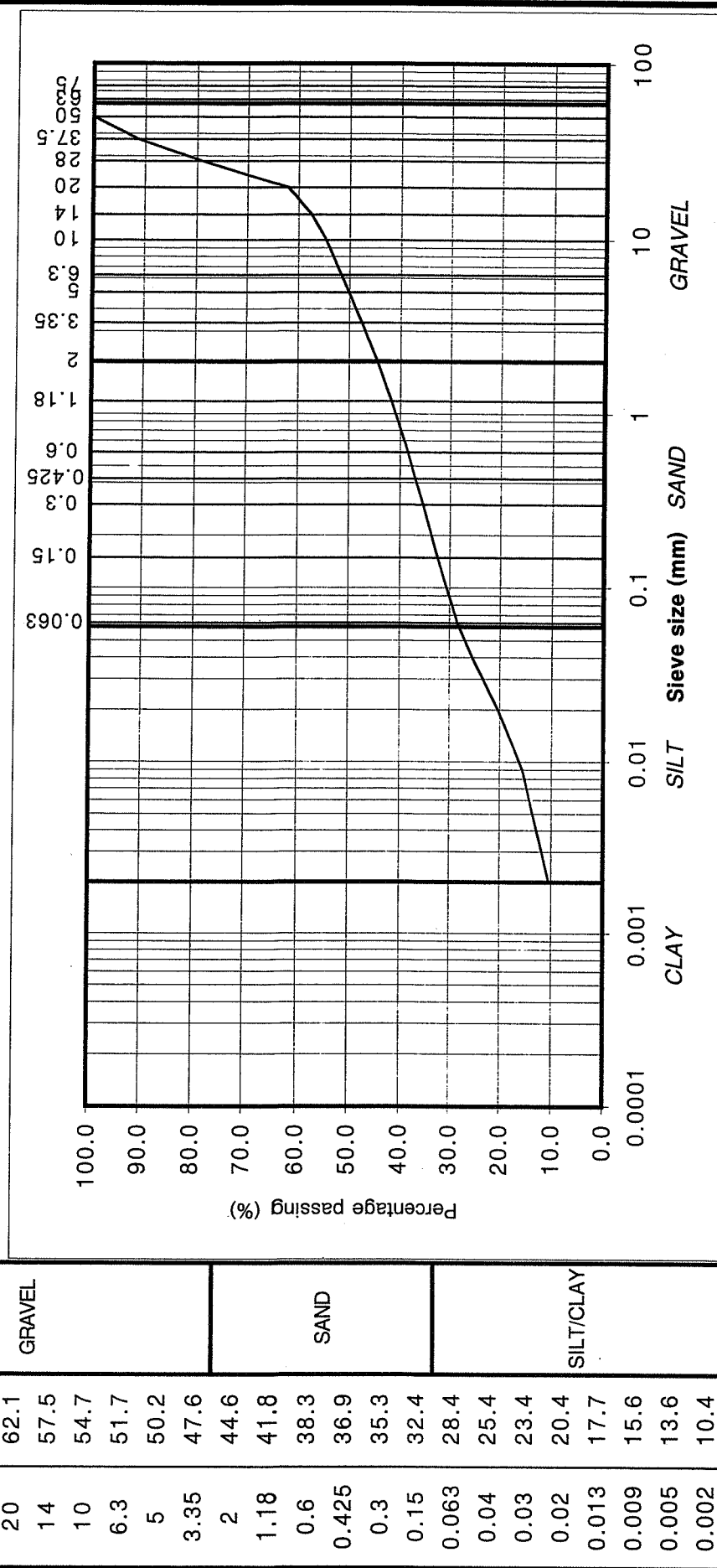


SULPHATE ANALYSIS										IGSL
CONTRACT: O'Devaney Gardens Phase 2										CONTRACT NO 10009
BH/TP NO.	DEPTH (M)	SAMPLE NO.	SAMPLE TYPE	TEST CODE	% Passing 2mm	SULPHUR TRIOXIDE		TOTAL SOIL so 3 %	TOTAL SOIL so 4 %	pH VALUE
						WATER SO3 g/L	TOTAL SOIL so3 %			
BH 12	2.10	3224	D	S	37.7		0.037	0.044		8.2
BH 14	4.00	3240	D	S	55.3		0.209	0.251		7.5
BH 15	3.00	3247	D	S	60.1		0.218	0.262		7.7
TEST CODE: W = WATER S = SOIL A = AQUEOUS SOIL EXTRACT(2:1)										

# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No:	10009
Contract:	O'Devaney Gardens Phase 2
BH/TP No:	BH 12
SAMPLE No.:	3226
DEPTH (m):	5.00
TEST METHOD:	Wet sieve and hydrometer
DESCRIPTION:	Black slightly sandy, gravelly, SILT/CLAY



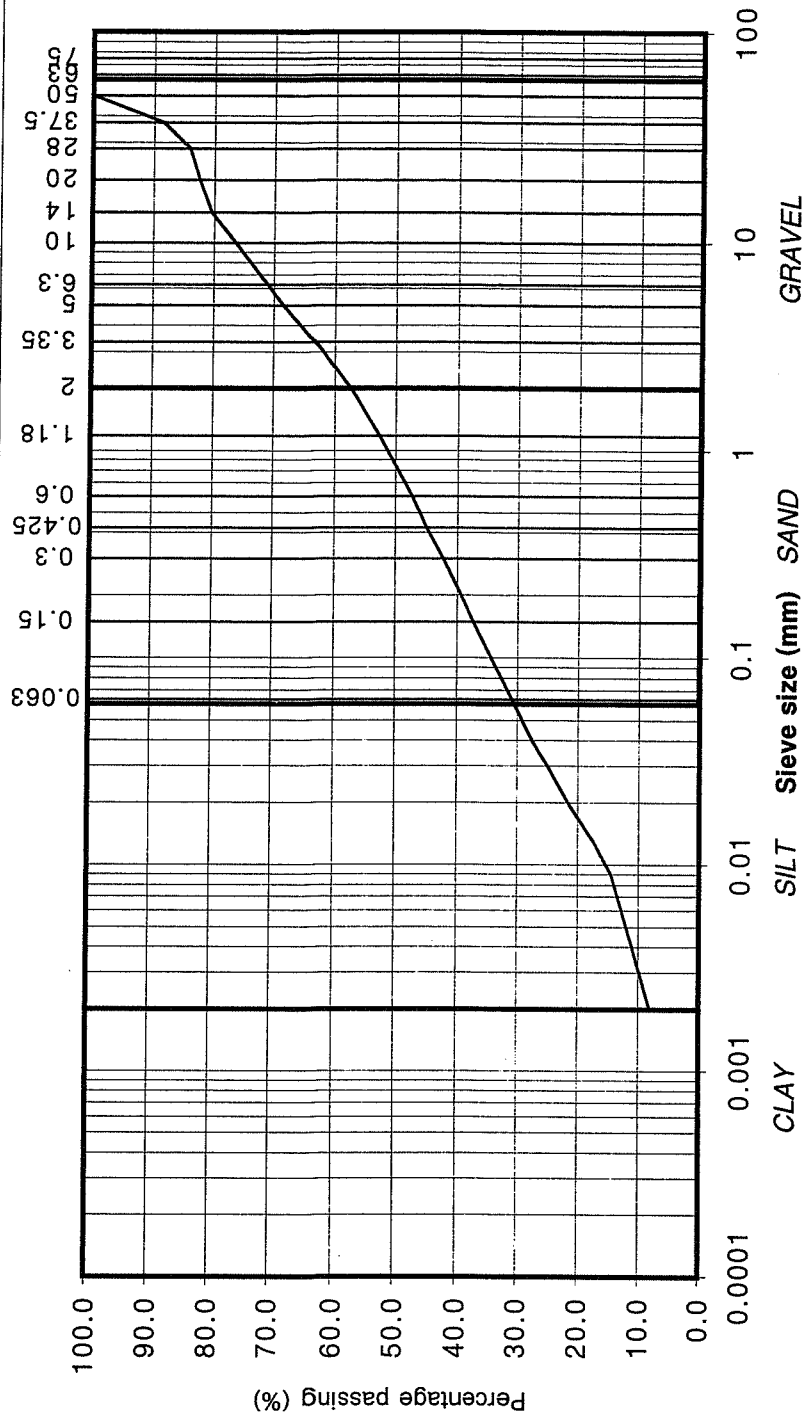
Compiled by:	D CONNOLLY	Date:	30/9/04	Checked by:		Date:		Page no:	
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# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	88.4	
28	84.0	
20	82.4	GRAVEL
14	80.4	
10	76.4	
6.3	71.1	
5	68.4	SAND
3.35	63.2	
2	57.4	
1.18	52.7	
0.6	47.2	SILT/CLAY
0.425	44.9	
0.3	42.2	
0.15	37.3	
0.063	30.8	
0.04	27.5	
0.03	25.1	
0.02	21.6	
0.013	17.4	SILT/CLAY
0.009	14.5	
0.005	12.0	
0.002	8.1	

Contract No: 10009  
 Contract: O'Devaney Gardens Phase 2  
 BH/TP No: BH 13  
 SAMPLE No.: 3230  
 DEPTH (m): 2.00  
 TEST METHOD: Wet sieve and hydrometer  
 DESCRIPTION: Brown slightly sandy, gravelly, SILT/CLAY



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30/9/04

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Date:

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# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 10009

Contract: O'Devaney Gardens Phase 2

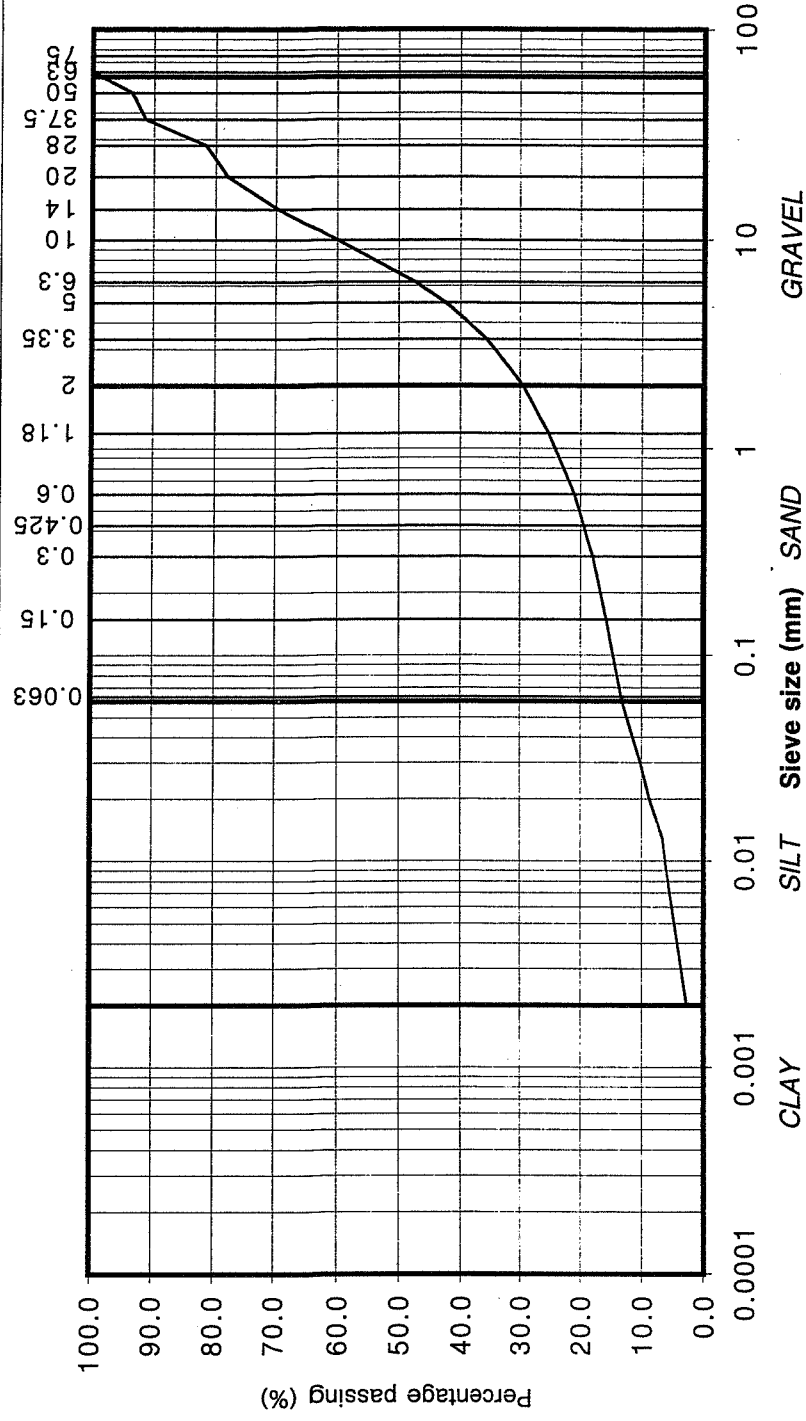
BH/TP No: BH 13

SAMPLE No.: 3231

DEPTH (m): 2.50

TEST METHOD: Wet sieve and hydrometer

DESCRIPTION: Brown clayey/silty, sandy, GRAVEL



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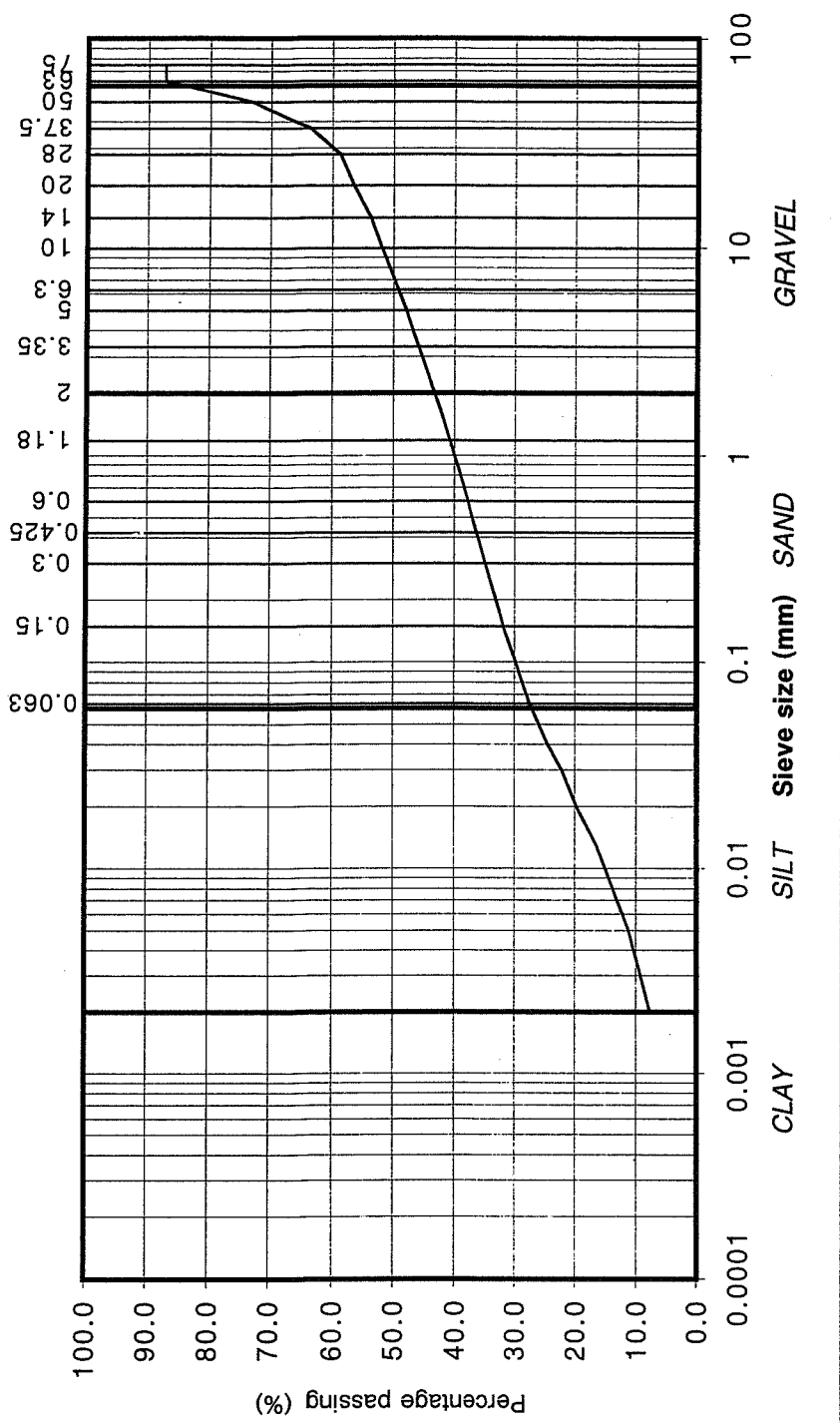
PSD V3.1 12.01

# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 10009  
 Contract: O'Devaney Gardens Phase 2  
 BH/TP No: BH 14  
 SAMPLE No.: 3237  
 DEPTH (m): 1.00  
 TEST METHOD: Wet sieve and hydrometer  
 DESCRIPTION: Mottled grey brown slightly sandy, gravelly, SILT/CLAY with some cobbles

particle size	% passing	
75	87.3	COBBLES
63	87.3	GRAVEL
50	73.0	
37.5	63.7	
28	58.7	
20	56.6	SAND
14	53.7	
10	52.0	
6.3	49.2	
5	48.0	SILT/CLAY
3.35	45.9	
2	43.2	
1.18	40.7	
0.6	37.6	
0.425	36.3	
0.3	34.7	
0.15	31.8	
0.063	27.4	
0.04	24.5	
0.03	22.1	
0.02	19.7	
0.013	16.4	
0.009	14.4	
0.005	11.1	
0.002	7.6	



Compiled by: D CONNOLLY Date: 30/9/04 Checked by: Date: Page no:

IGSL

# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 10009

Contract: O'Devaney Gardens Phase 2

BH/TP No: BH 14

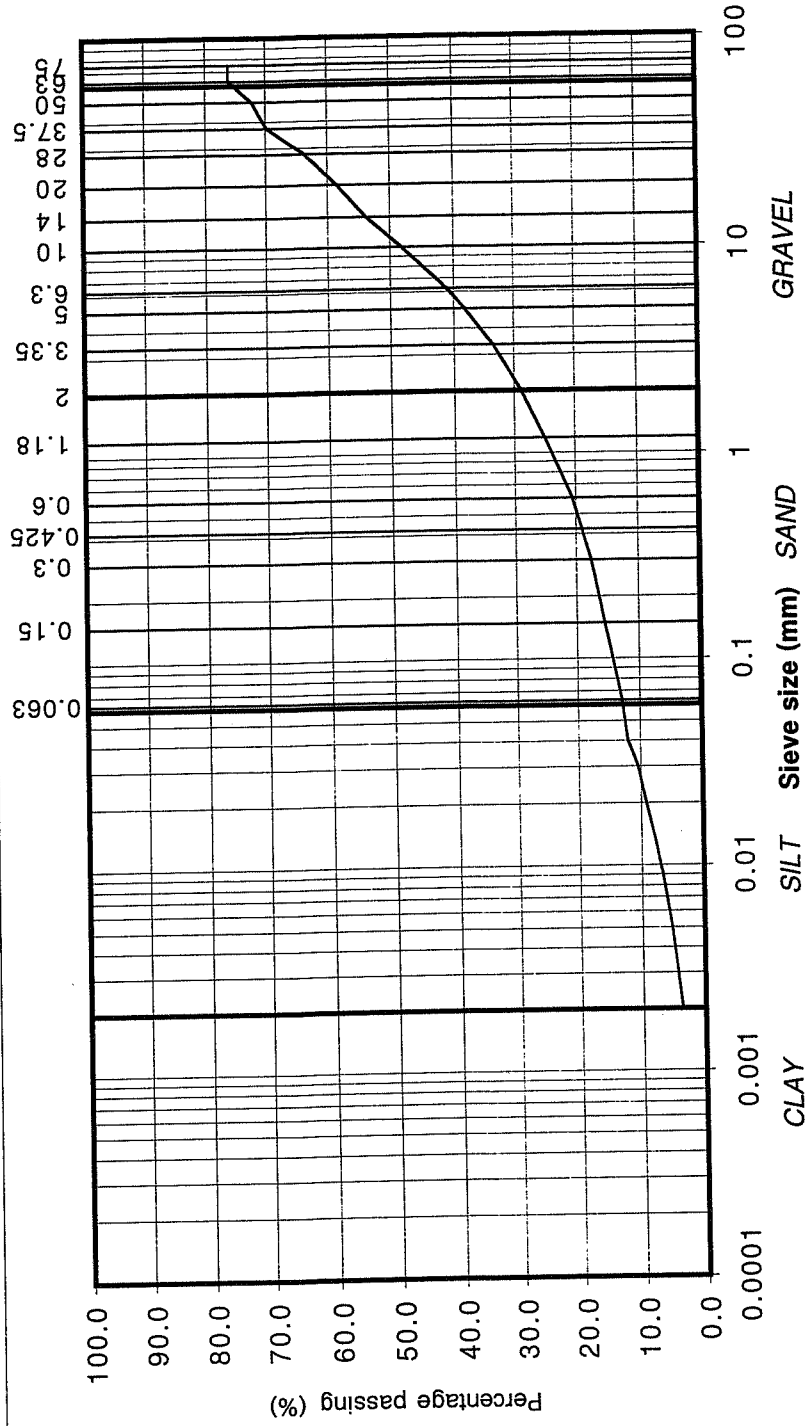
SAMPLE No.: 3241

DEPTH (m): 5.00

TEST METHOD: Wet sieve and hydrometer

DESCRIPTION: Black grey clayey/silty, sandy, GRAVEL with many cobbles

particle size	% passing	COBBLES	GRAVEL	SAND	SILT/CLAY
75	76.1				
63	76.0				
50	72.2				
37.5	69.8				
28	63.7				
20	58.6				
14	53.9				
10	48.2				
6.3	41.1				
5	38.2				
3.35	33.5				
2	28.8				
1.18	25.0				
0.6	20.6				
0.425	19.1				
0.3	17.7				
0.15	15.5				
0.063	12.9				
0.04	12.0				
0.03	10.4				
0.02	9.1				
0.013	7.6				
0.009	6.6				
0.005	5.2				
0.002	3.6				



Compiled by:

Date:

Checked by:

Date:

Page no:

IGSL

D CONNOLLY

30/9/04

IGSL LIMITED, UNIT F, M7 BUSINESS PARK, NAAS, CO.KILDARE.

PSD V3.1 12.01

# Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 10009

Contract: O'Devaney Gardens Phase 2

BH/TP No: BH 16

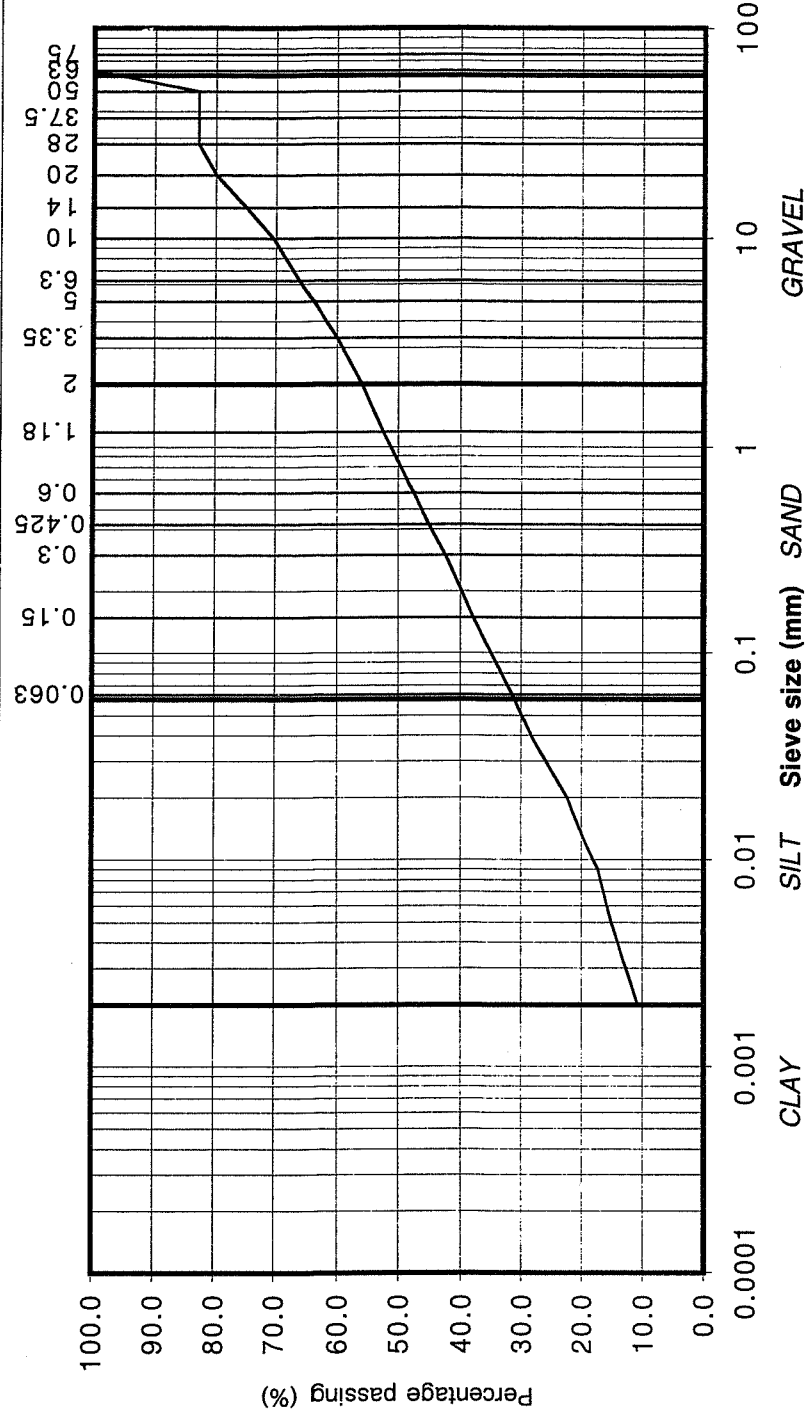
SAMPLE No.: 3252

DEPTH (m): 3.00

TEST METHOD: Wet sieve and hydrometer

DESCRIPTION: Grey slightly sandy, gravelly, SILT/CLAY

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	82.8	
37.5	82.8	
28	82.8	
20	79.9	GRAVEL
14	74.9	
10	70.4	
6.3	66.1	
5	63.9	SAND
3.35	60.1	
2	56.0	
1.18	52.5	
0.6	47.5	SILT/CLAY
0.425	45.1	
0.3	42.4	
0.15	37.9	
0.063	31.5	
0.04	28.4	
0.03	25.8	
0.02	22.3	
0.013	19.8	SILT/CLAY
0.009	17.3	
0.005	15.0	
0.002	10.8	



Compiled by:

D CONNOLLY

Date:

30/9/04

Checked by:

Date:

Page no:

**IGSL**



Report No.		CALIFORNIA BEARING RATIO					I.G.S.L.					
Contract:		O'Devaney Gardens Phase 2		DATE: 30/9/04		CONTRACT No 10009						
Location	Sample No.	Depth of Sample	Sample Description	Water Content %	Test Code	Water Content		Bulk Density Mg/M3	% Passing 20mm	C.B.R.		
						Top %	Bottom %			Top %	Base %	Average %
BH 13	3229	1.00	Brown slightly sandy slightly gravelly CLAY	8.8	L/St	8.7	8.9	2.07	91.1	33.4	23.5	28.5
BH 14	3237	1.00	Mottled grey brown slightly sandy gravelly SILT/CLAY with some cobbles	11.5	L/St	11.5	11.6	2.18	56.6	17.0	10.7	13.8
BH 15	3244	1.00	Brown slightly sandy slightly gravelly SILT/CLAY	10.7	L/St	11.5	9.7	2.21	81.8	13.7	12.3	13.0
Test Code:		U.-Undisturbed Sample	L.-2.5Kg. Rammer	A/5.-5% Air Voids Ratio	V.- Vibrating Hammer							
		D.-Dynamic Compaction	H.-4.5Kg. Rammer	A10.-10% Air Voids Ratio	M.- Method Number							
		St.-Static compaction	RN29.- Road Note 29 (St. 95% H.)									

**Appendix IV**

**Laboratory Test Records**  
**( Environmental )**

**Mr Keogh  
IRISH GEOTECHNICAL SURVEYS  
Unit F  
M7 Business Park  
Naas  
Co Kildare  
Ireland**

11 November 2004

**Test Report : TH/248933/2004**

Dear Mr Keogh,

Analysis of your sample(s) submitted on 29/09/2004 is now complete and we have pleasure in enclosing the appropriate test report(s).


Should you have any query on the report(s) or any part of our service we will be happy to discuss your requirements.

An invoice for the analysis carried out will be sent under separate cover.

Thank you for using STL and we look forward to receiving your next samples.

To arrange a container delivery or sample collection please ring the direct line to **COURIERS on 024 7685 6562.**

Yours Sincerely,

Signed : 

Name : J. Fell

Title : Section Manager

# Report Summary



1314  
0897  
1229  
1510



# STL

**Mr Darren Keogh**  
**IRISH GEOTECHNICAL SURVEYS LTD**  
**Unit F**  
**M7 Business Park**  
**Naas**  
**Co Kildare**  
**Ireland**

**Report Number : TH/248933/2004      Issue 1**

**Job Description :** Irish Geotechnical Surveys Ltd

**Job Location :** O Devant Gardens St Brins Hosp.

**Number of Samples**  
**included in report**

**1**

**Job Received : 29 September 2004**

**Number of test results**      **24**  
**included in report**

**Analysis Commenced : 30 September 2004**

**Signed :**

**Name : H. Quick**

**Date : 11 November 2004**

**Title : Senior Coordinator**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory

# Certificate of Analysis



1314  
0897  
1229  
1510



# STL

Sample 1 Laboratory Number : 424210  
of 1 Report Number : TH/248933/2004 Issue 1

Sample Source : IRISH GEOTECHNICAL SURVEYS LTD  
Sample Point Description : Irish Geotechnical Surveys  
Sample Description : BH 12 3222

Sample Date : 28 September 2004 Sample Received : 29 September 2004 Analysis Complete : 10 November 2004

Test Description	Result	Units	Accreditation	Method
Antimony, Total as Sb	<0.001	mg/l	C	WAS016
Arsenic, Total as As	0.009	mg/l	C	WAS014
Barium, Total as Ba	0.009	mg/l	C	WAS049
Cadmium, Total as Cd	<0.0005	mg/l	C	WAS049
Chromium, Total as Cr	<0.005	mg/l	C	WAS049
Copper, Total as Cu	<0.005	mg/l	C	WAS049
Lead, Total as Pb	<0.005	mg/l	C	WAS049
Mercury, Total as Hg	<0.1	ug/l	C	WAS013
Molybdenum, Total as Mo	<0.005	mg/l	C	WAS049
Nickel, Total as Ni	<0.005	mg/l	C	WAS049
Selenium, Total as Se	<0.001	mg/l	C	WAS015
Zinc, Total as Zn	0.006	mg/l	C	WAS049
Fluoride as F	0.3	mg/l	C	WAS029
NRA Leachate	Analyst Comment		* C	PREP
Chloride as Cl	3	mg/l	C	WAS036
Sulphate as SO4	<5	mg/l	C	WAS036
Solids, Total diss.at 180c	142	mg/l	* C	WAS010
TOC (Filtered)	6.7	mg/l	C	WAS005
Naphthols BG 2.6/3.0	<0.1	mg/l	* L	PHOHBGW2
Phenol BG 2.6/3.0	< 0.50	ug/l	* L	PHOHBG2.4
Cresols BG 2.6/3.0	< 0.50	ug/l	* L	PHOHBG2.4
Total Phenols BG 2.6/3.0	< 2.5	ug/l	* L	PHOHBG2.4
Trimethylphenol BG 2.6/3.0	< 0.50	ug/l	* L	PHOHBG2.4
Xylenols&EthylphenolsBG2.6/3.0	0.67	ug/l	* L	PHOHBG2.4

Analyst Comment for 424210 : NRA Leachate performed on this sample.

Accreditation Codes : \* = Not UKAS accredited B = Analysed at Bridgend C = Analysed at STL Coventry R = Analysed at Runcorn S = Sub-contracted  
L = Analysed at STL CAS For Microbiological determinands 0 or ND = Not Detected, DET = Detected

Signed :

Name : H. Quick

Date : 11 November 2004

Title : Senior Coordinator

# Report Summary



1314  
0897  
1229  
1510



# STL

**Mr Darren Keogh**  
**IRISH GEOTECHNICAL SURVEYS LTD**  
**Unit F**  
**M7 Business Park**  
**Naas**  
**Co Kildare**  
**Ireland**

**Report Number : TH/248936/2004 Issue 1**

**Job Description :** Irish Geotechnical Surveys Ltd

**Job Location :** O Devant Gardens St Bricens Hosp.

**Number of Samples**  
**included in report**

**1**

**Job Received : 29 September 2004**

**Number of test results**  
**included in report**

**44**

**Analysis Commenced : 30 September 2004**

**Signed :**

**Name : J. Fell**

**Date : 15 October 2004**

**Title : Production Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.  
Information on the methods of analysis and performance characteristics are available on request  
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation  
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory

# Certificate of Analysis



1314  
0897  
1229  
1510



# STL

Sample **1** Laboratory Number : **424220**  
of **1** Report Number : **TH /248936/2004** Issue **1**

Sample Source : **IRISH GEOTECHNICAL SURVEYS LTD**  
Sample Point Description : **Irish Geotechnical Surveys**  
Sample Description : **BH12 3222**

Sample Date : **28 September 2004** Sample Received : **29 September 2004** Analysis Complete : **13 October 2004**

Test Description	Result	Units	Accreditation	Method
Antimony as Sb, dry weight	2.5	mg/kg	L	30C
Arsenic as As, dry weight	13	mg/kg	L	30/30C
Barium as Ba, dry wt.	60	mg/kg	L	52
Cadmium as Cd, dry weight	2.4	mg/kg	L	30
Chromium as Cr, dry weight	14	mg/kg	L	30
Copper as Cu, dry weight	43	mg/kg	L	30
Lead as Pb, dry weight	47	mg/kg	L	30
Mercury as Hg, dry weight	< 0.20	mg/kg	L	30C
Molybdenum as Mo, dry weight	3.5	mg/kg	L	52
Nickel as Ni, dry weight	44	mg/kg	L	30
Selenium as Se, dry weight	0.75	mg/kg	L	30C
Zinc as Zn, dry weight	120	mg/kg	L	30
Sulphate as SO <sub>4</sub> , water sol dw	< 120	mg/kg	L	46
Total organic carbon	17000	mg/kg	L	36
PCB28	< 1.0	ug/kg	C	312
PCB52	< 1.0	ug/kg	C	312
PCB101	< 1.0	ug/kg	C	312
PCB118	< 1.0	ug/kg	C	312
PCB138	< 1.0	ug/kg	C	312
PCB153	< 1.0	ug/kg	C	312
PCB180	< 1.0	ug/kg	C	312
TPH >C6-C8	< 5.0	mg/kg	C	314
TPH >C8-C10	< 5.0	mg/kg	C	314
TPH >C10-C16	< 10	mg/kg	C	314
TPH >C16-C24	26	mg/kg	C	314
TPH >C24-C40	69	mg/kg	C	314
TPH >C6-C40	95	mg/kg	C	314
Naphthalene	< 0.50	mg/kg	C	313
Acenaphthylene	< 0.50	mg/kg	C	313
Acenaphthene	< 0.50	mg/kg	C	313
Fluorene	< 0.50	mg/kg	C	313
Phenanthrene	< 0.50	mg/kg	C	313
Anthracene	< 0.50	mg/kg	C	313
Fluoranthene	1.4	mg/kg	C	313
Pyrene	1.2	mg/kg	C	313
Benzo(a)anthracene	0.60	mg/kg	C	313
Chrysene	0.73	mg/kg	C	313
Benzo(b)fluoranthene	0.75	mg/kg	C	313
Benzo(k)fluoranthene	0.71	mg/kg	C	313
Benzo(a)pyrene	0.61	mg/kg	C	313

# Certificate of Analysis



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# STL

Sample **1** Laboratory Number : **424220**  
of **1** Report Number : **TH /248936/2004** Issue **1**

Sample Source : **IRISH GEOTECHNICAL SURVEYS LTD**  
Sample Point Description : **Irish Geotechnical Surveys**  
Sample Description : **BH12 3222**

Sample Date : **28 September 2004** Sample Received : **29 September 2004** Analysis Complete : **13 October 2004**

Test Description	Result	Units	Accreditation	Method
Indeno(123cd)pyrene	< 0.50	mg/kg	C	313
Dibenzo(ah)anthracene	< 0.50	mg/kg	C	313
Benzo(ghi)perylene	< 0.50	mg/kg	C	313
PAH total	5.9	mg/kg	C	313

Accreditation Codes : \* = Not UKAS accredited B = Analysed at Bridgend C = Analysed at STL Coventry R = Analysed at Runcorn S = Sub-contracted  
L = Analysed at STL CAS For Microbiological determinands 0 or ND = Not Detected, DET = Detected

Signed :

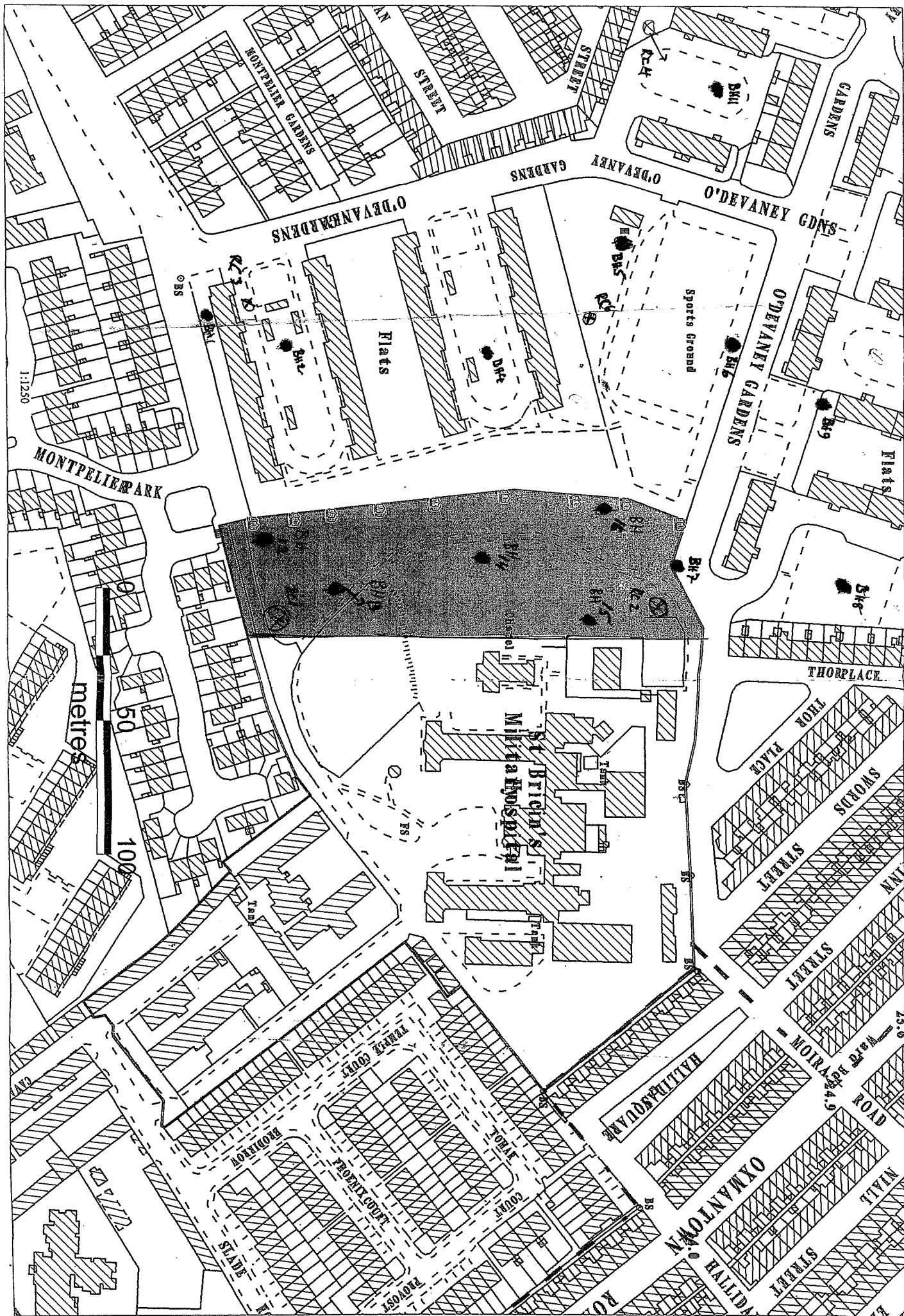
Name : **J. Fell**

Date : **15 October 2004**

Title : **Production Manager**



## **Appendix V – Site Plan**



# ***IGSL Ltd***

**Site Investigation Specialists &  
Geotechnical Consultants  
On-Site Testing Facilities, Concrete, Soils & Tarmacadam Testing**

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Unit F,  
M7 Business Park  
Naas,  
Co. Kildare,  
Republic of Ireland.

Phone No. 045 846176 / 846180  
Int. Phone ( Int. Access + 353 45 846180 )  
Fax. No. 045 846187  
E.Mail No. johnclancy@igsl.ie  
Web Site www.igsl.ie  
ILAB Accreditation No. 133T

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## **FACSIMILE COVER SHEET**

<b>To</b>	<b>Stephen Bradley</b>
<b>Company</b>	<b>Arup</b>
<b>Phone No.</b>	
<b>Fax. No.</b>	<b>01 - 6683169</b>
<b>From</b>	<b>John Clancy</b>
<b>Date</b>	<b>28.10.04</b>
<b>No. of Pages</b>	<b>26</b>
<b>Contract:</b>	<b>O'Devaney Gardens Phase 2</b>

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### **Message:**

Stephen,

Enclosed please find the completed report text and corehole logs.

Report has been dispatched by courier.

Regards

Transmission By Fax Only		Transmission By Fax & Post	
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