

# Appendix 6-1

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Irish Drilling Report

# **IRISH DRILLING LIMITED**

## **CONTRACT DRILLING SITE INVESTIGATION**

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## **MIXED DEVELOPMENT CROWN SITE, MERVUE GALWAY**

### **SITE INVESTIGATION REPORT**

Michael Punch & Ptns.,  
Consulting Engineers,  
97 Henry St.,  
Limerick

May 2007

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## **1.0 Introduction.**

Irish Drilling Ltd. were instructed by Michael Punch & Partners, Consulting Engineers, to carry out a site investigation on the site of a proposed development at the 'Crown' site, Mervue, Galway.

The site investigation has therefore been carried out to assess the ground conditions and provide data to assist in the design of foundations.

The investigation was carried out between 19<sup>th</sup> January 2007 and 22<sup>nd</sup> March 2007.

## **2.0 Site & Geology**

The site is located on the Mervue Road at the recently vacated 'Crown' site.

Much of the site was greenfield lawn area and the remainder had a factory and associated yards and parking area, during the period of this investigation.

A Site Plan is included in this report and shows the positions of the trial pits and boreholes.

Geological Survey maps of the area indicate that the site is underlain by the Carboniferous Limestone Formation.

## **3.0 Fieldwork.**

Sixteen (including one re-bore at Bh-5a) shell and auger (light cable percussion) boreholes were bored on the site. Standard Penetration Tests were carried out at approximately one metre intervals and samples were taken and returned to the laboratory for examination. The borehole records are included in Appendix 1.

Seven rotary core boreholes were drilled using HQ (65mm) wire-line drilling equipment, to depth of between 5.0m and 14.0m below existing ground levels. The boreholes were logged by an engineering geologist and the records are included in Appendix 2.

Eleven trial pits were excavated with a 13 tonne tracked excavator and subsequently a 20 tonne tracked excavator was used at a number of locations to try to penetrate deeper into a hard Glacial till which was presenting difficulties for the lighter machine. The trial pits records are included in Appendix 3

Contaminant testing was carried out at a number of locations and the tests were carried out by Alcontrol Geochem. Laboratory classification testing was carried out on a number of representative soil samples. Tests carried out were natural moisture content, Atterberg Limits and Particle Size Distribution tests. The results are included in Appendix 4



Photographs of some of the trial pits are included in Appendix 5.

Standpipe piezometers were installed in Boreholes 1, 3, 5, 7, 9, 13 and 15 to monitor groundwater and gas levels. Water and gas level readings are included in Appendix 6.

#### **4.0 Ground Conditions**

Generally the sub-soils consist of a layer of topsoil or fill over gravelly sandy clay with cobbles and boulders that becomes stiffer with increasing depth. The Till frequently becomes very stiff to hard .

Rock was encountered at between 0.60m on the western side of the site to a maximum depth of 10.8m in the south-western corner of the site. Generally rockhead appears to slope downwards from north to south. Rock is generally very strong, grey, slightly weathered limestone with close to medium spaced fractures. Rockhead was encountered at the following levels:

RC-1	2.40m
RC-3	10.80m
RC-5	6.20m.
RC-7	4.30m
RC-9	6.10m
RC-13	2.50m
RC-15	1.50m

#### **4.1 Groundwater**

Groundwater was not encountered in the trial pits or in the shell and auger boreholes, possibly as casing was used in the boreholes that prevented slow water inflows from entering the boreholes. Standpipes installed in some of the boreholes encountered groundwater and these levels are included in Appendix 6. The shallowest water table measured was at 2.40m depth in Bh-15 on 14<sup>th</sup> March 2007.

## 5.0 Foundations.

There are proposals to construct basements over part of this site. It is expected to be unlikely to be able to excavate into the soils and to maintain stability of excavations without some form of ground support. Alternatively consideration could be given to battering excavation sides at slopes no greater than 2:1 (horizontal:vertical).

Foundations on clean sound limestone may be designed using an allowable bearing pressure of 1,000kN/m<sup>2</sup>. On the hard Glacial Till foundations may be designed using an allowable bearing pressure of 300kN/m<sup>2</sup>. Formation should not be exposed to rainfall or groundwater as it is expected to soften rapidly under those conditions.

Consideration could also be given to using piled foundations. The length of pile would depend on the pile type and diameter, the design loads and the strength of the soils or rock. The advice of specialist contractors should be sought as to the feasibility of their type of pile.

### 5.1 Retaining Walls

For the design of retaining walls the following parameters may be used <sup>(4)</sup> :

Strata	Unit Wt. saturated/dry kN/m <sup>3</sup>	Cohesion (undrained) kPa	Angle of internal friction φ degrees
Fill	22/20	0	20
Loose Sand and Gravel	20/16	0	30
Dense Sand and Gravel	21/17	0	35
Very soft organic clay	14/6	10	0
Soft slightly organic clay	16/10	20	0
Firm sandy clay	17/12	40	0
Firm to stiff glacial till	20/17	75	0
Stiff glacial till	20/17	100	0
Very stiff glacial till	20/17	200	0
Hard glacial till	20/17	300	0
Limestone	24/24	10,000	40

## 6.0 Excavations

Excavations are likely to be unstable, particularly in sandy and gravelly soils and some form of side supports of excavation sides is likely to be necessary.

In the interest of safety, personnel should not be allowed enter unsupported excavations deeper than 1.0m.

## 7.0 Environmental tests

The results of environmental tests on representative samples indicate that the level of contaminants in the samples are within acceptable limits for a commercial/residential development .

Declan Joyce, B.E., M.Eng.Sc., C.Eng., MIEI.

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### REFERENCES:

- (1) B.S.5930:(1999), Code of Practice for Site Investigation.
- (2) B.S.1377:(1990), Methods of Test for Soils for Civil Engineering Purposes.
- (3) B.S.8004:(1986), Foundations.
- (4) Hoek E. & Bray J.W. (1991) Rock Slope Engineering. Revised 3<sup>rd</sup> ed. IMM
- (5) Kauzenkamp, K.W., Roels, J.M. and Hoppener, C. (1993), Assessment of soil contamination: General criteria and site specific modifications. In contaminated soil '93. Fourth Int. TNO /KfK Conference on Contaminated Soil. F Arendt, G.J. Annokkee, R. Bosman and W.J. van den Brink (eds.). Kluwer Academic Publishers.




**APPENDIX 1**  
**BOREHOLE RECORDS**  
**(SHELL & AUGER)**



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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				BOREHOLE No  <b>1</b>	
Job No	Date 23-01-07 23-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.50	B				 (0.80) 0.80	TOPSOIL Loose brown silt with cobbles.			
							Refusal - possible boulders or rock		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
23-01-07	08.00	0.00	0.00			0	0.8	2			
23-01-07	10.00	0.80	0.80		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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IDL AGS3 UK BH GALWAY CROWN.GPJ IDL TP TEMPLATE.GDT 02/02/07



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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>2</b>	
Job No	Date 17-01-07 17-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)		
0.00-0.50	B			(0.60)	0.60	TOPSOIL Loose brown silt with cobbles.		
0.50-1.00 0.50	B CPT	N11 (2, 2, 2, 2, 3, 4)			(3.20)	Firm grey gravelly sandy CLAY with cobbles.		
1.50-2.00 1.50	B CPT	N14 (2, 2, 3, 3, 4, 4)			3.80	Refusal - possible boulders or rock		
2.50-3.00 2.50	B CPT	N15 (3, 4, 4, 3, 4, 4)						
3.50	CPT	N50/ 70 (7, 14, 50)						
3.80	CPT	N75/ 125 (25, 50)						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Dia. mm	Water Dpt	From	To	Hours	From	To	
17-01-07	09.00	0.00	0.00			0.2	.4	0.5			
17-01-07	13.00	3.80	3.80		dry	3.5	3.8	1			

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>3</b>	
Job No	Date 17-01-07 17-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.50	B			(0.60)	0.60	TOPSOIL Loose brown silt with cobbles.			
0.50-1.00 0.50	B CPT	N11 (3, 2, 3, 3, 2, 3)			(3.70)	Firm grey gravelly sandy CLAY with cobbles.			
1.50-2.00 1.50	B CPT	N15 (2, 3, 4, 3, 4, 4)			4.30	Refusal - possible boulders or rock			
2.50-3.00 2.50	B CPT	N20 (3, 4, 4, 5, 5, 6)							
3.50-4.00 3.50	B CPT	N35 (3, 4, 6, 6, 9, 14)							
4.30	CPT	N75/ 75 (25, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-01-07	13.00	0.00	0.00			3.95	4.3	1			
17-01-07	16.00	4.30	4.30		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>4</b>		
Job No	Date 17-01-07 17-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.00-0.50	B				(0.40) 0.40	TOPSOIL Loose brown silt with cobbles.		
0.50-1.00 0.50	B CPT	N10 (2, 2, 1, 3, 3, 3)			(2.10)	Firm grey gravelly sandy CLAY with cobbles.		
1.50-2.00 1.50	B CPT	N14 (3, 3, 4, 3, 3, 4)			2.50	Stiff grey gravelly sandy CLAY with cobbles.		
2.50-3.00 2.50	B CPT	N42 (5, 5, 7, 10, 10, 15)			(1.00) 3.50	Refusal - possible boulders or rock		
3.50		N50/ 125 (9, 15, 15, 35)						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
17-01-07	16.00	0.00	0.00			2.8	3.2	1			
17-01-07	18.00	3.50	3.20		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>5</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.50	B			[Symbol]	(0.80)	TOPSOIL Loose brown silt with cobbles.			
0.50-1.00	B			[Symbol]	0.80				
0.50	CPT	N20 (3, 3, 2, 4, 4, 10)		[Symbol]	(0.40)	Firm grey gravelly sandy CLAY with cobbles.			
1.00	D			[Symbol]	1.20				
1.20	CPT	N75/ 75 (25, 50)				Refusal - possible boulders or rock			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-01-07	08.00	0.00	0.00			0.9	1.2	1			
18-01-07	10.00	1.20	1.20		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>6</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.00-0.50	B			(0.70)	(0.70)	TOPSOIL Loose brown silt with cobbles.		
0.50-1.00	B			(1.00)	(1.00)	Firm grey gravelly sandy CLAY with cobbles.		
0.50	D	N13 (2, 3, 3, 4, 3, 3)						
0.50	CPT							
1.50-2.00	B			(3.30)	(3.30)	Stiff grey gravelly sandy CLAY with cobbles.		
1.50	CPT	N22 (3, 4, 4, 6, 6, 6)						
2.50-3.00	B							
2.50	CPT	N44 (5, 8, 12, 12, 10, 10)						
3.50-4.00	B							
3.50		N50/ 150 (8, 15, 22, 28)						
4.30	CPT	N75/ 125 (25, 50)				Refusal - possible boulders or rock		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-01-07	14.00	0.00	0.00			3.7	4.3	1			
18-01-07	16.00	4.30	4.30		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>7</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.00-0.50	B			(0.60)	0.60	TOPSOIL Loose brown silt with cobbles.			
0.50-1.00 0.50 0.50	B D CPT	N13 (1, 2, 2, 3, 4, 4)		(0.90)	1.50	Firm grey gravelly sandy CLAY with cobbles.			
1.50-2.00 1.50	B CPT	N15 (3, 4, 4, 4, 3, 4)		(2.00)	3.50	Stiff grey gravelly sandy CLAY with cobbles.			
2.50-3.00 2.50	B CPT	N20 (2, 5, 3, 5, 6, 6)		(0.50)	4.00	Very stiff grey gravelly sandy CLAY with cobbles.			
3.50-4.00 3.50	B CPT	N48/ 150 (3, 10, 10, 12, 12, 14)				Refusal - possible boulders or rock			
4.00	CPT	N75/ 150 (25, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-01-07	16.00	0.00	0.00			2.1	2.3	0.5			
18-01-07	18.00	4.00	4.00		dry	3.6	4	1			

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>8</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.00-0.50	B				(0.50)	TOPSOIL Loose brown silt with cobbles.		
0.50-1.00	B D	N15 (3, 3, 4, 3, 4, 4)			(0.50)	Firm grey gravelly sandy CLAY with cobbles.		
0.50	CPT				1.00			
1.50-2.00	B CPT	N22 (2, 4, 5, 5, 6, 6)			(2.50)	Stiff grey gravelly sandy CLAY with cobbles.		
2.50-3.00	B CPT	N27 (3, 3, 5, 7, 8, 7)			3.50			
3.50-3.80	B CPT	N31/ 95 (18, 19, 19, 12)			3.80	Very stiff grey gravelly sandy CLAY with cobbles.		
3.80	CPT	N75/ 85 (25, 50)				Refusal - possible boulders or rock		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19-01-07	08.00	0.00	0.00			3.4	3.8	1			
19-01-07	10.30	3.80	3.80		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>9</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.50	B			(0.60)	0.60	TOPSOIL Loose brown silt with cobbles.			
0.50-1.00 0.50 0.50	B D CPT	N17 (3, 3, 4, 3, 5, 5)		(0.90)	1.50	Stiff grey gravelly sandy CLAY with cobbles.			
1.50-2.00 1.50	B CPT	N35 (5, 8, 8, 7, 9, 11)		(1.70)	3.20	Very stiff grey gravelly sandy CLAY with cobbles.			
2.50-3.00 2.50	B CPT	N50/ 225 (10, 10, 15, 15, 20)				Refusal - possible boulders or rock			
3.20	CPT	N75/ 125 (25, 50)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19-01-07	10.30	0.00	0.00			2.5	3.2	1			
19-01-07	13.30	3.20	3.20		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>10</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.00-0.50	B				(0.60)	TOPSOIL Loose brown silt with cobbles.		
0.50-1.00	B				0.60	Very stiff grey gravelly sandy CLAY with cobbles.		
0.50	CPT	N40 (4, 8, 8, 10, 10, 12)			(0.80)			
1.40	CPT	N18/ 20 (17, 32, 18)			1.40	Refusal - possible boulders or rock		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
19-01-07	13.30	0.00	0.00			0.9	1.1	1.5			
19-01-07	16.30	1.40	1.40		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>11</b>		
Job No	Date 23-01-07 23-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA			Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)		
0.00-1.00	B				(0.60) 0.60	TOPSOIL Loose brown silt with cobbles.		
1.00-1.50 1.00	B CPT	N39 (2, 3, 7, 9, 10, 13)			(2.30)	Dense grey SAND and GRAVEL with cobbles.		
2.00-2.50 2.00	B CPT	N46 (2, 2, 11, 10, 11, 14)			2.90	Refusal - possible boulders or rock		
2.90	CPT	N30/ 75 (30)						

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
23-01-07	09.00	0.00	0.00			2.9		1			
23-01-07	13.00	2.90	2.90		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				BOREHOLE No  <b>12</b>		
Job No	Date 22-01-07 22-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B			(0.60)	0.60	TOPSOIL Loose brown silt with cobbles.			
1.00-1.50 1.00	B CPT	N39 (1, 3, 5, 10, 10, 14)		(2.20)	2.20	Dense grey silty SAND and GRAVEL with cobbles.			
2.00-2.50 2.00	B CPT	N40 (1, 2, 8, 9, 10, 13)		2.80	2.80	Refusal - possible boulders or rock			
2.90		N30/ 0 (30)							

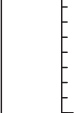
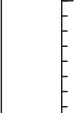
Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
22-01-07	09.00	0.00	0.00			2.8		1			
22-01-07	13.00	2.80	2.80		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				BOREHOLE No  <b>13</b>		
Job No	Date 22-01-07 22-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptns.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			STRATA					Geology	Instrument/ Backfill
Depth	Type No	Test Result	Water	Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B					(0.50) 0.50	TOPSOIL Loose brown silt with cobbles.		
1.00	CPT	N35 (2, 2, 7, 9, 8, 11)				(1.20) 1.70	Dense light brown silty SAND and GRAVEL with cobbles.		
1.70	CPT	N45/ 150 (15, 30)					Refusal - possible boulders or rock		

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
22-01-07	13.00	0.00	0.00			1.7		1			
22-01-07	18.00	1.70	1.70		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>14</b>		
Job No	Date 23-01-07 23-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptms.			GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.): Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B				(0.50) 0.50	TOPSOIL Loose brown silt with cobbles.			
					(0.50) 1.00	Dense light brown silty SAND and GRAVEL with cobbles.			
1.00	CPT	N30/ 0 (30)				Refusal - possible boulders or rock			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
23-01-07	13.00	0.00	0.00			1		1			
23-01-07	18.00	1.00	1.00		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>15</b>		
Job No	Date 22-01-07 22-01-07	Ground Level (m)	Co-Ordinates ()			
Engineer Ml. Punch & Ptns.			<b>GROUNDWATER STRIKES</b> Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:	Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-1.00	B				(0.40) 0.40	TOPSOIL Loose brown silt with cobbles.			
					(0.60) 1.00	Dense light brown silty SAND and GRAVEL with cobbles.			
1.00	CPT	N30/ 0 (30)				Refusal - possible boulders or rock			

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
22-01-07	13.00	0.00	0.00			1		1			
22-01-07	18.00	1.00	1.00		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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## BOREHOLE LOG

Project Mixed Development, Mervue, Galway				<b>BOREHOLE No</b>  <b>5a</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION		
0.00-0.50	B			(0.90)		TOPSOIL Loose brown silt with cobbles.			
0.50-1.00	B	N13 (3, 3, 4, 2, 3, 4)		(0.60)		Firm grey gravelly sandy CLAY with cobbles.			
1.00	D			(1.90)		Stiff grey gravelly sandy CLAY with cobbles.			
1.50-2.00	B	N16 (4, 3, 3, 4, 5, 4)		(1.90)		Stiff grey gravelly sandy CLAY with cobbles.			
1.50	CPT			(3.40)		Refusal - possible boulders or rock			
2.50-3.00	B	N27 (4, 8, 7, 7, 5, 8)							
2.50	CPT								
3.20	CPT	N60/ 135 (4, 18, 29, 31)							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	
18-01-07	11.00	0.00	0.00			2.8	3.2	1			
18-01-07	14.00	3.40	3.20		dry						

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Dando 2000	Bit Design	Logged By
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**APPENDIX 2**  
**BOREHOLE RECORDS**  
**(ROTARY CORE)**



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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No <b>RC-1</b>	
Job No	Date 26-02-07 26-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer MI. Punch & Ptns.				Sheet 1 of 1	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
26-02-00.00	20 (11) 8	-			(2.40)			Boulder Clay		
		4			2.40	2.40 - 6.20 Close to medium spaced, dipping 30 - 35 deg's, irregular, undulose, rough, grey silt smeared		Strong to very strong grey thickly bedded, fine to coarse grained LIMESTONE, slightly weathered.		
26-02-3.00	100 (98) 68	6			(3.80)	3.80 - 4.00 Joint, sub-vertical, planar, smooth, open				
		7				4.90 - 4.95 Joint, dipping 50 deg's, irregular, smooth, grey silt smeared, open				
26-02-5.00	100 (89) 79	4			6.20	5.80 - 6.00 Joint, sub-vertical, undulose, rough, orange silt smeared, open				
26-02-6.20										

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
26-02-07	09.00	0.00										
26-02-07	11.00	6.20	0.00									

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No <b>RC-13</b>	
Job No	Date 28-02-07 28-02-07	Ground Level (m)	Co-Ordinates ()		
Engineer MI. Punch & Ptns.				Sheet 1 of 1	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
28-02-00.00	0 (-) -	-			(2.00)			OPEN HOLE no recovery		
2.00					2.00					
28-02-2.50	30 (-) -	-			(0.50)			GRAVEL of limestone		
28-02-3.00	100 (96) 20	5				2.50 - 2.60 Joint:, dipping sub-vertical, undulose, rough, grey silt smeared, open		Strong to very strong grey, thinly bedded, fine to coarse grained, fossiliferous LIMESTONE, slightly weathered.		
28-02-4.50	100 (87) 60	8			(3.50)	2.50 - 6.00 Closely spaced, dipping 25 deg's, locally undulose, interlocking, smooth, brown silt smeared				
28-02-6.00	100 (97) 73	3				3.75 - 4.05 Joint:, dipping sub-vertical, undulose locally planar, stepped, smooth, orange brown silt smeared, open				
						4.10 - 4.15 Joint:, dipping 50 deg's, irregular, smooth, black silt smeared, iron stained, open				
						4.55 - 4.70 Joint:, dipping sub-vertical, undulose, smooth, grey silt smeared, open				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
28-02-07	11.00	0.00										
28-02-07	14.00	6.00	2.00									

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No <b>RC-15</b>	
Job No	Date 28-02-07 28-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.				Sheet 1 of 1	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
28-02-00.00	0 (-) -	-			(1.50)			OPEN HOLE no recovery		
1.50					1.50					
28-02-2.00	100 (90) 44	7				1.50 - 5.00 Very closely to medium spaced, dipping 25 -30 deg's, undulose and locally irregular, smooth, grey silt smeared, iron stained		Very strong grey, thinly bedded, fine to coarse grained, fossiliferous LIMESTONE, slightly weathered.		
28-02-3.50	100 (59) 0	13			(3.50)	2.80 - 3.80 Joint:, dipping vertical, planar, locally undulose, smooth, grey silt smeared, iron stained, open				
28-02-5.00	100 (81) 40	16			5.00	4.20 - 4.45 Joint:, dipping sub-vertical, undulose, locally planar, smooth, grey silt smeared, open				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
28-02-07	14.00	0.00										
28-02-07	18.00	5.00	1.50									

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				<b>DRILLHOLE No</b>  <b>RC-3</b>	
Job No	Date 26-02-07 26-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.				Sheet 1 of 2	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
26-02-00.00	0 (-) -	-			(3.00)			OPEN HOLE no recovery		
26-02-3.00	28 (-) -	-			3.00			Light grey slightly sandy gravelly SILT with angular to sub-rounded cobbles. Boulder Clay		
26-02-5.00	13 (-) -	-			(4.80)					
26-02-6.50	20 (-) -	-			7.80					
26-02-8.00										

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
26-02-07	13.00	0.00										

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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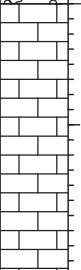






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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No <b>RC-5</b>	
Job No	Date 27-02-07 27-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.				Sheet 1 of 2	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
27-02-00.00	0 (-) -	-			(3.00)			OPEN HOLE no recovery		
27-02-3.00					3.00					
27-02-5.00	23 (-) -	-			(3.20)	3.00 - 9.30 Close to medium spaced, dipping 30 deg's, irregular, interlocking, rough, light brown silt smeared		GRAVEL and COBBLES of limestone.		
27-02-6.50	27 (17) 9				6.20			Strong to very strong, grey, thickly bedded, fine to medium grained, fossiliferous LIMESTONE, slightly weathered.		
27-02-8.00	100 (82) 13	8			(3.10)	6.60 - 7.00 Joint, sub-vertical, undulose, stepped, smooth, light creamy brown silt smeared, open				
		11				7.20 - 8.00 Joint, sub-vertical, undulose, smooth, brown silt smeared, iron stained, open				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
27-02-07	08.00	0.00										

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No  <b>RC-5</b>	
Job No	Date 27-02-07 27-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.				Sheet 2 of 2	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
27-02	100 (90) 62	4			9.30					
9.30										

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
27-02-07	13.00	9.30	3.00									

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				<b>DRILLHOLE No</b>  <b>RC-7</b>	
Job No	Date 27-02-07 27-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer MI. Punch & Ptms.				Sheet 1 of 1	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
27-02-07 0.00	0 (-) -	-								
3.50					3.50					
27-02-07 4.00	90 (-) -	-			(0.80)					
27-02-07 5.00	100 (65) 63	2			4.30	4.30 - 7.10 Medium spaced, dipping 30 deg's, irregular, interlocking, rough, black silt smeared				
27-02-07 6.50	100 (99) 73	4			(2.80)					
27-02-07 7.10	100 (95) 90	5			7.10	6.15 - 6.50 Joint, sub-vertical, undulose, smooth, orange brown silt smeared, open				

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Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
27-02-07	13.00	0.00										
27-02-07	18.00	7.10	3.50									


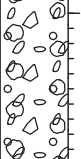
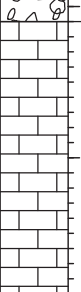
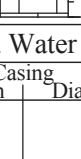
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No <b>RC-9</b>	
Job No	Date 28-02-07 28-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer Ml. Punch & Ptns.				Sheet 1 of 2	

RUN DETAILS					STRATA			Geology	Instrument/ Backfill	
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
28-02-00.00	0 (-) -	-			(3.00)			OPEN HOLE no recovery		
28-02-3.00					3.00					
28-02-5.00	30 (-) -	-			(3.10)			GRAVEL and COBBLES of limestone		
28-02-6.00	20 (-) -				6.10					
28-02-6.50	100 (76) 48				(3.10)	6.10 - 9.20 Medium and occasionally closely spaced, dipping 20 deg's, irregular, interlocking, smooth, a little brown silt smeared		Strong to very strong, grey, thickly bedded, fine to coarse grained, fossiliferous LIMESTONE, slightly weathered.		
28-02-8.00	100 (91) 85	5  3								

IDL AGS3 UK DH GALWAY CROWN.GPJ IDL TP TEMPLATE\_GDT 07/06/07

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
28-02-07	08.00	0.00										

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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## DRILLHOLE LOG

Project Mixed Development, Mervue, Galway				DRILLHOLE No  <b>RC-9</b>	
Job No	Date 28-02-07 28-02-07	Ground Level (m)	Co-Ordinates ( )		
Engineer MI. Punch & Ptns.				Sheet 2 of 2	

RUN DETAILS						STRATA			Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION				
						Discontinuities	Detail	Main		
28-02	100 (99) 95	4			9.20					
9.20										
Empty cells for the rest of the log										

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From	To	Type	Returns	
28-02-07	11.00	9.20	3.00									

All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used	Hydreq	Bit Design	NQ	Logged By
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IDL AGS3 UK DH GALWAY CROWN.GPJ IDL TP TEMPLATE.GDT 07/06/07



**APPENDIX 3**  
**TRIAL PIT RECORDS**

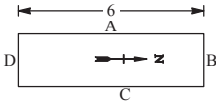
**PROJECT:** Mixed Development, Mervue, Galway  
**LOCATION:** Mervue, Galway  
**CLIENT:** Harmack Crown Control  
**ENGINEER:** M.L. Punch & Ptns.  
**Co-ordinates:** N E  
**Rig:** Kanamoto EX200

**TRIALPIT:** TP 1A  
**Sheet 1 of 1**



**Ground level:** m O.D. **DATE:** 22.3.07

**GROUNDWATER**  
 Water strikes:  
 1st: dry  
 2nd:  
 3rd:

**PIT DIRECTION:** 000  
**PIT DIMENSION:** 1.50 \* 6.00m  
**LOGGED BY:** MM



Shoring/Support:  
 Stability: Pit sides stable

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07							0.20	TOPSOIL (Brown sandy gravelly clay)
1	22.03.07		B	1.00				1.30	Firm brown gravelly slightly sandy CLAY with many sub-rounded to sub-angular cobbles and boulders.
						END			Refusal - limestone rock
2									
3									
4									
5									
6									
7									
8									
9									
10									

**Remarks:** Pit dry during excavation **Scale:** 1:50

<b>PROJECT: Mixed Development, Mervue, Galway</b>		<b>TRIALPIT: TP 2A</b>
<b>LOCATION: Mervue, Galway</b>		<b>Sheet 1 of 1</b>
<b>CLIENT: Harmack Crown Control</b>	<b>Co-ordinates:</b> N E	<b>Rig: Kanamoto EX200</b>
<b>ENGINEER: M.L. Punch &amp; Ptns.</b>		

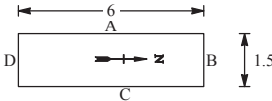
<b>Ground level: m O.D.</b>	<b>DATE: 22.3.07</b>
<b>GROUNDWATER</b> Water strikes: 1st: dry 2nd: 3rd:	<b>PIT DIRECTION: 000</b> <b>PIT DIMENSION: 1.50 * 6.00m</b> <b>LOGGED BY: MM</b>

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07								TOPSOIL (Firm dark brown sandy gravelly clay)
1			B	1.00				1.30	Firm light brown/grey slightly gravelly sandy SILT.
2			B	2.00				3.00	Hard light grey / brown slightly gravelly sandy CLAY with many rounded to sub-rounded cobbles and boulders. (Glacial Till)
3	22.03.07		B	3.00				3.70	Refusal - very slow digging in hard Till
4						<b>END</b>			
5									
6									
7									
8									
9									
10									

<b>Remarks:</b> Pit dry during excavation	<b>Scale:</b>
---	---------------

**1:50**

<b>PROJECT: Mixed Development, Mervue, Galway</b>		<b>TRIALPIT: TP 3A</b>
<b>LOCATION: Mervue, Galway</b>		<b>Sheet 1 of 1</b>
<b>CLIENT: Harmack Crown Control</b>	<b>Co-ordinates:</b> N E	<b>Rig: Kanamoto EX200</b>
<b>ENGINEER: M.L. Punch &amp; Ptns.</b>		

<b>Ground level: m O.D.</b>	<b>DATE: 22.3.07</b>
<b>GROUNDWATER</b> Water strikes: 1st: dry 2nd: 3rd:	<b>PIT DIRECTION: 000</b> <b>PIT DIMENSION: 1.50 * 6.00m</b> <b>LOGGED BY: MM</b> 

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07								TOPSOIL (Firm dark brown sandy very gravelly clay)
								0.35	Stiff grey slightly gravelly sandy SILT with occasional rounded to sub-rounded cobbles.
			B	1.00				0.90	
								1.10	Firm orange grey slightly sandy SILT.
			B	2.00				2.50	Firm to stiff grey slightly gravelly sandy SILT with occasional rounded to sub-rounded cobbles and boulders. (Glacial Till)
			B	3.00				3.50	Hard light grey / brown slightly gravelly sandy CLAY with many rounded to sub-rounded cobbles and boulders. (Glacial Till)
	22.03.07					END			Refusal - very slow digging in hard Till
-4									
-5									
-6									
-7									
-8									
-9									
-10									

<b>Remarks:</b> Pit dry during excavation	<b>Scale:</b> 1:50
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<b>PROJECT: Mixed Development, Mervue, Galway</b>		<b>TRIALPIT: TP 4A</b>
<b>LOCATION: Mervue, Galway</b>		<b>Sheet 1 of 1</b>
<b>CLIENT: Harmack Crown Control</b>	<b>Co-ordinates:</b> N E	<b>Rig: Kanamoto EX200</b>
<b>ENGINEER: M.L. Punch &amp; Ptns.</b>		<b>DATE: 22.3.07</b>

<b>Ground level: m O.D.</b>	<b>PIT DIRECTION: 000</b>	
<b>GROUNDWATER</b>	<b>PIT DIMENSION: 1.50 * 6.00m</b>	
Water strikes: 1st: dry 2nd: 3rd:	<b>LOGGED BY: MM</b>	

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07							0.55	TOPSOIL (Firm dark brown sandy very gravelly clay)
1			B	1.00				1.10	Grey slightly silty SAND and GRAVEL with many rounded to sub-rounded cobbles and some boulders. (medium dense)
2			B	2.00				2.80	Firm to stiff grey slightly gravelly slightly sandy SILT interbedded with layers of coarse gravelly SAND with some rounded to sub-rounded cobbles and boulders. (Glacial Till)
3	22.03.07							3.00	Hard light grey / brown slightly gravelly sandy CLAY with many rounded to sub-rounded cobbles and boulders. (Glacial Till)
						<b>END</b>			Refusal - very slow digging in hard Till
4									
5									
6									
7									
8									
9									
10									

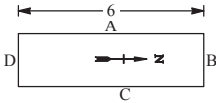
<b>Remarks:</b> Pit dry during excavation	<b>Scale:</b>
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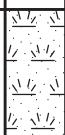



TRIALPIT GALWAY CROWN.GPJ IRISHDRL.GDT 07/06/07

**PROJECT:** Mixed Development, Mervue, Galway  
**LOCATION:** Mervue, Galway  
**CLIENT:** Harmack Crown Control  
**ENGINEER:** M.L. Punch & Ptns.  
**Co-ordinates:** N E  
**Rig:** Kanamoto EX200

**TRIALPIT:** TP 5A  
**Sheet 1 of 1**

**Ground level:** m O.D. **DATE:** 22.3.07

**GROUNDWATER**  
 Water strikes:  
 1st: dry  
 2nd:  
 3rd:  
**PIT DIRECTION:** 000  
**PIT DIMENSION:** 1.50 \* 6.00m  
**LOGGED BY:** MM  
  
 Shoring/Support:  
 Stability: Pit sides stable

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07								TOPSOIL (Firm dark brown sandy slightly gravelly clay)
1			B	1.00				0.90	Firm to stiff grey slightly gravelly slightly sandy SILT with occasional rounded to sub-rounded cobbles and boulders. (Glacial Till)
2			B	2.00				2.30	Stiff light grey / brown slightly gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders. (Glacial Till)
3			B	3.00				2.70	Hard light grey / brown slightly gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders. (Glacial Till)
4	22.03.07					<b>END</b>		3.90	Refusal - presumed limestone rock
5									
6									
7									
8									
9									
10									

**Remarks:** Pit dry during excavation **Scale:** 1:50

**PROJECT:** Mixed Development, Mervue, Galway  
**LOCATION:** Mervue, Galway  
**CLIENT:** Harmack Crown Control  
**ENGINEER:** M.L. Punch & Ptns.  
**Co-ordinates:** N E  
**Rig:** Kanamoto EX200

**TRIALPIT:** TP 6A  
**Sheet 1 of 1**  
**DATE:** 22.3.07

**GROUNDWATER**  
 Water strikes:  
 1st: dry  
 2nd:  
 3rd:

**PIT DIRECTION:** 000  
**PIT DIMENSION:** 1.50 \* 6.00m  
**LOGGED BY:** DJ  
 Shoring/Support:  
 Stability: Pit sides stable

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07							0.20	TOPSOIL (Dark brown sandy gravelly clay)
								0.40	SUBSOIL (Soft to firm brown slightly gravelly sandy CLAY) Firm to stiff light brown/grey very gravelly sandy CLAY with some sub-rounded to sub-angular cobbles and boulders .
1			B	1.00					
2			B	2.00					
3			B	3.00				2.80	Hard light brown slightly gravelly sandy CLAY with occasional sub-rounded cobbles. (Glacial Till)
4			B	4.00					
5	22.03.07					END		4.60	Refusal - limestone rock
6									
7									
8									
9									
10									

**Remarks:** Pit dry during excavation  
**Scale:** 1:50

<b>PROJECT: Mixed Development, Mervue, Galway</b>		<b>TRIALPIT: TP 8A</b>
<b>LOCATION: Mervue, Galway</b>		<b>Sheet 1 of 1</b>
<b>CLIENT: Harmack Crown Control</b>	<b>Co-ordinates:</b> N E	<b>Rig: Kanamoto EX200</b>
<b>ENGINEER: M.L. Punch &amp; Ptns.</b>		<b>DATE: 22.3.07</b>

<b>Ground level: m O.D.</b>	
<b>GROUNDWATER</b> Water strikes: 1st: dry 2nd: 3rd:	<b>PIT DIRECTION: 000</b> <b>PIT DIMENSION: 1.50 * 6.00m</b> <b>LOGGED BY: DJ</b>

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07							0.25	TOPSOIL (Brown sandy gravelly clay)
								0.50	SUBSOIL (Soft to firm brown slightly gravelly sandy CLAY) Firm to stiff brown very gravelly sandy CLAY with some sub-rounded to sub-angular cobbles and boulders (to 600mm size).
1			B	1.00					
2			B	2.00					
3			B	3.00					
								3.50	
4			B	4.00-4.50					Hard light brown slightly gravelly sandy CLAY. (Glacial Till)
	22.03.07							4.70	
5						END			Refusal - limestone rock
6									
7									
8									
9									
10									

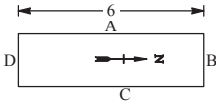
<b>Remarks:</b> Pit dry during excavation	<b>Scale:</b> 1:50
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**PROJECT:** Mixed Development, Mervue, Galway  
**LOCATION:** Mervue, Galway  
**CLIENT:** Harmack Crown Control  
**ENGINEER:** M.L. Punch & Ptns.  
**Co-ordinates:** N E  
**Rig:** Kanamoto EX200

**TRIALPIT:** TP 9A  
**Sheet 1 of 1**

**Ground level:** m O.D. **DATE:** 22.3.07

**GROUNDWATER**  
 Water strikes:  
 1st: dry  
 2nd:  
 3rd:  
**PIT DIRECTION:** 000  
**PIT DIMENSION:** 1.50 \* 6.00m  
**LOGGED BY:** DJ  
  
 Shoring/Support:  
 Stability: Pit sides unstable

Depth (m)	Date	Water	Samples	Depth (m)	SPT (N)	LEGEND	Elevation m O.D.	Depth (m)	DESCRIPTION
0	22.03.07							0.30	TOPSOIL (Brown sandy gravelly clay)
									Firm light brown very gravelly sandy CLAY with some sub-rounded to sub-angular cobbles.
1			B	1.00				1.20	Light grey very silty sandy GRAVEL with some sub-angular to sub-rounded cobbles.
2			B	2.00				2.70	
3	22.03.07 22.03.07					END			Refusal - limestone rock
4									
5									
6									
7									
8									
9									
10									

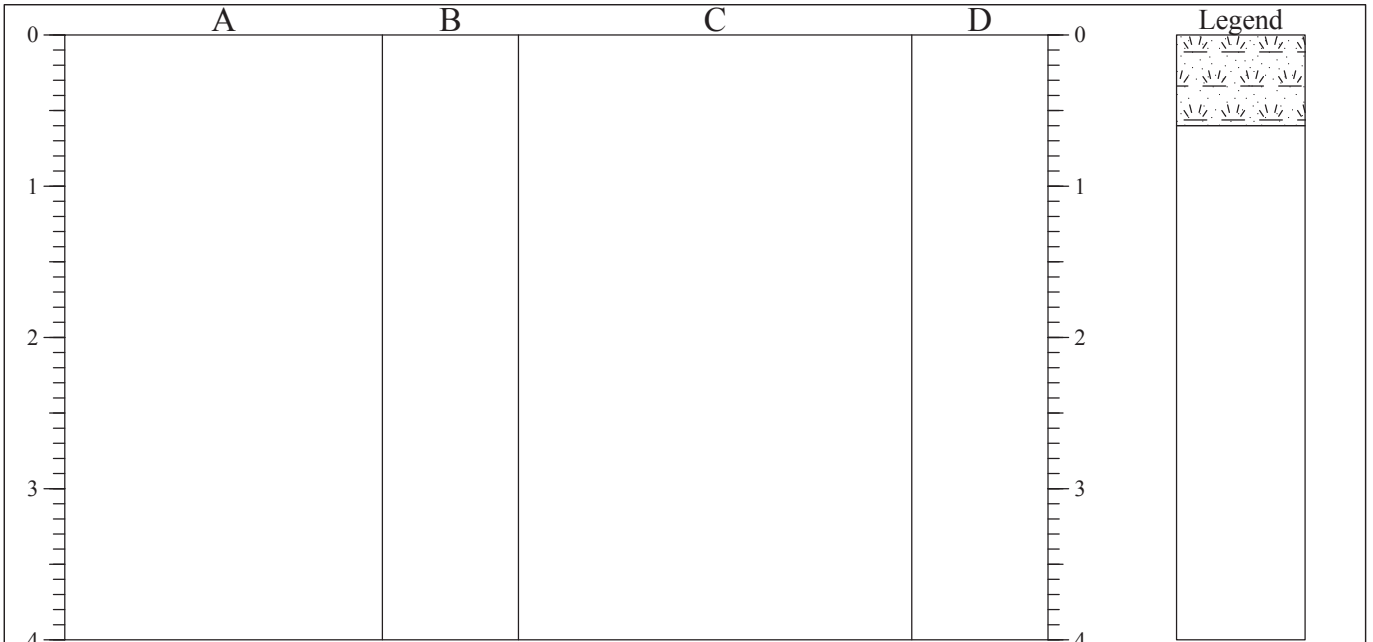
**Remarks:** Pit dry during excavation **Scale:** 1:50



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## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-1</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.60		TOPSOIL (Brown sandy gravelly clay)			0.40	D	
0.60		Refusal - possible rock or very large boulders					

Shoring/Support: Stability: Pit sides stable  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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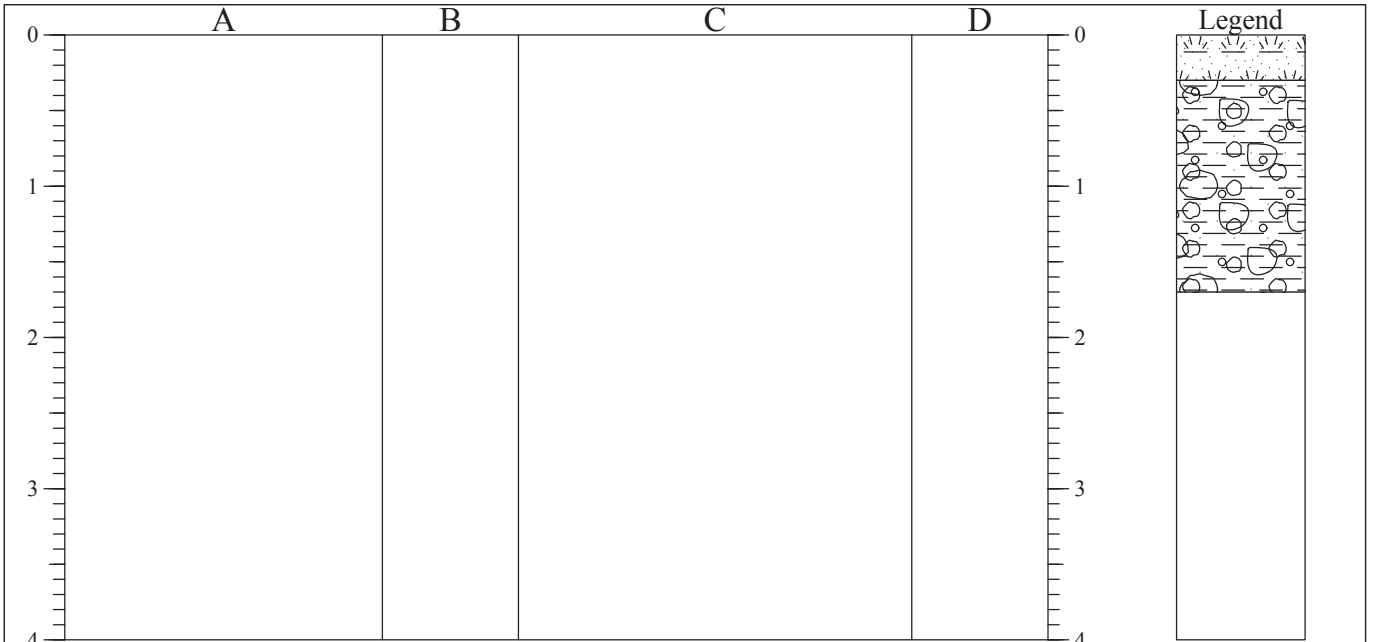
IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07



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### TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-10</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.30		TOPSOIL (Brown sandy clay)					
0.30-1.70		Grey silty SAND and GRAVEL with some sub-rounded to sub-angular cobbles and boulders (to 400mm size)			1.00	B	
					1.50	B	
1.70		Refusal - possible rock or very large boulders					

IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

Shoring/Support: Stability: Pit sides unstable  	GENERAL REMARKS
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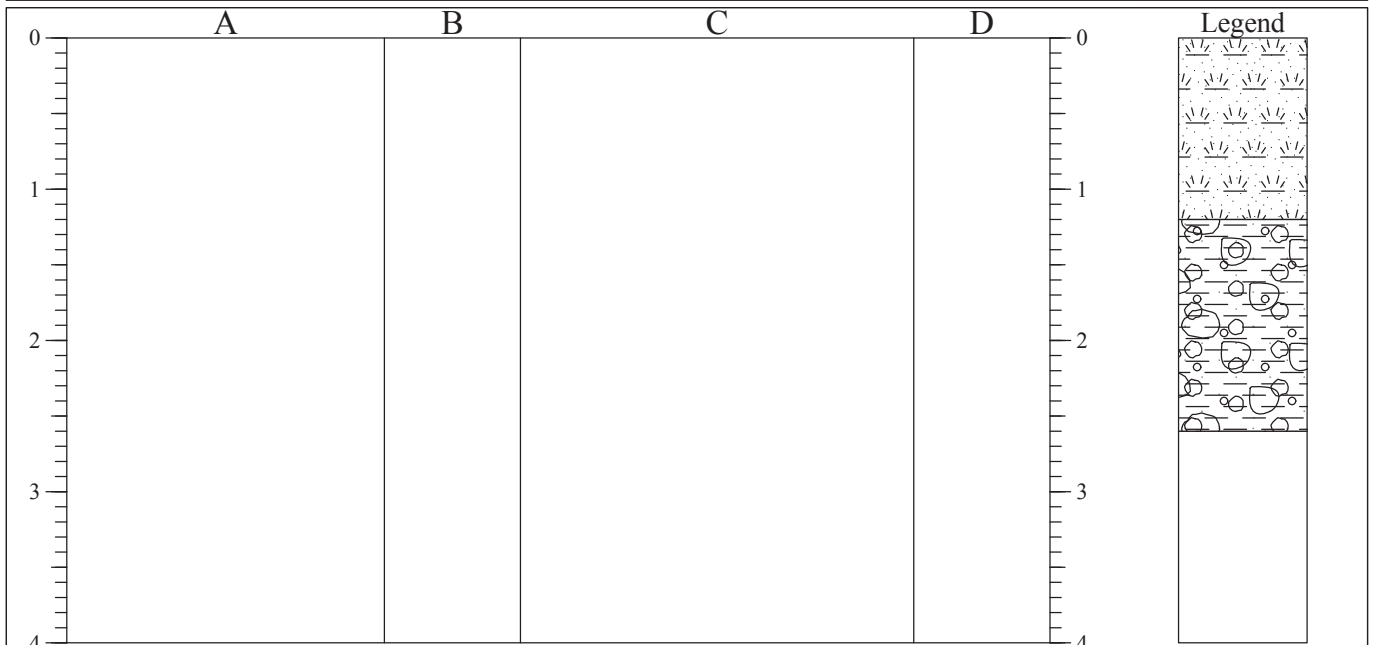
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-2</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-1.20		TOPSOIL (Brown sandy gravelly clay)			0.50	D	
1.20-2.60		Firm grey gravelly sandy CLAY with some sub-rounded cobbles and boulders (to 400mm size)			1.50	B	
					2.00	D	
2.60		Refusal - possible rock or very large boulders			2.60	B	

Shoring/Support: Stability: Pit sides stable  	<b>GENERAL REMARKS</b>  
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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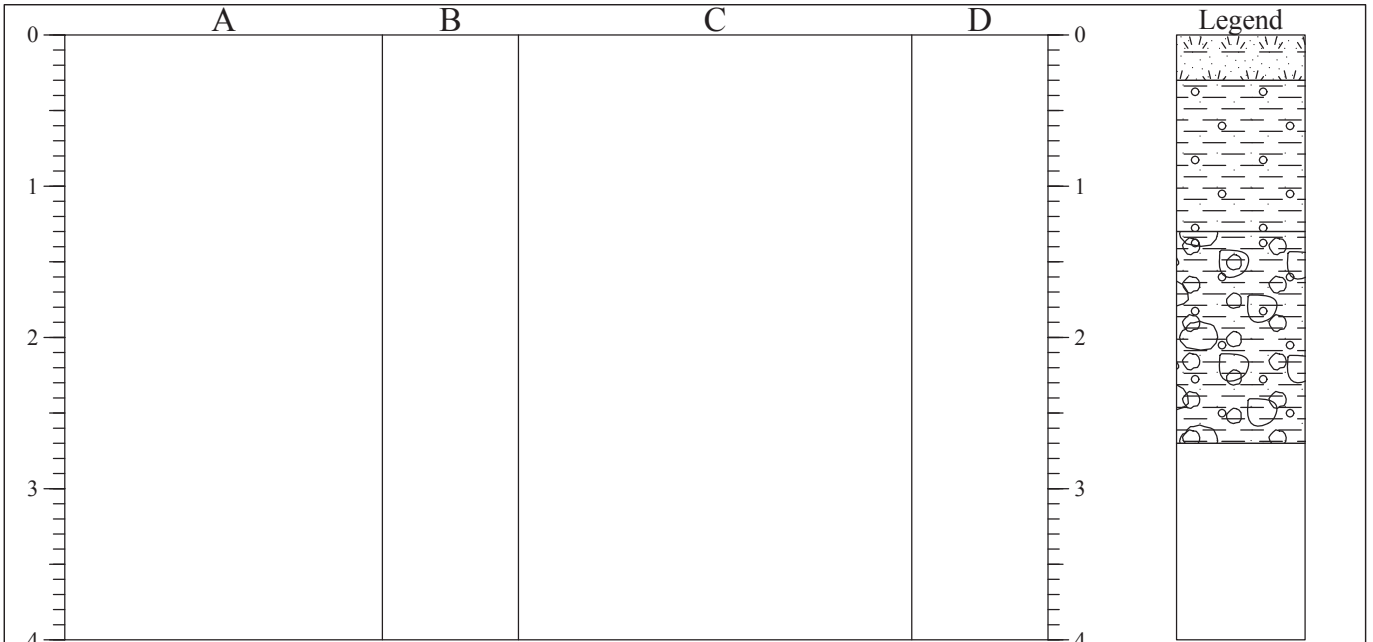
IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07



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## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-3</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.30		TOPSOIL (Brown sandy gravelly clay)					
0.30-1.30		Soft to firm brown rgavelly sandy CLAY.			0.30	D	
					1.00	B	
1.30-2.70		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 300mm size)			2.00	D	
					2.50	B	
2.70		Refusal - possible rock or very large boulders					

IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

Shoring/Support: Stability: Pit sides unstable  	<b>GENERAL REMARKS</b>
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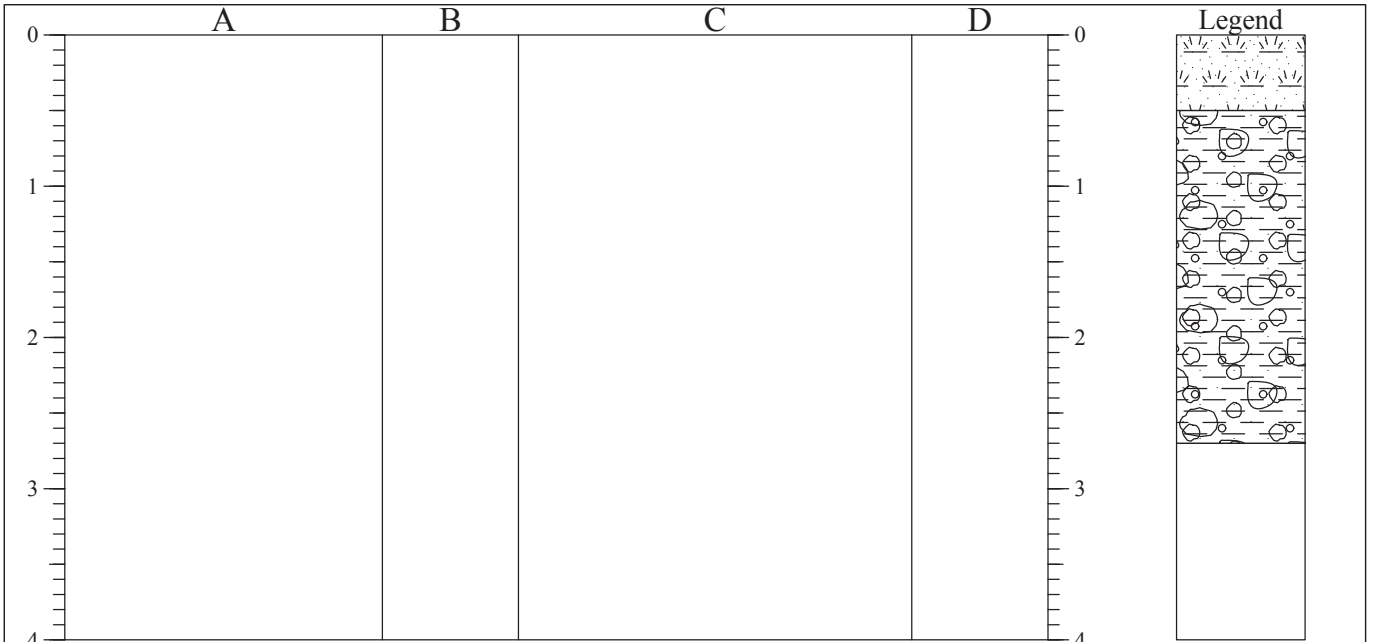
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-4</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.50		TOPSOIL (Brown sandy gravelly clay)					
0.50-2.70		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 700mm size)			0.40	D	
					1.50	B	
					2.50	D	
2.70		Refusal - possible rock or very large boulders					

IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

Shoring/Support: Stability: Pit sides unstable  	<b>GENERAL REMARKS</b>  
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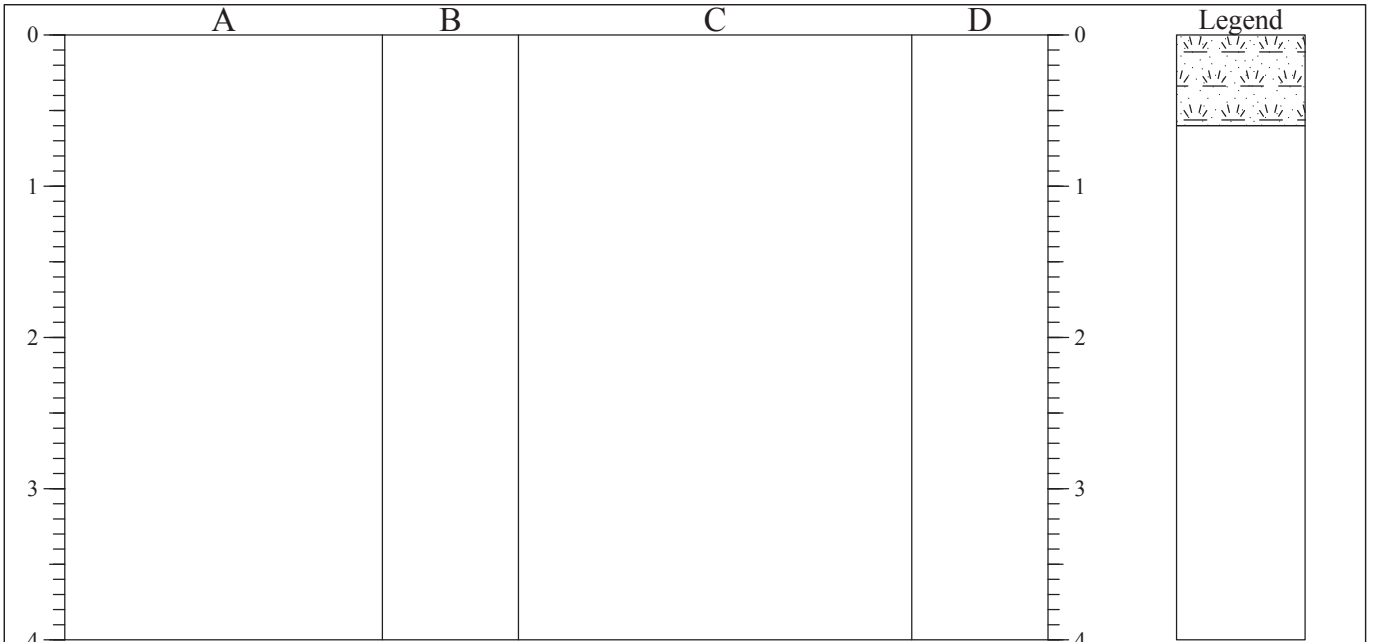
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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Irish Drilling Ltd.  
 Old Galway Rd.,  
 Loughrea, Co. Galway  
 Telephone: 091 841274  
 Fax: 091 847687

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-5</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.60		TOPSOIL (Brown sandy gravelly clay)					
0.60		Abandoned - 100mm blue duct					

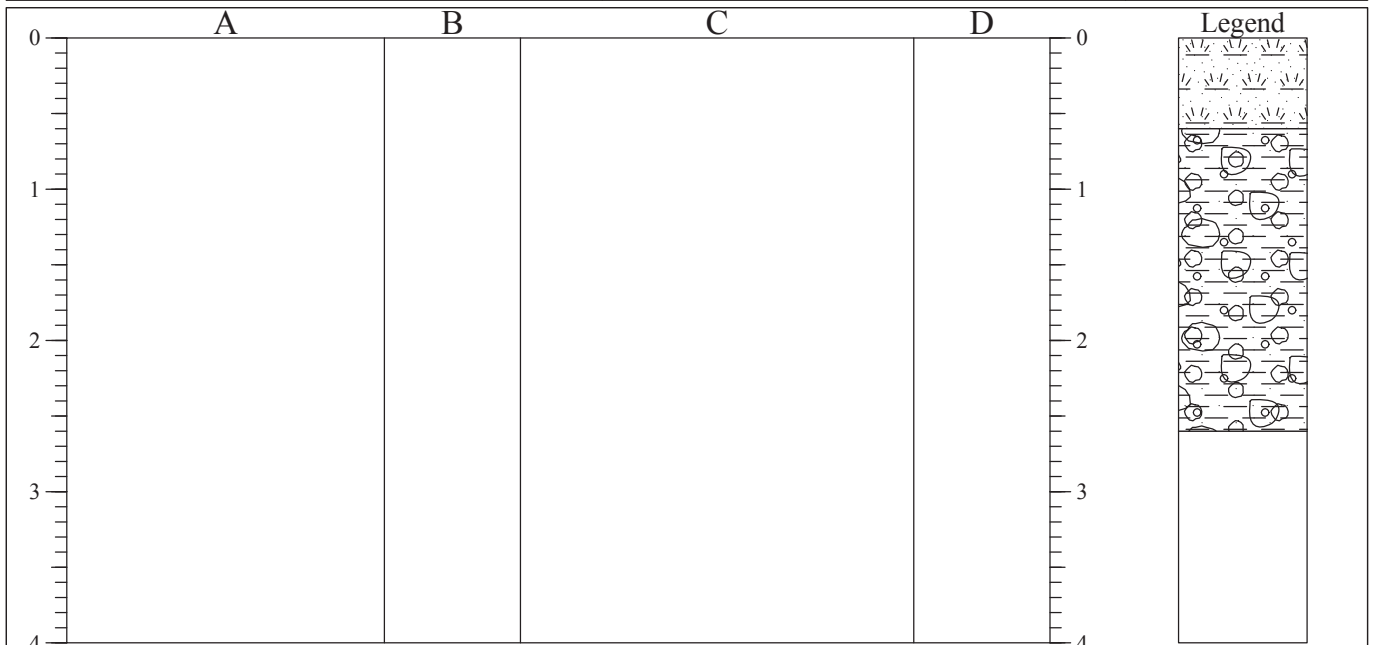
Shoring/Support: Stability: Pit sides unstable  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-5a</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.60		TOPSOIL (Brown sandy clay)					
0.60-2.60		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 300mm size)			1.00	B	
					2.00	B	
2.60		Refusal - possible rock or very large boulders			2.60	B	

<p>Shoring/Support: Stability: Pit sides unstable</p>	<p><b>GENERAL REMARKS</b></p>
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

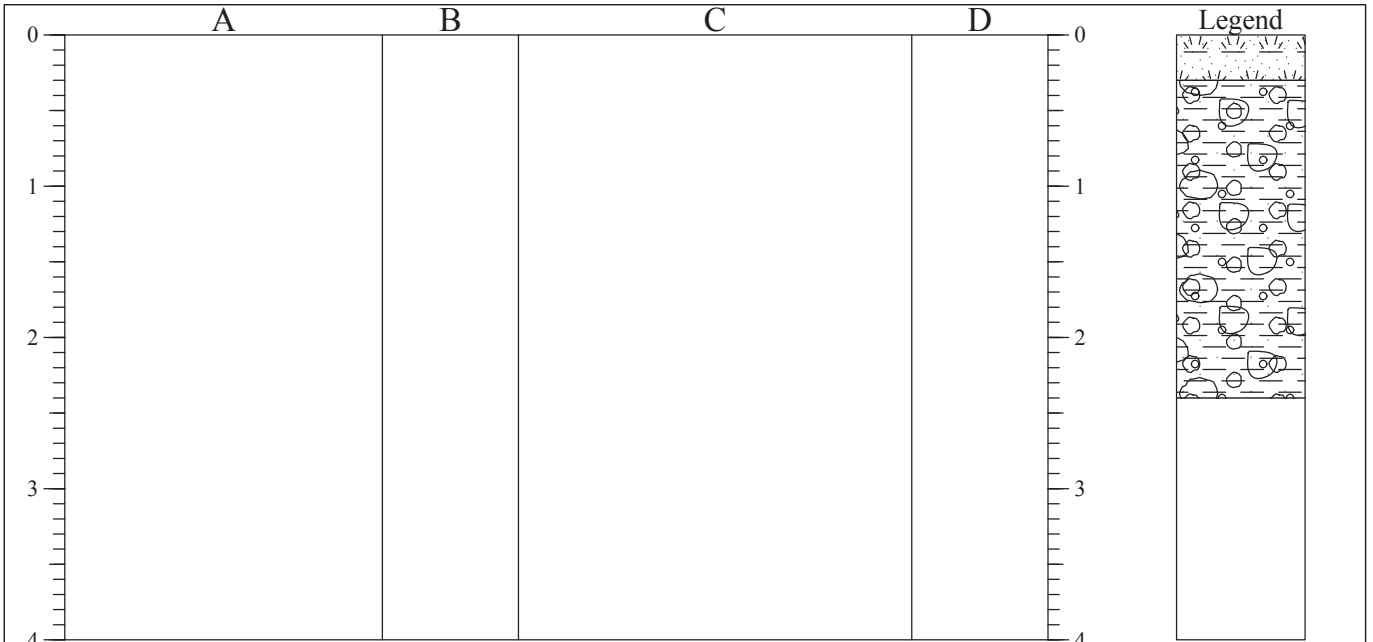




Irish Drilling Ltd.  
 Old Galway Rd.,  
 Loughrea, Co. Galway  
 Telephone: 091 841274  
 Fax: 091 847687

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-6</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.30		TOPSOIL (Brown sandy clay)					
0.30-2.40		Firm to stiff brownish grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 700mm size)			0.50	B	
					1.50	B	
					2.00	B	
2.40		Refusal - possible rock or very large boulders					

IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

Shoring/Support: Stability: Pit sides unstable  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  
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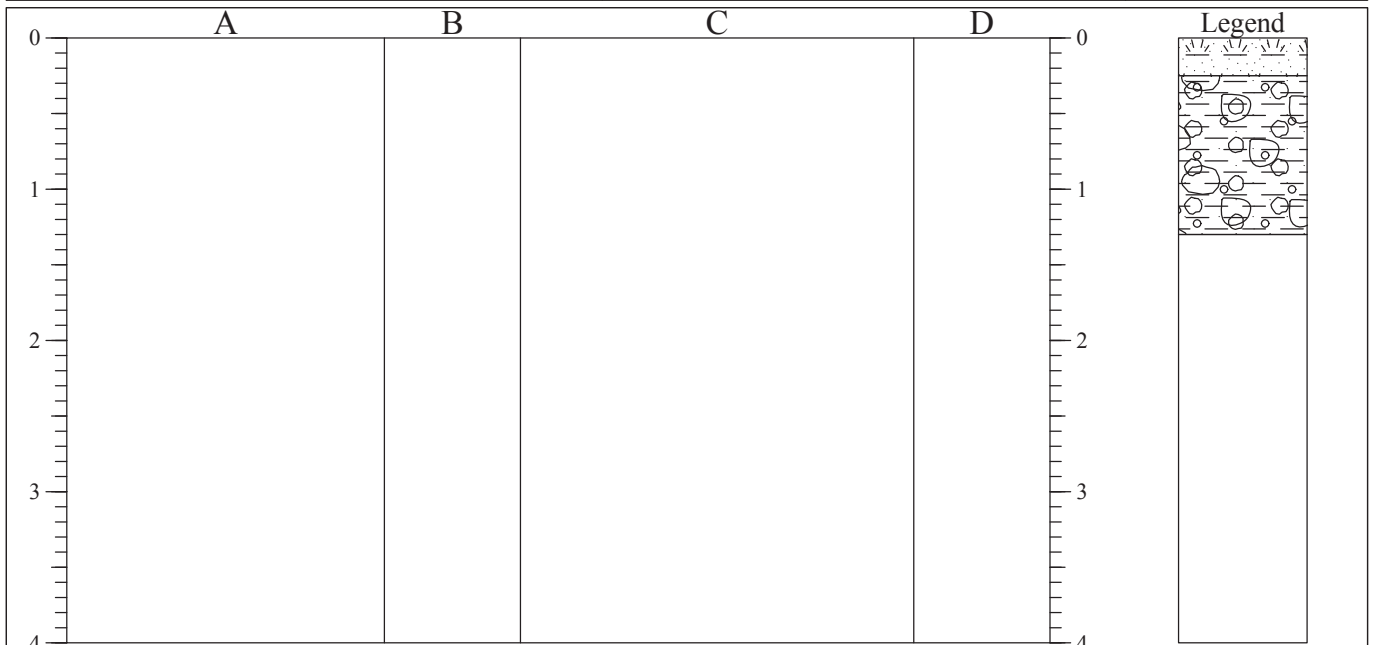
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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Irish Drilling Ltd.  
 Old Galway Rd.,  
 Loughrea, Co. Galway  
 Telephone: 091 841274  
 Fax: 091 847687

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-7</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.25		TOPSOIL (Brown sandy clay)					
0.25-1.30		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 800mm size)			1.00	B	
1.30		Refusal - possible rock or very large boulders					

<p>Shoring/Support: Stability: Pit sides unstable</p> <div style="text-align: center; margin-top: 10px;"> </div>	<p style="text-align: center; font-weight: bold;">GENERAL REMARKS</p>
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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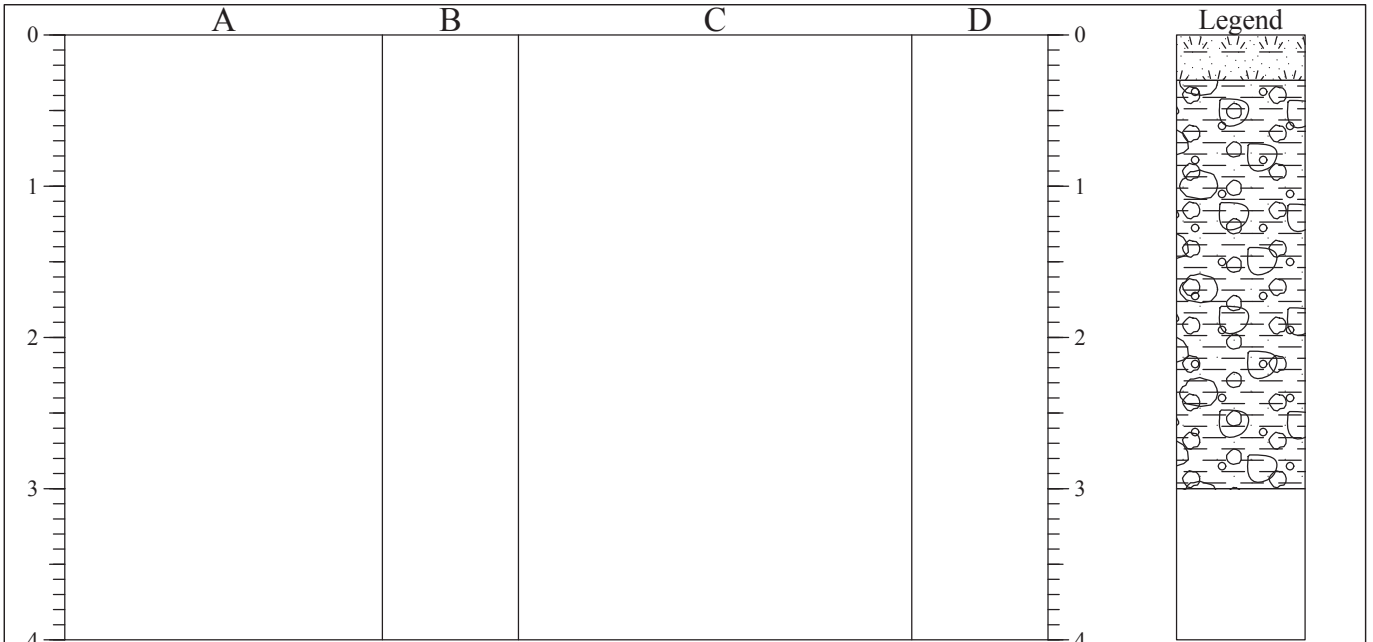
IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07



Irish Drilling Ltd.  
 Old Galway Rd.,  
 Loughrea, Co. Galway  
 Telephone: 091 841274  
 Fax: 091 847687

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-8</b>	
Job No	Date 18-01-07 18-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptns.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.30		TOPSOIL (Brown sandy clay)					
0.30-3.00		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 900mm size)			1.00	B	
					2.00	B	
3.00		Refusal - possible rock or very large boulders			3.00	B	

IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

Shoring/Support: Stability: Pit sides unstable  	<b>GENERAL REMARKS</b>  
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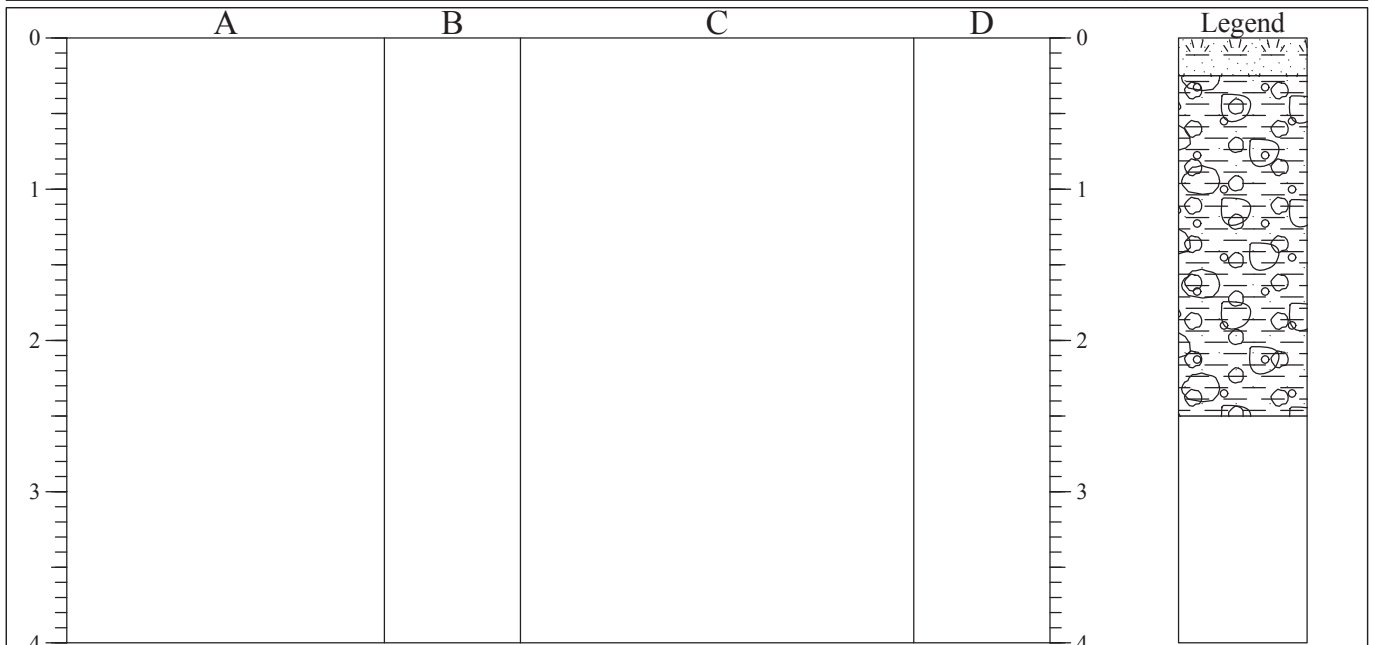
All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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Irish Drilling Ltd.  
 Old Galway Rd.,  
 Loughrea, Co. Galway  
 Telephone: 091 841274  
 Fax: 091 847687

## TRIAL PIT LOG

Project Mixed Development, Mervue, Galway				TRIAL PIT No <b>TP-9</b>	
Job No	Date 19-01-07 19-01-07	Ground Level (m)	Co-Ordinates ()		
Engineer Ml. Punch & Ptms.		GROUNDWATER STRIKES	Water strikes: 1st: dry 2nd: 3rd:	Rose to (@ 20 min.):	Sealed at:
					Sheet 1 of 1



STRATA				SAMPLES & TESTS			
Depth	No	DESCRIPTION	In Situ Tests	Water	Depth (m)	No	Remarks/Tests
0.00-0.25		TOPSOIL (Brown sandy clay)					
0.25-2.50		Firm to stiff grey gravelly sandy CLAY with some rounded to sub-rounded cobbles and boulders (to 600mm size)			1.00	B	
					2.00	B	
2.50		Refusal - possible rock or very large boulders					

Shoring/Support: Stability: Pit sides unstable  <div style="text-align: center;"> </div>	<b>GENERAL REMARKS</b>  
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All dimensions in metres Scale 1:50	Client Harmack Crown Control	Method/ Plant Used Hitachi EX135	Bit Design	Logged By DK
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IDL AGS3 UK TP GALWAY CROWN.GPJ AGS 3\_1.GDT 02/02/07

**APPENDIX 4**  
**LABORATORY TEST RESULTS**



## CERTIFICATE OF ANALYSIS

**Client:** Irish Drilling Limited (Loughrea)  
Loughrea  
Co. Galway  
Ireland

**Attention:** Dympna Darcy

**Date:** 14 March, 2007

**Our Reference:** 07-B01570/01

**Your Reference:** Crown Site

**Location:** Galway

A total of 6 samples was received for analysis on Tuesday, 6 March 2007 and authorised on Wednesday, 14 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.

Signed

**Ken Scally**  
General Manager, Ireland

**Lorraine McNamara**  
Laboratory Technical Manager

Compiled By

.....  
*Paul Barry*



# Alcontrol Laboratories Ireland

## Test Schedule

**Ref Number: 07-B01570/01**

**Sample Type: SOIL**

**Client: Irish Drilling Limited (Loughrea)**

**Location: Galway**

**Date of Receipt: 06/03/2007**

**Client Contact: Dymrna Darcy**

**Client Ref: Crown Site**

UKAS Accredited [Testing Laboratory] No. 1291				Detection Method																	
Sample Identity	Other ID	P / V	Chromium VI	PAH EPA (16)	Natural Moisture Content	Total Phenols by HPLC	Total Sulphate (Acid Soluble)**	Metals (9)	Water Soluble Boron	Acid Soluble Sulphide	Total Sulphur**	pH (Solid)	Free Cyanide	Thiocyanate	Total Cyanide						
DR RANGE	GC/MS	GRAVIMETRIC	HPLC	ICP	ICP	ICP OES	KONE	LEO	METER	SPECTRO	SPECTRO	SPECTRO	SPECTRO								
07-B01570-S0010-A01	BH1	0-0.5M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						
07-B01570-S0011-A01	BH5	0.5-1M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						
07-B01570-S0012-A01	BH7	0.5-1M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						
07-B01570-S0013-A01	BH9	0.5-1M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						
07-B01570-S0014-A01	BH11	1-1.5M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						
07-B01570-S0015-A01	BH14	0-1M	Non-Alcohol Plastic Tub	X	X	X	X	X	X	X	X	X	X	X	X						

**Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING**



# ALcontrol Laboratories Ireland

## Test Schedule Summary

<b>Ref Number: 07-B01570/01</b> Client: Irish Drilling Limited (Loughrea) Date of Receipt: 06/03/2007	<b>Sample Type: SOIL</b> Location: Galway Client Contact: Dympna Darcy Client Ref: Crown Site
---	--

\* SUBCONTRACTED TO OTHER LABORATORY / \*\* SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	DR LANGE	Chromium VI	6
X	GCMS	PAH EPA (16)	6
X	GRAVIMETRIC	Natural Moisture Content	6
X	HPLC	Total Phenols by HPLC	6
X	ICP	Total Sulphate (Acid Soluble)**	6
X	ICP	Metals (9)	6
X	ICP OES	Water Soluble Boron	6
X	KONE	Acid Soluble Sulphide	6
X	LECO	Total Sulphur**	6
X	METER	pH (Solid)	6
X	SPECTRO	Free Cyanide	6
X	SPECTRO	Thiocyanate	6
X	SPECTRO	Total Cyanide	6



Interim  
 Validated

# Alcontrol Laboratories Ireland

## Table Of Results

**Ref Number: 07-B01570/01**

**Sample Type: SOIL**

Client: Irish Drilling Limited (Loughrea)

Location: Galway

Date of Receipt: 06/03/2007

Client Contact: Dymrna Darcy

(of first sample)

Client Ref: Crown Site

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method		GCMS																				
	Method	Detection Limit	DR LANGE	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS						
Alcontrol Reference	Sample Identity	Other ID	Chromium VI	mg/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg					
				07-B01570-S0010	BH1	0-0.5M	<0.1	21	20	24	13	46	31	61	55	54	37	59	30	21	2		
				07-B01570-S0011	BH5	0.5-1M	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
				07-B01570-S0012	BH7	0.5-1M	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
				07-B01570-S0013	BH9	0.5-1M	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
				07-B01570-S0014	BH11	1-1.5M	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
				07-B01570-S0015	BH14	0-1M	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. NDP = NO DETERMINATION POSSIBLE

Checked By : Paul Barry





# Alcontrol Laboratories Ireland

## Table Of Results

- Interim  
 Validated

Ref Number: 07-B01570/01

Sample Type: SOIL

Client: Irish Drilling Limited (Loughrea)

Location: Galway

Date of Receipt: 06/03/2007

Client Contact: Dymrna Darcy

(of first sample)

Client Ref: Crown Site

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method		KONE	LECO	METER	SPECTRO	SPECTRO	SPECTRO	SPECTRO								
	Method	Detection Limit															
	Acid Soluble Sulphide	<5mg/kg	✓	<0.01%	naph Units	<0.5mg/kg	<1mg/kg	<2.5mg/kg	✓								
	Total Sulphur**	%			pH Units	mg/kg	mg/kg	mg/kg									
Alcontrol Reference	Sample Identity	Other ID	mg/kg	%	pH Units	mg/kg	mg/kg	mg/kg									
07-B01570-S0010	BH1	0-0.5M	11	0.07	7.86	<0.5	<1	<2.5									
07-B01570-S0011	BH5	0.5-1M	15	0.04	8.33	<0.5	<1	<2.5									
07-B01570-S0012	BH7	0.5-1M	13	0.04	8.34	<0.5	<1	<2.5									
07-B01570-S0013	BH9	0.5-1M	24	0.04	8.36	<0.5	<1	<2.5									
07-B01570-S0014	BH11	1-1.5M	10	0.04	8.44	<0.5	<1	<2.5									
07-B01570-S0015	BH14	0-1M	12	0.05	8.05	<0.5	<1	<2.5									

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. NDP = NO DETERMINATION POSSIBLE

Checked By : Paul Barry

**APPENDIX**

## APPENDIX

1. Results are expressed as mg/kg dry weight (dried at 30°C) on all soil analyses except for the following: NRA Leach tests, flash point, and ammoniacal N<sub>2</sub> by the BRE method, VOC, PRO, Cyanide, Acid Soluble Sulphide, SVOC, DRO, PAH, PCB, TPH CWG ,TPH by IR, OFGs and SEM.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. A sub sample of all samples received will be retained free of charge for one month for soils and one month for waters (sample size permitting), but may then be discarded 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.
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 Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS 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 fibres are detected, then identification and quantification is carried out by ALcontrol Technichem or Alcontrol Shutlers in the UK . If a sample is suspected of containing asbestos, then drying and crushing will be suspended on that sample until the asbestos results are known. If asbestos is present, then no analysis requiring dry sample are 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 is present in the volatile sample.
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.

Last updated February 2005

**IRISH DRILLING LTD.**

Loughrea Co. Galway.

Contract: Crown Site, Mervue, Galway.

Client:

Engineer:

Date: 3.4.07

Tested By: DMH

Checked: DJ

2007/G/002

DJ

Tel: (091)841274 Fax: (091) 847687

**Summary of Soil Classification Tests**

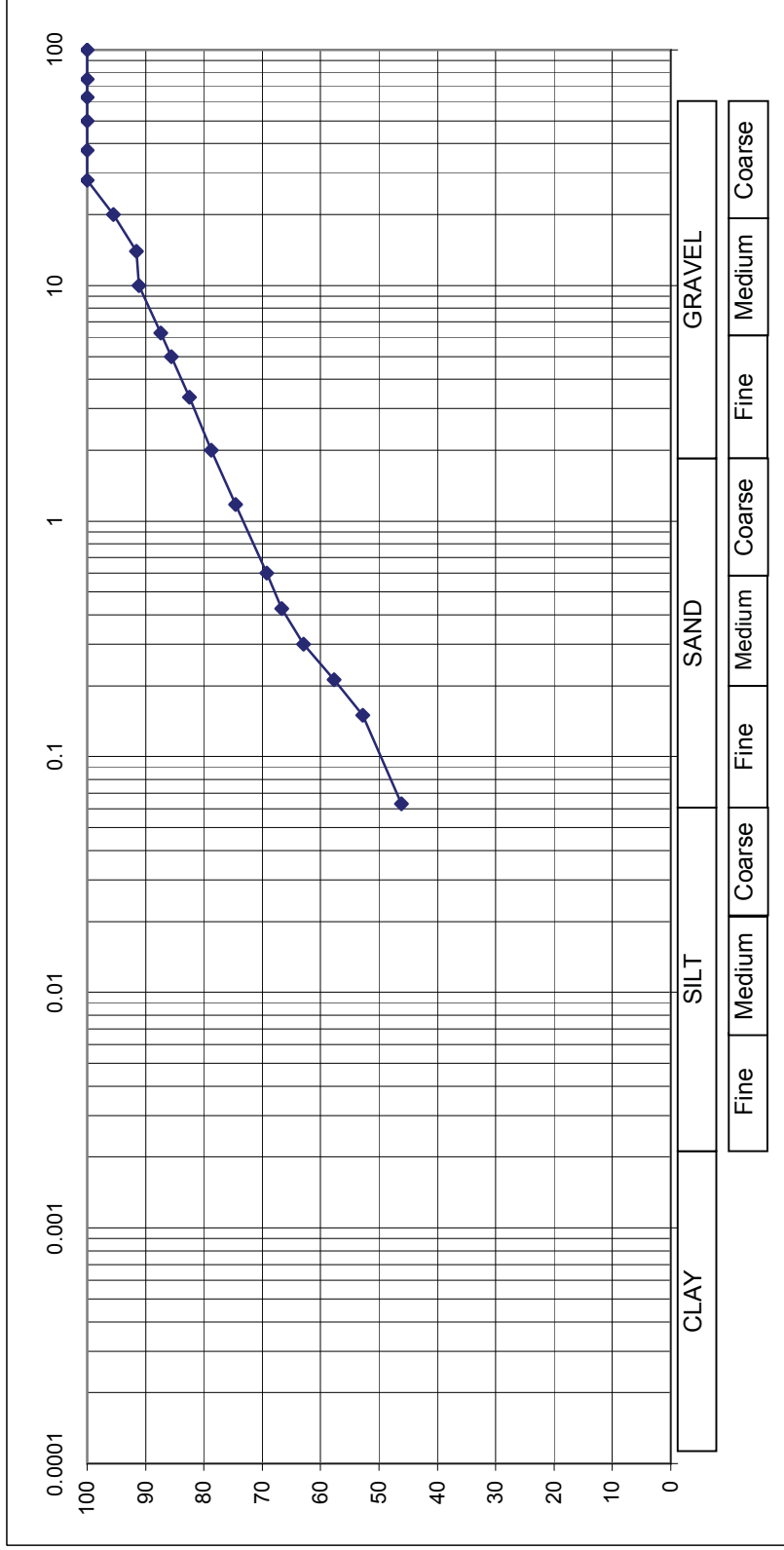
BS1377: Part 2: 1990

Borehole/ Trialspit	Type	Depth m	Bulk Density Mg/m <sup>3</sup>	Moisture Content %	Particle Density Mg/m <sup>3</sup>	Liquid Limit %	Plastic Limit %	Plasticity Index %	% passing 425 micron %	Description of fraction passing 425 micron sieve.
TP 6A		3.0		7.7			NON PLASTIC		67	
TP 8A		4.0-4.5		7.1			NON PLASTIC		58	

# PARTICLE SIZE DISTRIBUTION BS 1377: 1990: PART 2 (9.2, 9.5)

07/06/2007

Sieve size mm	Percentage passing, %
100	100
75	100
63	100
50	100
37.5	100
28	100
20	96
14	92
10	91
6.3	87
5	86
3.35	83
2	79
1.18	75
0.600	69
0.425	67
0.300	63
0.212	58
0.150	53
0.063	46
0.020	
0.006	
0.002	



**Soil Description:** Light brown slightly gravelly slightly sandy SILT.

IRISH DRILLING LTD.  
Loughrea Co. Galway  
Tel: (091) 84 1274  
Fax: (091) 847687

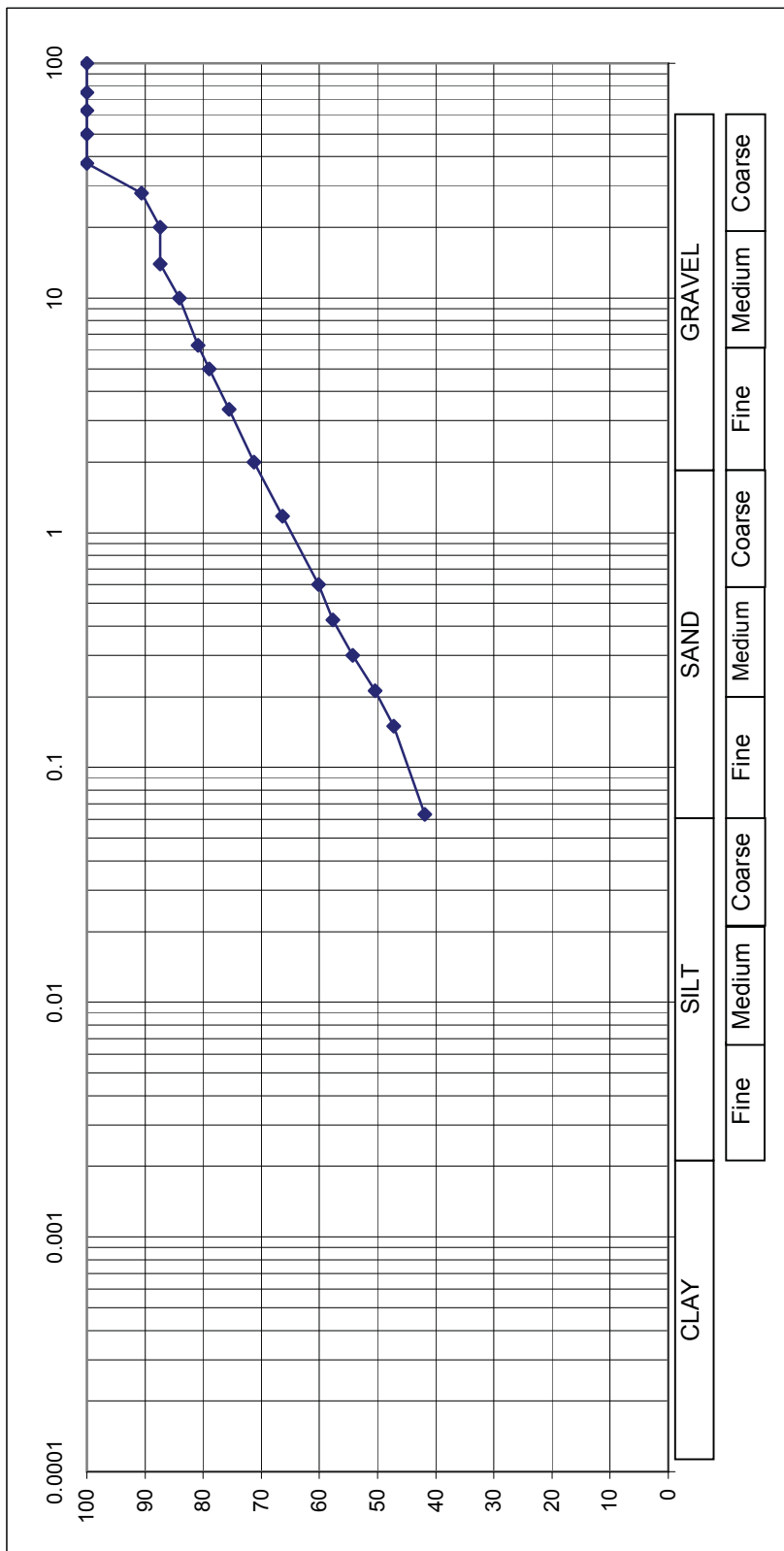
Contract: Crown Site, Mervue, Galway.  
Client:  
Engineer:  
Date: 3.4.07  
Tested by: DD

Job Code: 2007/G/002  
Checked: DJ

Location: TP 6A.  
Depth: 3 m

# PARTICLE SIZE DISTRIBUTION BS 1377: 1990: PART 2 (9.2, 9.5)

Sieve size mm	Percentage passing, %
100	100
75	100
63	100
50	100
37.5	100
28	91
20	87
14	87
10	84
6.3	81
5	79
3.35	76
2	71
1.18	66
0.600	60
0.425	58
0.300	54
0.212	50
0.150	47
0.063	42
0.020	
0.006	
0.002	



**Soil Description:** Light brown slightly gravelly slightly sandy SILT.

IRISH DRILLING LTD.  
Loughrea Co. Galway  
Tel: (091) 84 1274  
Fax: (091) 847687

Contract: Crown Site, Mervue, Galway.

Client:  
Engineer:  
Date:  
Tested by:

3.4.07  
DD  
Checked: DJ  
Job Code: 2007/G/002

Location  
**TP 8A.**  
Depth: **4.0-4.5 m**



## APPENDIX 5































































**APPENDIX 6**  
**GAS & WATER LEVELS**

## Gas & Water Levels

**Contract:** Crown Site, Mervue  
**Location:** Mervue, Galway  
**Client:** Harmack  
**Engineer:** Ml. Punch & Ptins.

**Test carried out by:** Irish Drilling Ltd.  
**Operators:** D. Kivlehan  
**Date installed:** February March 2007  
**Monitoring Period:**

Date: 14.03.'2007	CH <sub>4</sub> %	CO <sub>2</sub> %	O <sub>2</sub> %	BAL %	H <sub>2</sub> S ppm	CO ppm	LEL CH <sub>4</sub>	Peak CH <sub>4</sub> %	Barometric Press mbar	Relative Press. mbar	Groundwater level m bgl
Bh-1	0.0	0.0	20.6	79.3	0	0	0.0	0.0	1024	-0.04	5.92
Bh-3	0.0	0.0	20.7	79.2	0	0	0.0	0.0	1024	-0.04	dry (to 10.0m)
Bh-5	0.0	0.0	20.7	79.3	0	0	0.0	0.0	1024	0.01	8.40
Bh-7	0.0	0.0	19.4	79.6	0	0	0.0	0.0	1023	0.01	6.14
Bh-9	0.0	0.0	20.2	79.2	0	0	0.0	0.0	1024	0.02	5.50
Bh-13	0.0	0.0	20.2	79.3	0	0	0.0	0.0	1023	-0.01	3.26
Bh-15	0.0	0.0	20.8	79.3	0	0	0.0	0.0	1024	-0.01	2.40

Date: 22.03.'2007	CH <sub>4</sub> %	CO <sub>2</sub> %	O <sub>2</sub> %	BAL %	H <sub>2</sub> S ppm	CO ppm	LEL CH <sub>4</sub>	Peak CH <sub>4</sub> %	Barometric Press mbar	Relative Press. mbar	Groundwater level m bgl
Bh-1	0.0	0.0	20.5	79.5	0	0	0.0	0.0	1014	0.04	5.18
Bh-3	0.0	0.1	20.6	79.4	0	0	0.0	0.0	1024	-0.04	dry (to 10.0m)
Bh-5	0.0	0.0	20.6	79.4	0	0	0.0	0.0	1024	-0.61	8.40
Bh-7	0.0	0.7	19.6	79.6	0	2	0.0	0.0	1023	-0.53	dry
Bh-9	0.0	0.0	20.5	79.5	0	0	0.0	0.0	1024	1.38	6.49
Bh-13	0.0	0.0	20.5	79.4	0	0	0.0	0.0	1023	-0.08	3.30
Bh-15	0.0	0.0	20.6	79.3	0	0	0.0	0.0	1024	0.02	2.45

### Notes:

LEL Lower Explosive Limit

BAL Balance - All other gases except CH<sub>4</sub>, O<sub>2</sub> and CO<sub>2</sub> (usually Nitrogen)

>, >>, >>> Concentration above measurable range

< Concentration below measurable range

Relative Pressure Difference between air pressure and well pressure