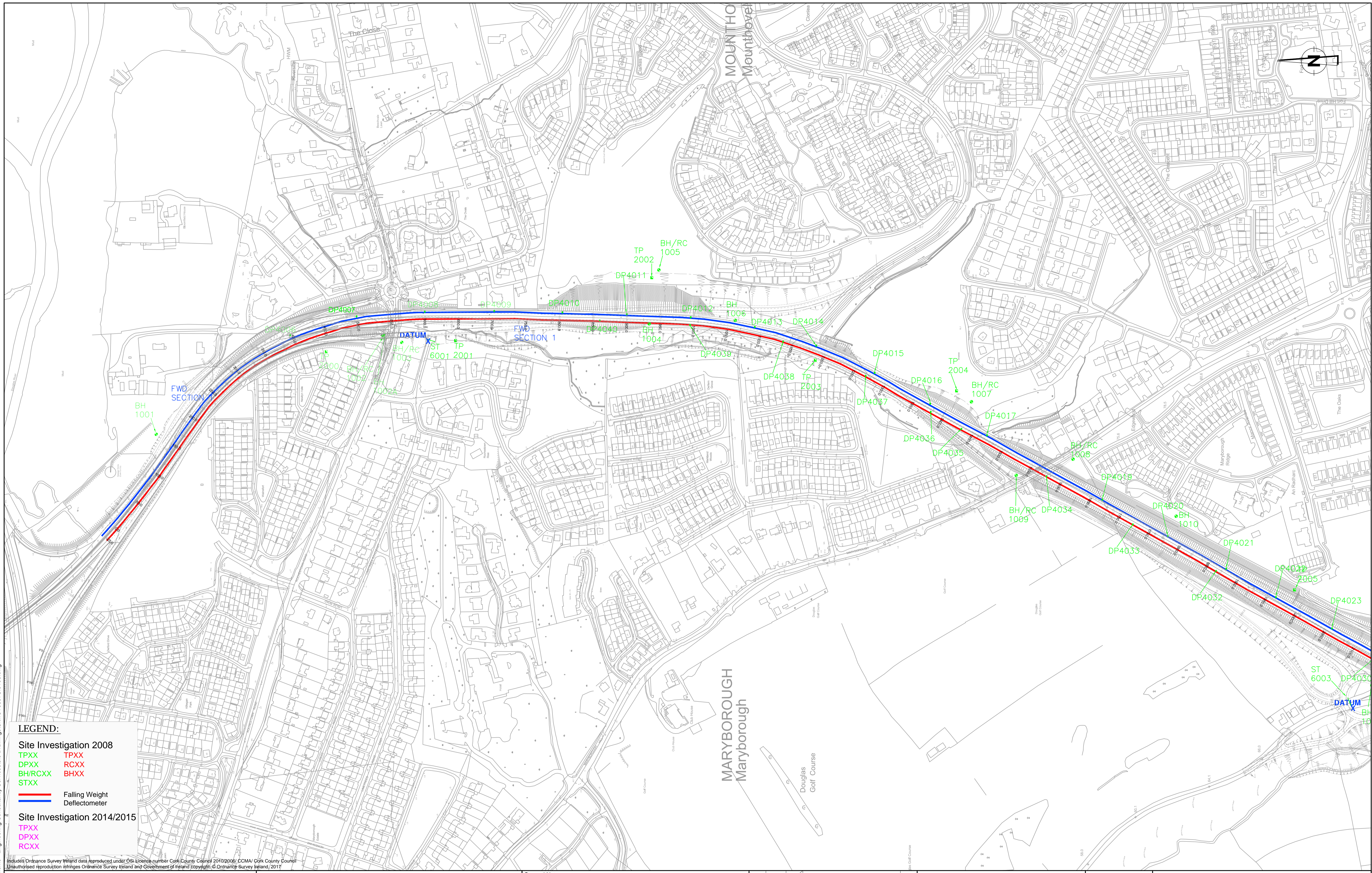




APPENDIX 11A: SI DATA



LEGEND:

Site Investigation 2008
 TPXX TPXX
 DPXX RCXX
 BH/RCXX BHXX
 STXX

Site Investigation 2014/2015
 TPXX
 DPXX
 RCXX

Falling Weight Deflectometer

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Cork County Council

National Roads Office,
 Richmond,
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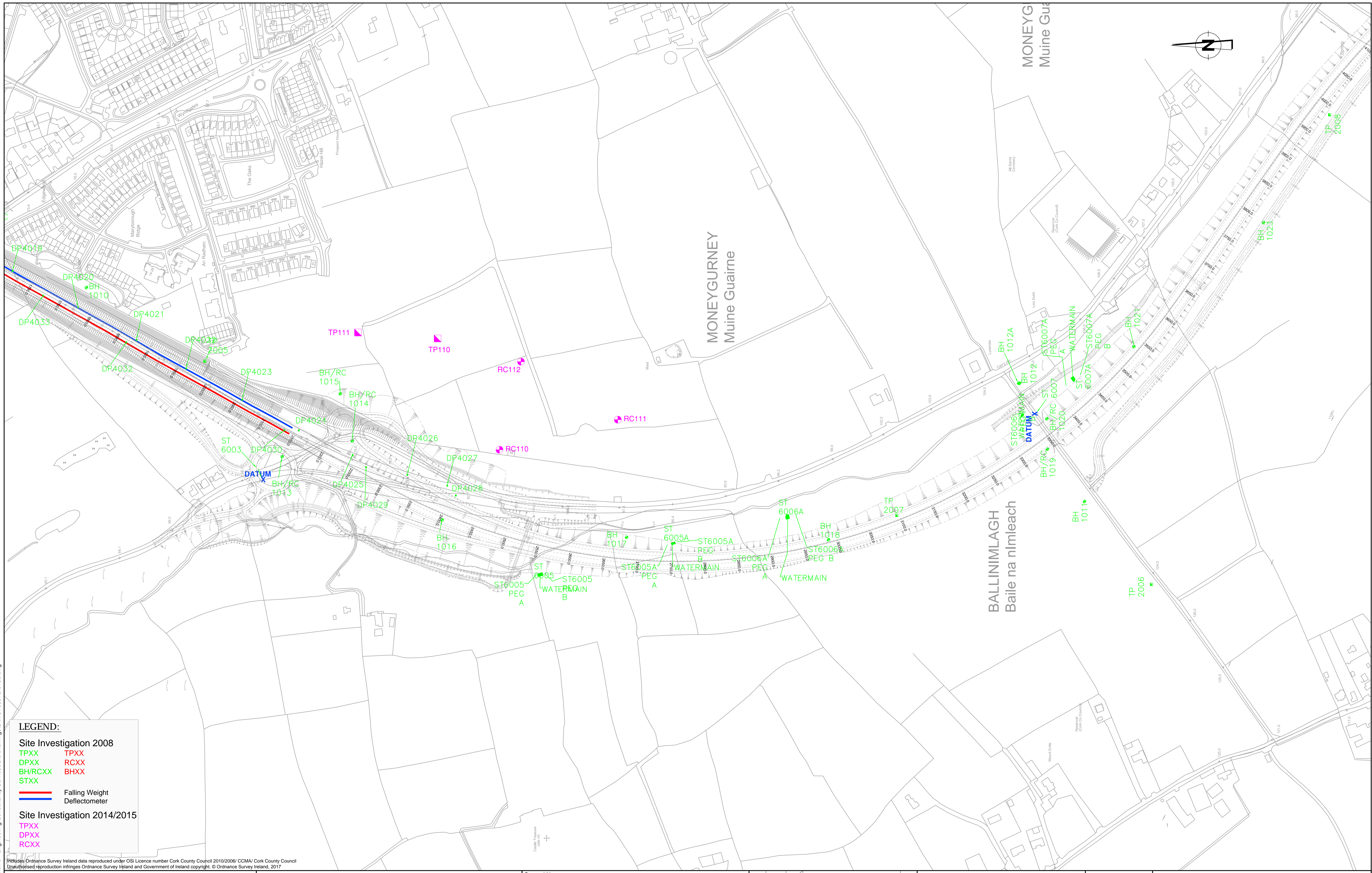


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Innishmore
 Ballincollig
 Co. Cork
 Ireland

T +353 21 4665900
 W www.rpsgroup.com/ireland
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Drawn	KT	Project	M28 CORK TO RINGASKIDDY PROJECT		
Checked	LB	Title	SITE INVESTIGATION LOCATIONS		
Approved	LB	Sheet	Sheet 1 of 7		
Date	May 2015	Appendix	APPENDIX 11A: SI DATA		
Scale	1:5000 @ A3 1:2500 @ A1	Job No.	MCT0597	File Ref.	MCT0597NTS001
Job No.	MCT0597	Drg. No.	SI0101	Rev.	F01



LEGEND:

Site Investigation 2008
 TPXX TPXX
 DPXX DPXX
 BH/RCXX BH/RCXX
 STXX STXX

Site Investigation 2014/2015
 TPXX TPXX
 DPXX DPXX
 RCXX RCXX


Falling Weight Deflectometer
 (Red and Blue lines)

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 Co. Cork. Tel. No: (021) 4821046
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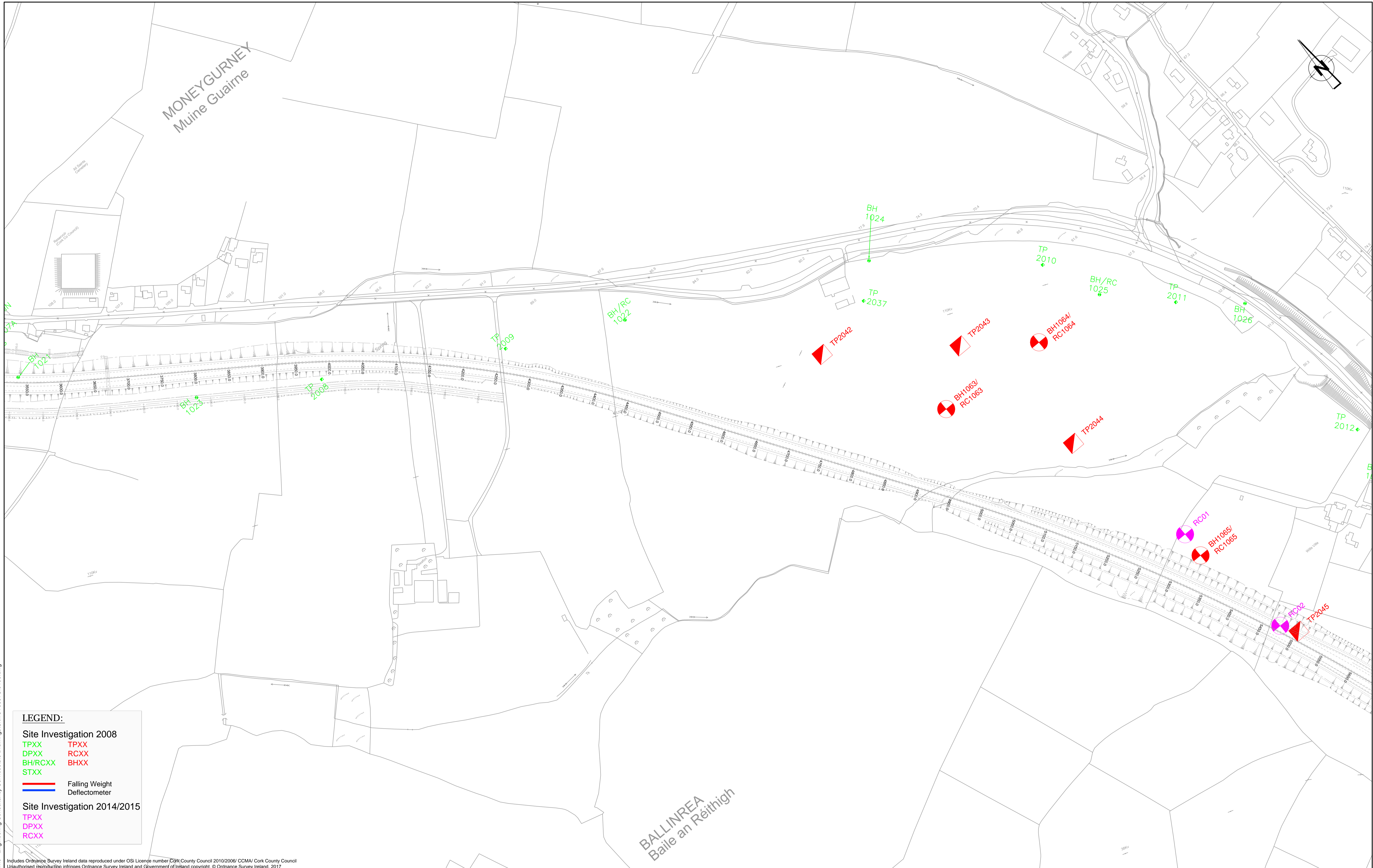
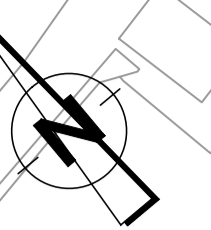
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 Innishmore
 Ballincollig
 Co. Cork
 Ireland

T +353 21 4665900
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 E ireland@rpsgroup.com

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Approved	LB	Sheet 2 of 7			
Date	May 2015	APPENDIX 11A: SI DATA			
Scale	1:5000 @ A3	Job No.	MCT0597	File Ref.	MCT0597NTS001
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Muine Guaire



LEGEND:

Site Investigation 2008

TPXX	TPXX
DPXX	RCXX
BH/RCXX	BHXX
STXX	

Site Investigation 2014/2015

TPXX	
DPXX	
RCXX	

Falling Weight Deflectometer

— Falling Weight
— Deflectometer

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National Roads Office,
Richmond,
Glanmire,
Co. Cork.

Tel. No: (021) 4821046
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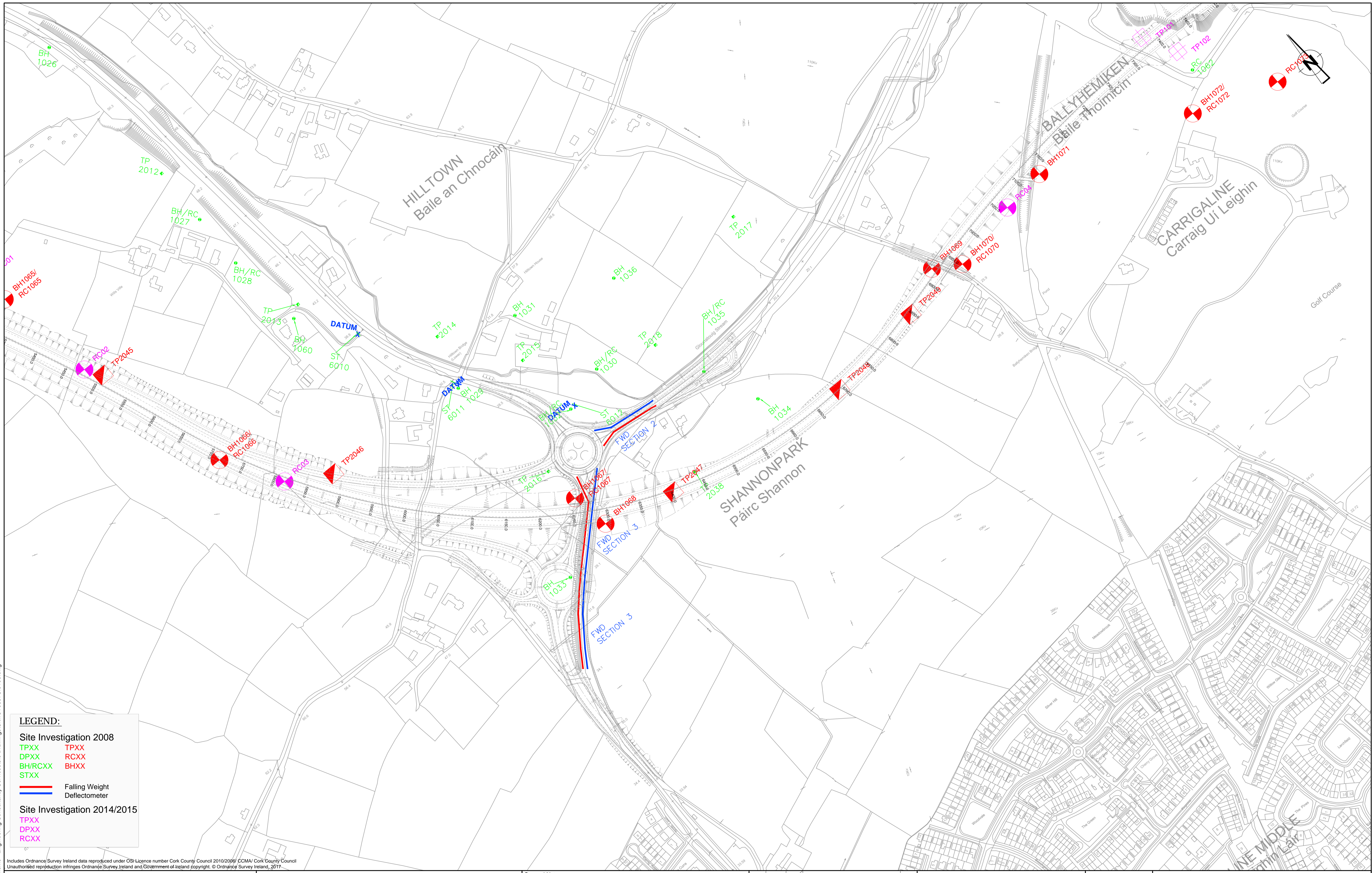
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Innishmore
Ballincollig
Co. Cork
Ireland

T +353 21 4665900
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

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Date	May 2015	Title	SITE INVESTIGATION LOCATIONS		
Scale	1:5000 @ A3 1:2500 @ A1	Sheet 3 of 7 APPENDIX 11A: SI DATA			
Job No.	MCT0597	File Ref.	MCT0597NTS001	Drg. No.	SI0103
				Rev.	F01

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LEGEND:


Site Investigation 2008	
TPXX	TPXX
DPXX	RCXX
BH/RCXX	BHXX
STXX	
	Falling Weight Deflectometer
Site Investigation 2014/2015	
TPXX	
DPXX	
RCXX	

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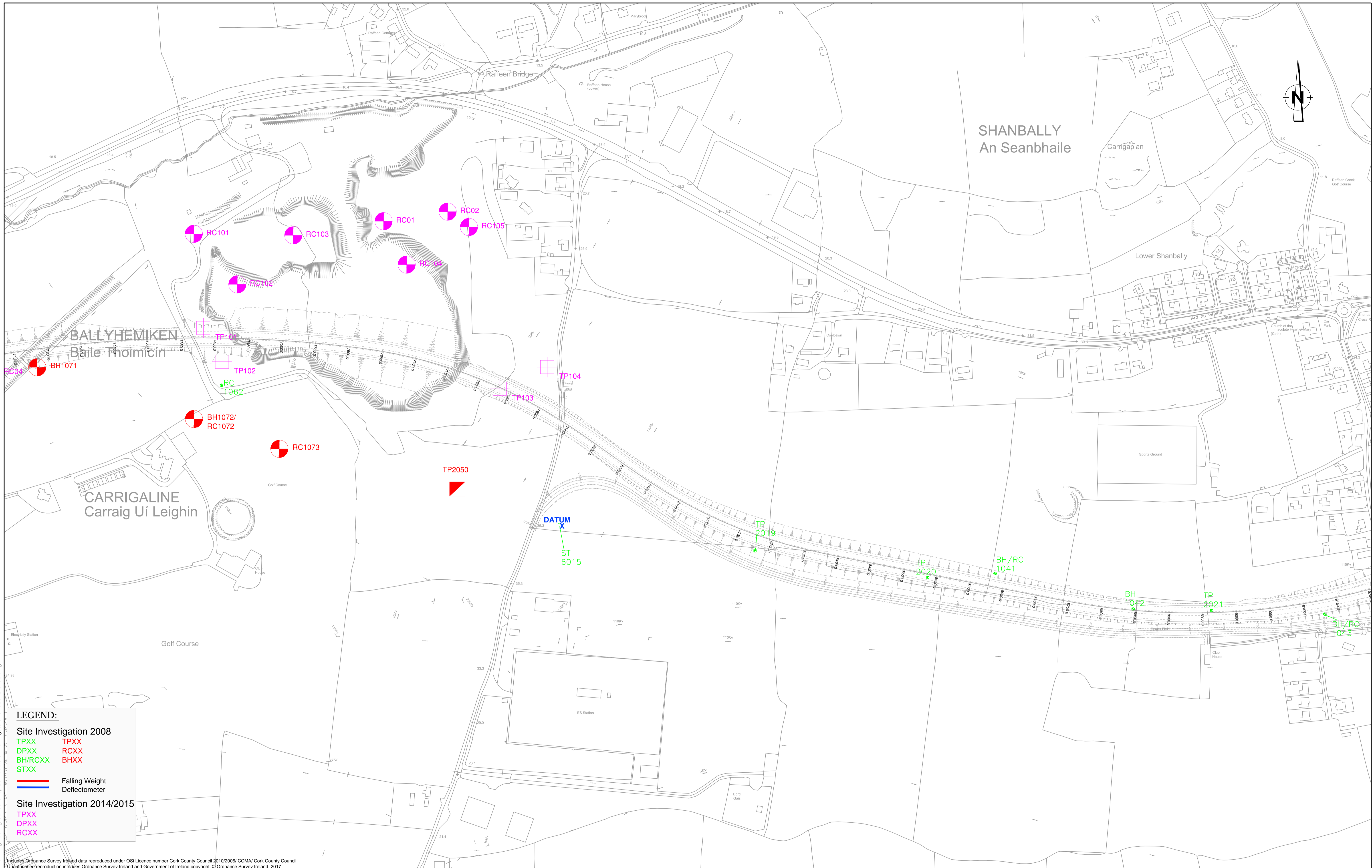


RPS
 Innishmore
 Ballincollig
 Co. Cork
 Ireland

T +353 21 4665900
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 E ireland@rpsgroup.com

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Approved	LB	Scale	Sheet 4 of 7		
Date	May 2015	Scale	APPENDIX 11A: SI DATA		
Scale	1:5000 @ A3	Job No.	MCT0597	File Ref.	MCT0597NTS001
Scale	1:2500 @ A1	Drg. No.	SI0104	Rev.	F01

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LEGEND:

Site Investigation 2008
 TPXX TPXX
 DPXX RCXX
 BH/RCXX BHXX
 STXX

Site Investigation 2014/2015
 TPXX
 DPXX
 RCXX


Falling Weight Deflectometer

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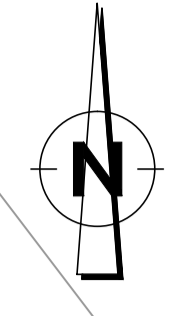
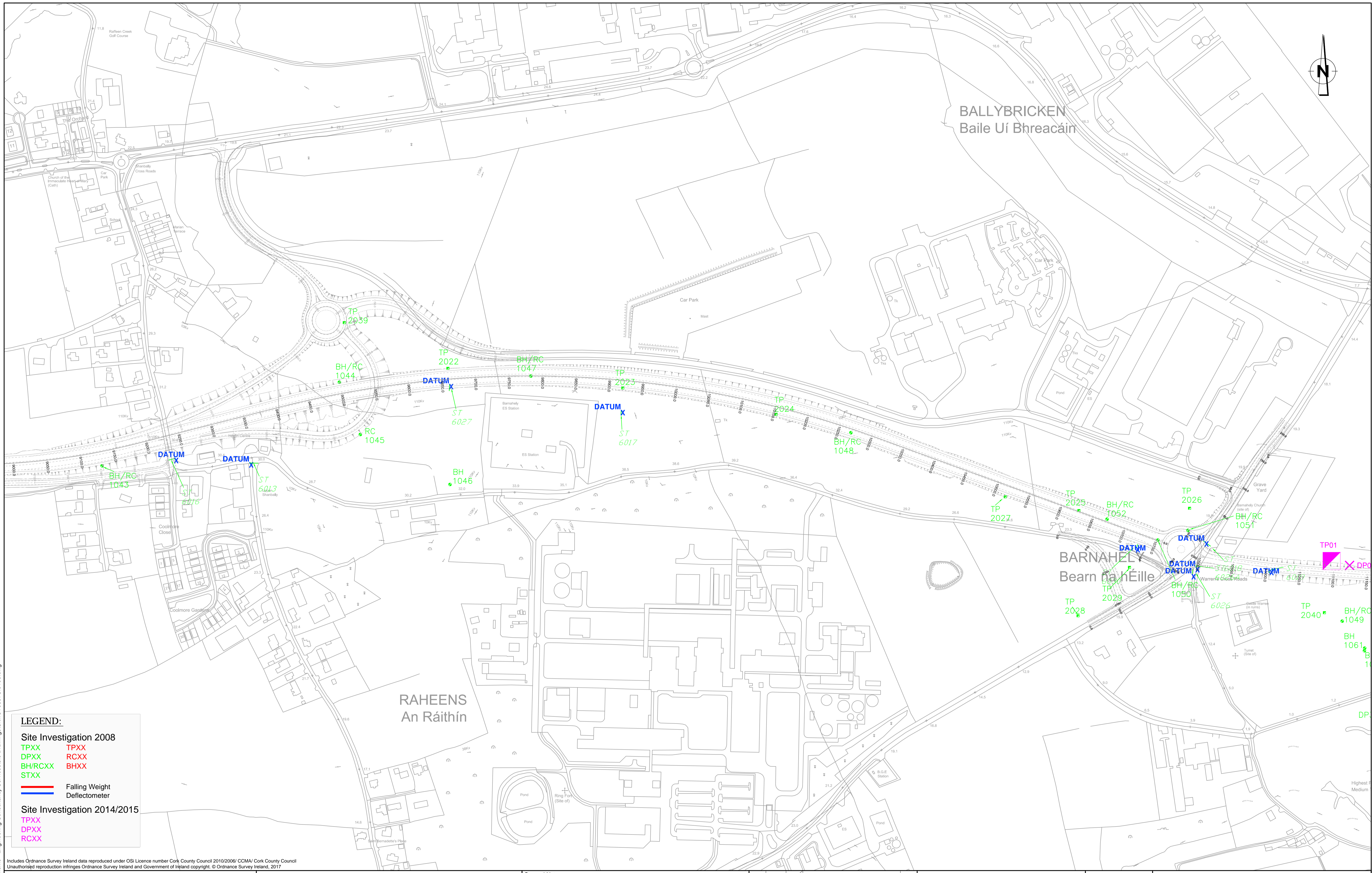
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Date	May 2015	Title	SITE INVESTIGATION LOCATIONS		
Scale	1:5000 @ A3 1:2500 @ A1	Sheet 5 of 7 APPENDIX 11A: SI DATA			
Job No.	MCT0597	File Ref.	MCT0597NTS001	Drg. No.	SI0105
Rev.	F01				



LEGEND:

Site Investigation 2008

TPXX TPXX
 DPXX RCXX
 BH/RCXX BHXX
 STXX

Site Investigation 2014/2015

TPXX
 DPXX
 RCXX

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Approved	LB		Sheet 6 of 7		
Date	May 2015		APPENDIX 11A: SI DATA		
Scale	1:5000 @ A3 1:2500 @ A1	File Ref.	MCT0597NTS001	Drg. No.	SI0106
Job No.	MCT0597	Rev.		F01	

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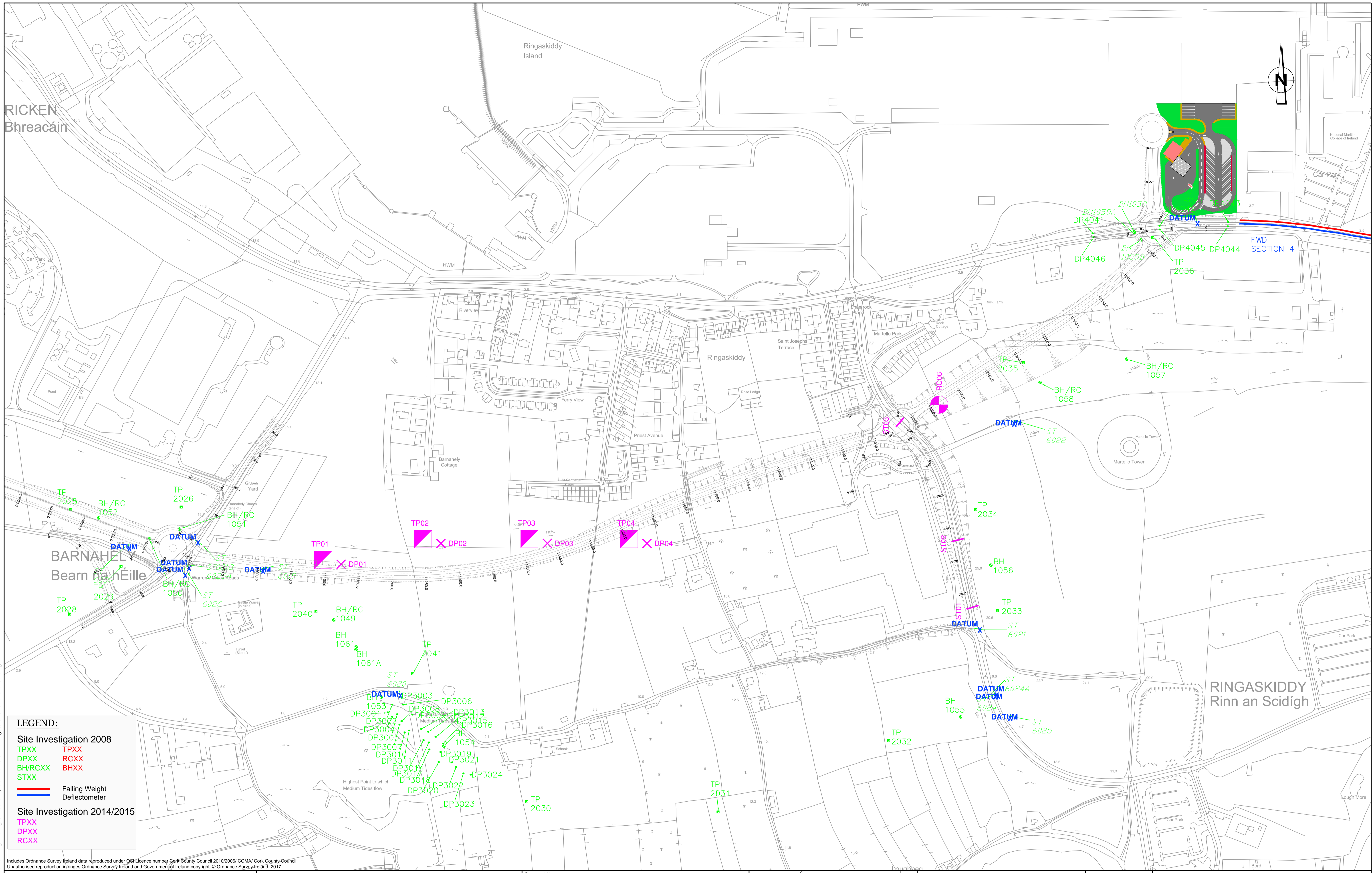
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LEGEND:

Site Investigation 2008
 TPXX TPXX
 DPXX RCXX
 BH/RCXX BHXX
 STXX

Site Investigation 2014/2015
 TPXX
 DPXX
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Falling Weight Deflectometer

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 Co. Cork
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Approved	LB	Scale	Sheet 7 of 7		
Date	May 2015	Scale	APPENDIX 11A: SI DATA		
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Job No.	MCT0597	Drg. No.	SI0107	Rev.	F01

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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1001
Sheet 1 of 2

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 171479E - 69582N

Hole Type
Cable

Location: Cork

Level: 5.26 m AOD

Scale
1:50

Client: Cork County Council

Dates: 07/09/2006

Logged By
S A

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00-0.50	B				MADE GROUND - Firm, brown, sandy (fine-coarse grained), slightly gravelly (fine-medium grained, sub-angular to sub-rounded), SILT, includes timber and plastic	
		0.50	SPT	N=17 (2,2/ 3,4,7,3)				
		0.50-0.95	D					
		1.00-1.50	B					
		1.50	SPT	N=13 (2,3/ 3,4,3,3)				
		1.50-1.95	D					
		2.00-2.50	B					
		2.50	SPT	N=42 (6,8/ 15,15,8,4)				
		3.50	SPT	N=9 (3,2/ 2,2,2,3)	3.50	1.76		
		3.30-3.80	B				Medium dense, light brown, gravelly (fine-coarse grained, sub-angular to sub-rounded), fine-coarse grained SAND.	
		3.50-3.95	D					
		4.50	SPT	N=15 (3,3/ 4,3,3,5)				
		4.30-4.80	B					
		4.50-4.95	D					
		6.00	CPT	N=16 (3,3/ 4,4,3,5)	5.80	-0.55		
		6.00-6.50	B				Medium dense, sandy (fine-coarse grained), fine to coarse grained, sub-angular to sub-rounded GRAVEL	
		7.50	CPT	N=21 (4,4/ 5,5,5,6)				
		7.50-8.00	B					
		9.00	CPT	N=41 (8,8/ 10,9,10,12)	9.00	-3.75		Dense, broken, angular COBBLES - limestone rock
		9.00-9.60	B					
		9.80-10.10	B					

Remarks: Chiselling 10.0 -10.1m / 1hr. Standpipe installed at 10.0m. Water strike at 5.8m, rose to 3.0m in 20 mins.

Continued next sheet





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1004
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171644E - 68849N	Hole Type Cable
Location: Cork		Level: 37.24 m AOD	Scale 1:50
Client: Cork County Council		Dates: 25/10/2006	Logged By P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	36.94	TAR	
					0.50	36.74	Hardcore	
		0.50-1.00	B					
		1.00	CPT	50 (25/ 25,25 for 60mm)	1.08	36.16	Dense, clayey, slightly sandy (fine-coarse grained), fine to coarse grained angular to sub-rounded GRAVEL	
								End of Borehole at 1.06 m

Remarks: Chisel: 1.0 - 1.08m / 1hr Standing 8:00 - 10:00 putting Traffic management Standing 3:00 - 6:00 waiting for instruction



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 Tel: 021 4631600
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Borehole No
BH-1005
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171724E - 68835N	Hole Type Cable
Location: Cork		Level: 62.62 m AOD	Scale 1:50
Client: Cork County Council		Dates: 14/09/2006	Logged By S A

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
		0.50	CPT	0.50	62.12		Driller describes - Stiff CLAY and broken rock
		0.50-1.00	B				Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded), CLAY
		1.20	CPT	1.31	61.31		End of Borehole at 1.31 m



Remarks: Chiselling 1.2 - 1.31m / 1hr



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Borehole No
BH-1009
Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171419E - 68304N	Hole Type Cable
Location: Cork		Level: 73.01 m AOD	Scale 1:50
Client: Cork County Council		Dates: 11/09/2006	Logged By S A

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	72.81		TOPSOIL - Drillers description
								FILL - Drillers description, stiff clay and fill
		0.70-0.90	B		0.70	72.31		
		0.90	CPT	50 (25.0 for 0mm/ 25 for 30mm)	0.95	72.06		Stiff, brown, sandy (fine-coarse grained, Sub-angular to sub-rounded), gravelly (fine-coarse grained, angular to sub-rounded) CLAY
								End of Borehole at 0.95 m

Remarks: Driller notes broken rock below 0.7m Chiselling: 0.9 - 0.95m / 1hr



TECHNICAL & DESIGN SERVICES DIVISION FOR THE COUNTY OF CORK



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1012
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171215E - 66678N	Hole Type Cable
Location: Cork		Level: 104.41 m AOD	Scale 1:50
Client: Cork County Council		Dates: 28/09/2006	Logged By

Well	Water Sirkas	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type						Results
		0.50 0.50	CPT B	50 (8,10/ 15,20,15 for 45mm)		[Cross-hatched pattern]	FILL - Very stiff, brown, gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, frequent cobbles (driller describes plastic and concrete)	1
		1.50	CPT	N=34 (4,8/ 10,8,8,8)	2.00			102.41	2
End of Borehole at 2.00 m								3
								4
								5
								6
								7
								8
								9
								10

Remarks: Chisel: 0.7 - 0.94m / 1hr Terminated due to presence of concrete in borehole



Borehole Log of BH-1012



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1012A
Sheet 1 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171216E - 66680N	Hole Type Cable
Location: Cork		Level: 104.29 m AOD	Scale 1:50
Client: Cork County Council		Dates: 28/09/2006-29/09/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Results					
		0.50	CPT	N=36 (8,8/)			MADE GROUND Slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-angular) CLAY (driller describes plastic & concrete)	
		0.50-1.00	B	10,8,9,9)				
		1.10	W					
		1.80	SPT	N=2 (2,3/)				
		1.50-1.95	D	1,0,1,0)	1.70		102.59	Soft, dark brown, spongy, slightly sandy, slightly gravelly, organic CLAY
		1.70-2.20	B					
		2.00-2.45	U	61Blows				
		2.45-2.80	D		2.45		101.84	Soft, gray, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) SILT with rootlets
		2.80	SPT	N=5 (1,1/)				
		2.50-3.00	B	2,1,1,1)				
		2.60-3.05	D					
		3.10-3.45	U	80Blows				
		3.55-3.70	D		3.55		100.74	Stiff, brown, slightly sandy (fine-coarse grained), gravelly (angular to sub-angular) CLAY
		3.70	SPT	N=31 (4,6/)				
		3.50-4.00	B	6,7,8,10)				
		3.70-4.15	D					
		4.50	W					
		4.50	W					
	4.70	SPT	N=35 (8,8/)					
	4.50-5.00	B	8,7,9,11)					
	4.70-5.15	D						
	5.60-6.00	B		5.60	98.69	Medium dense, brown, very sandy (fine-coarse grained), angular to sub-angular GRAVEL		
	6.00	CPT	N=16 (4,4/)					
			4,4,3,5)					
	6.80-7.20	B		6.80	97.49	Stiff, brown, very sandy (fine to coarse grained), gravelly (fine to coarse grained, subangular to subrounded) CLAY		
	7.20	CPT	N=15 (3,3/)					
			4,4,3,4)					
	7.50-8.10	B						
	8.00	SPT	N=36 (5,7/)					
	8.00-8.45	B	8,8,10,10)					
	8.00-8.45	D		8.50	95.79	Dense, brown, sandy (fine-coarse grained), fine to coarse grained, sub-angular to sub-rounded GRAVEL with many sub-angular to sub-rounded cobbles		
	8.50-9.00	B						
	9.00	CPT	N=37 (7,8/)					
			8,9,10,10)					
	9.60-10.00	B						

Remarks: Chisel: 10.95 - 11.01m / 1hr. Water strike at 5.6m, rose to 4.5m after 20mins. Standpipe installed to 11.0m

Continued next sheet



Numbered in blue (10) indicates maximum log of casing (200 mm dia)



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Borehole No
BH-1012A
 Sheet 2 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171216E - 66680N	Hole Type Cable
Location: Cork		Level: 104.29 m AOD	Scale 1:50
Client: Cork County Council		Dates: 28/09/2006-29/09/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00	SPT	50 (10,14/ 25,25)				Dense, brown, sandy (fine-coarse grained), fine to coarse grained, sub-angular to sub-rounded GRAVEL with many sub-angular to sub-rounded cobbles
		10.50-10.95	B					
		10.95	CPT	25 (25,25 for 55mm/ 25 for 51mm)	11.01	93.28		End of Borehole at 11.01 m
								11
								12
								13
								14
								15
								16
								17
								18
								19

Remarks: Chisel: 10.95 - 11.01m / 1hr. Water strike at 5.6m, rose to 4.5m after 20mins. Standpipe installed to 11.0m



Form 002 of (Rev 02) Standard Borehole Log of sheet 2/20 Nov 02



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Borehole No
BH-1013
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171106E - 67775N	Hole Type Cable
Location: Cork		Level: 70.76 m AOD	Scale 1:50
Client: Cork County Council		Dates: 13/09/2006	Logged By S A

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.60	70.16		Stiff clay and shaley rock - probable FILL
		0.60-1.20	B					Medium dense to dense, brown, slightly sandy (fine-coarse grained, sub-angular to sub-rounded), silty, fine-coarse grained, sub-angular to sub-rounded GRAVEL
		0.60-1.65 1.20	D SPT	N=28 (4,4/ 6,7,7,8)				
		1.60-2.10	B					
		2.70-3.00 3.00	B CPT	50 (10,15 for 60mm/ 25,25 for 60mm)	2.70 3.27	68.06 67.49		Assumed weathered claybound ROCK recovered as brown, slightly sandy (fine to coarse), slightly gravelly (fine to coarse, subangular to subrounded) CLAY.
								End of Borehole at 3.27 m

Remarks: Driller notes clay bound broken rock at 2.7m to 3.27m. Chisel: 3.1 -3.27m / 1hr.



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Borehole No
BH-1014
Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171130E - 67671N	Hole Type Cable
Location: Cork		Level: 77.26 m AOD	Scale 1:50
Client: Cork County Council		Dates: 14/09/2006	Logged By S A

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	76.96		TOPSOIL
		0.70-1.20	B					Brown, sandy (fine-coarse grained, Sub-angular to sub-rounded), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with occasional cobbles
		1.20	SPT	N=12 (2,3/	1.20	76.06		
		1.20-1.65	D	2,3,3,4)				Firm brown, sandy, slightly gravelly CLAY
		1.70-2.20	B		1.65	75.61		Stiff, brown, slightly sandy (fine-coarse grained, Sub-angular to sub-rounded), gravelly (fine-coarse grained, angular to sub-rounded) CLAY
		2.20	SPT	N=21 (4,4/				
		2.20-2.65	D	5,4,5,7)				
		2.80-3.20	B					
		3.20	SPT	N=22 (4,5/				
		3.20-3.65	D	5,6,6,5)				
		3.80-4.20	B					
		4.20	SPT	N=27 (5,5/				
		4.20-4.65	D	7,7,6,7)				
		4.50	W					
		4.80-5.20	B					
		5.20	SPT	N=27 (4,4/				
		5.50-6.00	B		5.50	71.76		Dense, sandy, fine to coarse grained, angular GRAVEL - weathered bedrock
		6.00	CPT	N=31 (5,6/				
				7,7,6,9)				
		7.00-7.55	B					
		7.50	CPT	N=43 (7,7/				
				8,9,12,14)				
		8.20	CPT	50 (25,0 for 0mm/ 25,25 for 60mm)	8.32	68.94		End of Borehole at 8.32 m

Remarks: Chisel: 8.2 - 8.35m / 1hr. Water strike at 5.5m, rose to 4.5m after 20mins.



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Borehole No
BH-1020
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171163E - 66638N	Hole Type Cable
Location: Cork		Level: 106.16 m AOD	Scale 1:50
Client: Cork County Council		Dates: 19/09/2006	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	105.86	TOPSOIL	
		0.50	SPT	N=25 (4,5/)	0.50	105.66		Driller describes as "Stiff, brown, slightly sandy, gravelly CLAY"
		0.50-0.95	D					
		0.50-1.00	B	5,7,7,6)				
		1.00-1.45	U	80Blows				
		1.45-1.60	D					
		1.60	SPT	50				
		1.50-2.00	B	(1,3/				
		1.60-1.97	D	12,17,21 for 70mm)				
		2.50	SPT	N=35 (2,5/	2.50	103.66		Dense, brown, very silty, very sandy (fine-coarse grained), fine-coarse grained, sub-angular to sub-rounded GRAVEL, with occasional cobbles
		2.50-2.95	D	8,10,8,9)				
		2.50-3.00	B					
		3.50	SPT	N=23 (2,4/	3.50	102.66		Firm, brown, slightly sandy (fine-coarse grained), gravelly(fine-coarse grained, sub-angular to sub-rounded) CLAY
		3.50-3.95	D	6,7,5,5)				
		3.50-4.00	B					
		4.00-4.45	U	88Blows				
		4.40	W					
		4.45-4.60	D		4.50	101.66		Dense, very silty, sandy, fine-coarse grained, sub-angular GRAVEL.
		4.60	SPT	50				
		4.50-5.00	B	(4,7/				
		4.60-4.93	D	14,25,11 for 30mm)				
		5.40	CPT	50 (25/ 25,25 for 50mm)	5.48	100.68		End of Borehole at 5.48 m

Remarks: Chisel: 5.4 - 5.48m / 1hr. Water strike at 5.4m, rose to 4.4m after 20mins.



DRAWN BY: P. BIRD (10/09/2006) CHECKED BY: J. O'NEILL (17/09/2006)



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Fax: 021 4638690
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Borehole No
BH-1022
Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172017E - 65997N	Hole Type Cable
Location: Cork		Level: 87.49 m AOD	Scale 1:50
Client: Cork County Council		Dates: 22/09/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	SPT	N=11 (2,2)	0.30	87.19	TOPSOIL (Driers description)	
		0.50-0.95	D	3,2,2,4			Firm, brown, sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY	
		0.50-1.00	B					
		1.00-1.45	U	63Blows				
		1.45-1.60	D					
		1.60	SPT	N=23 (5,5)	1.60	85.99	Stiff, brown, sandy (fine-coarse grained), gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY	
		1.60-2.00	B					
		1.60-2.05	D	6,6,5,6				
		2.20-2.40	D					
		2.20-2.40	U	50Blows				
		2.50	SPT	N=39 (6,7)	2.50	84.99	Stiff, brown, sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY	
		2.50-2.95	D					
		2.50-3.00	B	8,10,10,11				
		3.00-3.45	U	90Blows				
		3.45-3.60	D					
		3.60	SPT	N=18 (4,5)	3.60	83.89	Stiff, brown, sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with occasional cobbles	
		3.60-4.00	B					
		3.60-4.05	D	4,4,5,5				
		4.60	SPT	N=28 (4,8)				
		4.50-5.00	B					
		4.60-5.05	D	6,7,7,8				
		5.80	W					
		6.00	SPT	N=28 (4,4)				
		6.00-6.45	D	5,6,8,9				
		6.00-6.50	B					
		7.75	SPT	N=62 (14,11 for 45mm/ 17,15,15,15)				
		7.50-8.00	B					
		7.75-8.17	D					
		8.49	CPT	50 (25/ 25,25 for 60mm)	8.49	79.00	End of borehole at 8.49 m	

Remarks: Chisel: 8.4 - 8.49m / 1hr. Water strike at 7.2m, rose to 6.8m after 20mins; water strike at 8.4m, rose to 5.8m after 20mins. Water level at 5.1m on the 25th of September.





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Borehole No
BH-1025
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 172583E - 65575N

Hole Type
 Cable

Location: Cork

Level: 78.00 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 25/09/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	77.70		TOPSOIL (Drillers description)
		0.50	SPT	N=19 (3,3)				Stiff, brown, gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY
		0.50-0.95	D	4,4,5,6)				
		0.50-1.00	B					
		1.50	SPT	N=27 (4,4)				
		1.50-1.95	D	6,6,7,8)				
		1.50-2.00	B					
		2.50	SPT	50 (7,6)	2.50	75.50		Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY
				8,10,25,7 for 20mm)	2.88	75.12		
								End of Borehole at 2.88 m

Remarks: Chisel: 2.8-2.88m /1hr



Issue 1.01 of 10/04/03 Standard Borehole Log - 12 Issues 27/01/04



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Borehole No
BH-1026
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172740E - 65426N	Hole Type Cable
Location: Cork		Level: 50.62 m AOD	Scale 1:50
Client: Cork County Council		Dates: 06/10/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	50.32		Driller describes HARDCORE
		0.50-1.00	B					Siff, brown, slightly sandy (fine-coarse grained) gravelly (fine-coarse grained Sub-angular to sub-rounded) CLAY
		1.20	CPT	50	1.20	49.42		
		1.00-1.40	B	(8, 10/ 25, 25)	1.45	49.17		Weathered, broken rock with clay smears
								End of Borehole at 1.45 m

Remarks: Chisel: 1.4 - 1.45m / 1hr



MARKED BY: P.K. (2007) (Specialist) (Technical) (1st) (06/10/2006) (27/10/2006)



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Borehole No
BH-1028
Sheet 1 of 1

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 172748E - 65003N

Hole Type
Cable

Location: Cork

Level: 54.56 m AOD

Scale
1:50

Client: Cork County Council

Dates: 26/09/2006

Logged By
P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	54.26		TOPSOIL (drillers description)
		0.50	SPT	N=11 (2,2/ 3,2,3,3)				Firm, brown, slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY
		0.50-0.95	D					
		0.50-1.00	B					
		1.00-1.45	U					
		1.45-1.60	D					
		1.60	SPT	N=15 (3,3/ 4,3,4,4)				
		1.50-2.00	B					
		1.60-2.05	D					
		2.50	SPT	N=35 (4,5/ 7,8,10,10)	2.50	52.06		Very stiff, brown, slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY
		2.50-2.95	D					
		2.50-3.00	B					
		3.40	CPT	50 (15,10 for 35mm/ 25,25)	3.54	51.02		End of Borehole at 3.54 m

Remarks: Chisel: 3.45 - 3.54 / 1hr





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Borehole No
BH-1031
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 173017E - 64677N

Hole Type
 Cable

Location: Cork

Level: 29.67 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 04/10/2006

Logged By

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
				0.30	29.37		TOPSOIL - (Drillers description)
		0.50	SPT	N=7 (2,2/)			Firm, brown, gravelly (fine-coarse grained angular to sub-angular) CLAY
		0.50-0.95	D	1,2,2,2)			
		0.50-1.00	B				
		1.00-1.45	U	45Blows			
		1.00-1.50	B				
		1.45-1.60	D		1.60	28.07	Firm, light brown, slightly gravelly (fine-coarse grained angular to sub-rounded) CLAY
		1.60	SPT	N=8 (1,1/			
		1.50-2.00	B	2,1,2,3)			
		1.60-2.05	D				
		2.20-2.65	U	75Blows			
		2.65-2.85	D				
		3.00	SPT	N=20 (3,4/	3.00	26.67	Stiff, light brown, slightly gravelly (fine-medium grained angular to sub-rounded) CLAY
		3.00-3.45	D	4,5,5,6)			
		4.00	SPT	N=31 (4,4/	4.00	25.67	Stiff, light brown/grey, slightly sandy (fine-coarse grained) gravelly (fine-coarse grained angular) CLAY
		4.00-4.45	D	6,7,8,10)			
		4.00-4.50	B				
		4.50	W				
		5.00	CPT	N=39 (4,5/			
		5.20-5.50	B	7,8,10,14)			
		5.58	CPT	50 (25/ 25,25 for 70mm)	5.45 5.58	24.22 24.09	Dense, brown, clayey coarse grained, angular to sub-angular GRAVEL, with weathered bedrock
							End of Borehole at 5.58 m

Remarks: Chisel: 5.5 - 5.58m / 1hr. Water strike at 5.2m, rose to 4.5m after 20mins.



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Borehole No
BH-1033
Sheet 1 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172832E - 64325N	Hole Type Cable
Location: Cork		Level: 26.36 m AOD	Scale 1:50
Client: Cork County Council		Dates: 05/10/2006-06/10/2006	Logged By

Wall	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	26.06	TOPSOIL Drillers report	
		0.50	SPT	N=16 (2,3/				
		0.50-0.95	D	4,4,5,5)				
		0.50-1.00	B		0.95	25.41	Stiff, brown, slightly gravelly (fine-medium grained, angular), sandy (fine-medium grained) CLAY with rootlets	
		1.00-1.45	U				Stiff, brown, slightly gravelly (fine-coarse grained, sub-angular), slightly sandy (fine-coarse grained) CLAY	1
		1.45-1.60	D					
		1.60	SPT	N=26				
		1.50-2.00	B	(3,5/				
		1.60-2.05	D	5,6,7,8)				2
		2.50	SPT	N=17				
		2.50-2.95	D	(5,8/				
		2.50-3.00	B	4,4,5,4)				3
		3.50	SPT	N=27				
		3.50-4.00	B	(4,4/	3.50	22.86	Dense, brown, silty, fine to coarse grained, sub-angular to sub-rounded GRAVEL, with rare sub-angular cobbles	4
		4.30-4.70	B	6,6,7,8)				
		4.70	CPT	N=19	4.30	22.06	Stiff, brown, slightly gravelly (fine-coarse grained, sub-angular), sandy (fine-medium grained) CLAY	5
				(3,3/				
				4,5,5,5)				
		5.50-6.00	B		5.50	20.86	Stiff, brown, gravelly (fine-coarse grained, sub-angular), very sandy (fine-medium grained) CLAY, with occasional cobbles	6
		6.00	CPT	N=20				
				(3,3/				
				4,4,6,6)				
		7.00-7.50	B		7.00	19.36	Dense, brown, sandy, fine to coarse grained sub-angular to sub-rounded GRAVEL, with frequent cobbles	7
		7.50	CPT	N=26				
				(4,8/				
				6,5,7,8)				
		7.50-8.55	U	80Blows	8.10	18.26	Stiff, grey, slightly sandy, slightly gravelly CLAY	8
		8.65	D					
		9.10	U	100Blows	9.10	17.26	Stiff, grey, gravelly (fine-coarse grained, sub-angular), CLAY, with frequent cobbles	9
		9.10-9.60	B					
		9.70	D					

Remarks: Chisel: 8.7 - 8.9m / 0.5hr; 10.0 - 11.6m / 8hrs; 11.6 - 12.0m / 4hrs (total => 12.5hr). Water strike at 7m, rose to 5.1m after 20mins; water strike at 3.5m, rose to 2.5m after 20mins.

Continued next sheet





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Borehole No
BH-1033
 Sheet 2 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172832E - 64325N	Hole Type Cable
Location: Cork		Level: 26.36 m AOD	Scale 1:50
Client: Cork County Council		Dates: 05/10/2006-06/10/2006	Logged By

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
		10.00-10.50	B	10.00	16.36		Medium dense, grey clayey, fine to coarse grained sub-angular to sub-rounded GRAVEL
		10.00-10.50	D				
		10.50	SPT					N=17 (4,5/ 6,4,4,3)
		11.00-11.40	B	10.95	15.41		Stiff, grey, gravelly (fine-coarse grained, sub-angular), CLAY
		11.00-11.40	D				
		12.00	SPT	12.00	14.36		End of Borehole at 12.00 m

Remarks: Chisel: 8.7 - 8.9m / 0.5hr; 10.0 - 11.6m / 8hrs; 11.6 - 12.0m / 4hrs (total => 12.5hr). Water strike at 7m, rose to 5.1m after 20mins; water strike at 3.5m, rose to 2.5m after 20mins.





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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1036
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 173166E - 64626N	Hole Type Cable
Location: Cork		Level: 25.40 m AOD	Scale 1:50
Client: Cork County Council		Dates: 04/10/2006-05/10/2006	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	SPT	N=11 (2,2)	0.30	25.10	TOPSOIL (Drillers description)	
		0.50-0.95	D	2,2,4,3			Soft to firm, brown, slightly sandy, slightly gravelly (fine-coarse grained angular to sub-angular) SILT	
		1.20-1.60	B		1.20	24.20	Stiff, brown, slightly gravelly (fine-coarse grained, angular to sub-angular), sandy CLAY with rare cobbles	1
		1.50-1.95	D	N=32 (4,6, 7,8,8,9)				
		2.20-2.60	B		2.20	23.20	Stiff to very stiff, brown, sandy, slightly gravelly (fine-coarse grained sub-angular) CLAY	2
		2.50-3.00	SPT	N=47 (4,8, 8,10,14,15)				
		3.00	CPT	50 (18,7 for 25mm/ 25,25)	3.10	22.30	End of Borehole at 3.10 m	3

Remarks: Chisel: 3.0 - 3.1m / 1hr





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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1041
 Sheet 1 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 175175E - 64033N	Hole Type Cable
Location: Cork		Level: 38.94 m AOD	Scale 1:50
Client: Cork County Council		Dates: 16/10/2006-17/10/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Results				
				0.30	38.64		TOPSOIL (Drillers description)
		0.50	SPT N=9 (2,2/)				Loose, brown, very silty, very sandy (fine-coarse grained), fine-coarse grained, sub-angular GRAVEL.
		0.50-0.95	D 3,2,2,2)				
		0.50-1.00	B				
		1.00-1.45	U				
		1.45-1.60	D				
		1.60	SPT N=14 (2,2/)				
		1.50-2.00	B 4,4,3,3)				
		1.60-2.05	D				
		2.50	SPT N=11 (2,3/)				
		2.50-2.95	D 3,2,3,3)				
		3.00-3.45	U				Stiff, brown, slightly sandy CLAY
		3.45-3.60	D	3.45	35.49		
		3.60	SPT N=12 (2,2/)				
		3.50-4.00	B 3,3,3,3)				
		3.60-4.05	D				
		4.50	SPT N=14 (3,4/)				
		4.50-4.95	D 4,3,3,4)				
		4.50-5.00	B				
		6.00	SPT N=21 (4,4/)	6.00	32.94		
		6.00-6.45	D 5,5,6,5)				
		6.00-6.50	B				Stiff, brown, slightly sandy (sand is fine to coarse grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded), SILT.
		7.50	SPT N=22 (4,5/)				
		7.50-8.00	B 5,6,6,5)				
		9.00	SPT N=24 (4,6/)	9.00	29.94		
		9.00-9.45	D 5,6,6,7)				
		9.00-9.50	B				

Remarks: Chisel: 11.70 - 11.78m / 1hr

Continued next sheet



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1041
 Sheet 2 of 2

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 175175E - 64033N

Hole Type
 Cable

Location: Cork

Level: 38.94 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 16/10/2006-17/10/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.50	SPT	N=35 (5,6/ 6,7,10,12)			Medium dense, brown, clayey, fine to medium grained SAND	
		10.50-10.95	B					
		11.00-11.50	B		11.30	27.64	Dense, dark brown, clayey, fine to coarse grained SAND	
		11.30	SPT	50 (10,15/ 20,20,10 for 30mm)				
		11.30-11.63	D					
		11.70	CPT	(25.5 for 15mm/ 25,25)	11.78	27.16	End of Borehole at 11.78 m	

Remarks: Chisel: 11.70 - 11.78m / 1hr



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1046
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 176183E - 63945N

Hole Type
 Cable

Location: Cork

Level: 36.59 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 13/10/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	D		0.30	36.29		TOPSOIL (Drillers description)
		0.50	SPT	N=9				Firm, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) SILT, with rare sub-rounded cobbles
		0.50	D	(13,6/				
		0.50	SPTLS	3,2,2,2)				
		0.60-1.00	B					
		0.60-1.00	D					
		1.30	D					
		1.50	SPT	N=66	1.50	35.09		Very dense, grey, sandy, fine to coarse grained, angular to sub-angular GRAVEL
		1.50-1.95	SPTLS	(6,12/				
		1.50-1.95		11,15,18,22)				
					1.95	34.64		End of Borehole at 1.95 m

Remarks: Chisel: 1.3 - 1.35m / 0.5hr; 1.9 - 1.95m / 1hr Stopped on possible rock obstruction



UNAPPROVED BY (P.K.) 13/10/2006



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1049
Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 177509E - 63742N	Hole Type Cable
Location: Cork		Level: 10.07 m AOD	Scale 1:50
Client: Cork County Council		Dates: 16/10/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
		0.20	D		9.87		TOPSOIL (Drillers description)
		0.50	SPT	N=33 (2,4/	9.57		Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY, with rare sub-rounded cobbles
		0.50-0.95	SPTLS	5,4,15,9)			
		0.50-1.00	B				
		0.50-1.00	D				
		1.20	D				
		1.50	SPT	N=8 (2,2/	8.57		Soft to firm, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		1.50-1.95	SPTLS	2,0,1,5)			
		1.80-2.20	B				
		1.80-2.20	D				
		2.50	SPT	N=4 (1,2/	7.27		Soft, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		2.50-2.95	SPTLS	0,1,2,1)			
		2.80-3.20	B				
		2.80-3.20	D				
		3.50	SPT	N=5 (0,0/	6.57		Soft, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY, with frequent angular cobbles
		3.50-3.95	SPTLS	1,2,1,1)			
		3.90-4.20	B				
		3.90-4.20	D				
		4.50	CPT	25 (25,25/ 25 for 50mm)	5.52		4.5m. Clay becoming very stiff. End of Borehole at 4.20 m

Remarks: Chisel: 1.0-1.1m / 0.5hr; 4.0-4.2m / 1hr, 4.5 - 4.55m/ 1hr.



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No

BH-1053

Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 177580E - 63627N

Hole Type
 Cable

Location: Cork

Level: 0.05 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 19/10/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	W					
		0.50	SPT	N=21 (4,4/ 5,5,6,5)				
		0.50-0.95	B					
		1.50	CPT	N=34 (4,5/ 6,10,10,8)	1.20	-1.15		
		1.50-2.00	B					
		2.80	CPT	50 (25/ 25,25 for 50mm)	2.89	-2.84		
								End of Borehole at 2.89 m

Remarks: Chisel: 2.8 - 2.89m / 1hr. Water strike at 1.2m, rose to 0.2m after 20mins.



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Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1054
Sheet 1 of 2

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 177673E - 63554N

Hole Type
Cable

Location: Cork

Level: 0.51 m AOD

Scale
1:50

Client: Cork County Council

Dates: 18/10/2006-19/10/2006

Logged By
P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	SPT	N=0 (0,0/ - - -)			Soft, brown, slightly sandy (fine-coarse grained), gravelly (fine-medium grained, angular to sub-rounded) CLAY, with occasional cobbles	
		0.50-0.95 0.50-1.00	D B	- - - -				
		1.00-1.45	U	44Blows			Loose to medium dense, brown, silty, sandy (fine-coarse grained), fine to coarse grained, sub-angular to sub-rounded GRAVEL, with cobbles	
		1.45-1.60 1.60	D SPT	N=6 (2,2/ 1,1,2,2)	1.60	-1.09		
		1.60-2.05	D				Soft to very soft, grey, slightly sandy (fine-medium grained) SILT.	
		2.00-2.50	B					
		2.50	CPT	N=17 (3,3/ 4,4,4,5)			6.2m. Silt becoming very soft.	
		3.50	CPT	N=17 (4,4/ 4,5,4,4)	4.00	-3.49		
		3.50-4.00	B				Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		4.50	CPT	N=5 (3,3/ 1,2,1,1)				
		4.80-5.20	B				Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		5.20-5.65	U	35Blows				
		5.65-5.80 5.80	D SPT	N=0 (0,0/ - - -)			Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		5.80-6.25	D					
		6.20-6.60	B				Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		7.30	SPT	N=0 (0,0/ - - -)				
		7.30-7.75	D				Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		7.80-8.20	B					
		8.80	SPT	N=2 (0,1/ 0,1,0,1)	9.25	-8.74	Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		8.80-9.25	D					

Remarks: Chisel: 15.08 - 15.28m / 1hr. Water strike at 3.5m, rose to 1m after 20mins.

Continued next sheet



sheet 1 of 2 (BH-1054) Sheet 1 of 2 (BH-1054) Sheet 1 of 2 (BH-1054)



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1054
 Sheet 2 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 177673E - 63554N	Hole Type Cable
Location: Cork		Level: 0.51 m AOD	Scale 1:50
Client: Cork County Council		Dates: 18/10/2006-19/10/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00-10.50 10.30	B SPT	N=5 (0,1/ 1,1,1,2)			Very soft, brown/grey, sandy (fine-coarse grained), SILT.	
		10.30-10.75	D					
		11.30-11.80	B					
		11.80	SPT	50 (8,10/ 18,18,14 for 50mm)				
		12.80-13.20	B					
		13.20	SPT	50 (10,15/ 25,25)	13.20	-12.69		
		13.20-13.50	D				Dense, orange, clayey, fine grained SAND	
		14.80	SPT	50				
		14.80-15.07	D	(10, 15 for 60mm/ 25,25 for 60mm)				
		15.28	CPT	50 (25/ 25,25 for 50mm)	15.28	-14.77	End of Borehole at 15.28 m	

Remarks: Chisel: 15.08 - 15.28m / 1hr. Water strike at 3.5m, rose to 1m after 20mins.



11/06/06 BH-1054 (Priority) Borehole Log of BH-1054 (Rev 2)



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638890
 email: geotechnical@priority.ie

Borehole No
BH-1057
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 178688E - 64130N

Hole Type
 Cable

Location: Cork

Level: 36.00 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 12/10/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	D		0.30	35.70	[Pattern]	TOPSOIL (Drillers Description)
		0.50	SPT	N=13 (5,6/)				
		0.50-0.95	SPTLS	4,3,3,3)				
		0.50-1.00	B					
		0.50-1.00	D					
		1.30	D		1.30	34.70	[Pattern]	Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular) SILT, with rare angular cobbles
		1.50	SPT	52 (7,4/)				
		1.50-1.95	SPTLS	9,11,15 for 35mm)				
					1.95	34.05		Dense brown, clayey, slightly sandy, fine to coarse grained, angular to sub-angular GRAVEL
								End of Borehole at 1.95 m

Remarks: Chisel: 1.85 - 1.95m / 1hr



DRAWN BY: P. K. (12/10/06) CHECKED BY: P. K. (12/10/06) DATE: 12/10/06



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1058
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 178559E - 64095N	Hole Type Cable
Location: Cork		Level: 34.30 m AOD	Scale 1:50
Client: Cork County Council		Dates: 13/10/2006	Logged By P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.40	D		0.40	33.90		TOPSOIL (Driller description)
		0.50	SPT	N=12 (2,2)				
		0.50-1.00	B	2,3,3,4				Medium dense to dense, brown, silty, sandy (fine-coarse grained) fine-coarse grained, angular to sub-angular GRAVEL.
		0.50-1.00	D					Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, angular to sub-angular) CLAY
		1.50	SPT	85 (6,11/ 15,20,25,25 for 1mm)	1.30	33.00		
					1.90	32.40		End of Borehole at 1.90 m

Remarks:




TRACKS 10 201 102 Standard Borehole Log of Borehole BH-1058

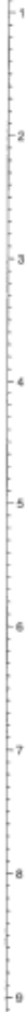


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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1059
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 178699E - 64319N	Hole Type Cable
Location: Cork		Level: 2.73 m AOD	Scale 1:50
Client: Cork County Council		Dates: 23/10/2006	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10	2.63	 Driller records TAR Driller records hardcore	
					0.80	1.93		
								End of Borehole at 0.80 m



Remarks: Refused on Wavin Sewer Pipe





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 email: geotechnical@priority.ie

Borehole No
BH-1059A
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 178699E - 64318N	Hole Type Cable
Location: Cork		Level: 2.69 m AOD	Scale 1:50
Client: Cork County Council		Dates: 23/10/2006	Logged By

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	2.49		Driller records TAR
					0.40	2.29		Driller records hardcore
								End of Borehole at 0.40 m



Remarks: Borehole stopped at 0.4m by engineers instruction



AGS 10/06/06 10:00 AM



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Tel: 021 4631600
Fax: 021 4638690
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Borehole No
BH-1059B
Sheet 1 of 1

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 178710E - 64307N

Hole Type
Cable

Location: Cork

Level: 2.35 m AOD

Scale
1:50

Client: Cork County Council

Dates: 23/10/2006-24/10/2006

Logged By

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
		0.30	SPT	N=7 (2,2/)	2.05		TOPSOIL (Drillers description)
		0.50-0.95	D	1,2,2,2)			Medium dense, brown, very clayey, very sandy (fine-coarse grained), fine-coarse grained, sub-angular to sub-rounded) GRAVEL
		0.50-1.00	B				
		1.00-1.45	U				
		1.45-1.60	D		1.60		Firm, brown, sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY
		1.60	SPT	N=9 (2,2/)	0.75		
		1.50-2.00	B	2,3,2,2)			
		1.60-2.05	D				
		2.50	SPT	N=10 (2,3/)	2.50		Firm, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, angular to sub-rounded) CLAY with angular cobbles
		2.50-2.95	D	2,2,3,3)	-0.15		
		2.80-3.00	B				
		3.30-3.45	B		3.30		Dense angular GRAVEL, smeared with clay
		3.45	CPT	50 (25/ 25,25 for 50mm)	-0.95		
					3.50		End of Borehole at 3.50 m
					-1.15		

Remarks: Chisel: 3.45 - 3.5m / 1hr Standpipe Installed Water strike at 3.3m, roseto 2.9m after 20mins.



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Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1060
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172762E - 64884N	Hole Type Cable
Location: Cork		Level: 50.63 m AOD	Scale 1:50
Client: Cork County Council		Dates: 01/11/2006-02/11/2006	Logged By P R

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
				0.30	50.33		Hardcore (Drillers description)
							Fill, gravelly CLAY, cobbles and boulders (Drillers description)
		1.20	CPT				
		1.60-2.00	B	1.60	49.03		Firm, brown, sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY with angular to sub-angular cobbles
		2.00	SPT	2.00	48.63		
		2.00-2.45	D				Firm, brown, sandy (fine-coarse grained), slightly gravelly (fine-medium grained, sub-rounded) CLAY
				2.45	48.18		
		2.60-3.00	B				Firm, brown, slightly gravelly (fine-coarse grained, sub-rounded), sandy (fine-coarse grained) CLAY with angular to sub-angular cobbles
		3.00	SPT	3.00	47.63		
		3.00-3.45	B				Dense, brown, slightly sandy (fine-coarse grained), fine-coarse grained, angular to sub-rounded GRAVEL with angular cobbles
		3.00-3.45	D				
		4.00	CPT				
		4.00-4.45	B				
		4.80	CPT	4.80	45.83		
							End of Borehole at 4.80 m

Remarks: Chisel: 1.3 - 1.5m / 0.5hr; 4.7 - 4.8m / 1hr Water strike at 4m, rose to 3.6m after 20mins.



Version 1.0 - 2006-02-11
 Borehole Log of BH-1060



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1061
Sheet 1 of 1

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 177542E - 63702N

Hole Type
Cable

Location: Cork

Level: 8.69 m AOD

Scale
1:50

Client: Cork County Council

Dates: 27/10/2006

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	SPT	N=21 (3,3/ 4,5,6,8)	0.30	8.39		TOPSOIL (drillers description)
		0.50-0.95 0.50-1.00	D B					Stiff, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-rounded) CLAY, (with angular fragments of weathered limestone rock)
		1.30-1.60 1.50	B CPT	50 (10,15/ 25,25)	1.76	6.93		End of Borehole at 1.76 m

Remarks: Chisel: 1.7 - 1.76m / 1hr



AGS 01 281 422 Standard Borehole Log 12 2006 27/10/06 23



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH-1061A
Sheet 1 of 2

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 177542E - 63698N

Hole Type
Cable

Location: Cork

Level: 8.42 m AOD

Scale
1:50

Client: Cork County Council

Dates: 30/10/2006-31/10/2006

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	8.12		TOPSOIL (Drillers description)
		0.50 0.50-1.00	CPT B	N=15 (3,3/ 4,3,4,4)				Firm, brown, very silty, very sandy (fine grained), fine-medium grained, sub-angular GRAVEL, and angular fragments of limestone rock
		1.50 1.50-2.00	CPT B	N=30 (5,6/ 7,7,8,8)				Firm, brown, slightly sandy (fine grained), slightly gravelly (fine-medium grained, sub-angular) CLAY
		2.50 2.50-2.95 2.50-3.00	SPT D B	N=14 (3,3/ 4,4,3,3)	2.50 2.95	5.92 5.47		Firm, brown, slightly sandy (fine-medium grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY
		3.50 3.50-3.95 3.50-4.00	SPT D B	N=13 (4,3/ 3,4,3,3)				Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		4.50 4.50-4.95 4.50-5.00	SPT D B	N=17 (4,4/ 5,4,4,4)				Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		6.00 6.00-6.50	SPT B	N=18 (4,5/ 5,4,5,4)	6.00	2.42		Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		7.50 7.50-7.95 7.50-7.95	SPT B D	N=23 (4,5/ 6,6,5,6)				Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		9.00 9.00-9.45 9.00-9.50 9.50	SPT D B W	N=19 (4,4/ 3,5,6,5)				Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles

Remarks: Chisel: 12.7 - 12.76m / 1hr Stopped on possible rock obstruction. Water strike at 12.3m, rose to 9.5m after 20mins.

Continued next sheet



Produced by (Pb-463) Inland Systems Log of sheet 27/10/06



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
BH-1061A
 Sheet 2 of 2

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 177542E - 63698N

Hole Type
 Cable

Location: Cork

Level: 8.42 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 30/10/2006-31/10/2006

Logged By
 P R

Well	Water Strikes	Samples & In Situ Testing		Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type					Results
		10.50	SPT	N=23 (4,4/ 8,8,5,8)			Stiff, brown, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY, with rare sub-angular cobbles
		10.50-10.95	D				
		10.50-11.00	B				
		11.70	SPT	N=28 (6,6/ 7,7,6,8)			Dense, angular fragments of clay smeared rock
	▽	12.30-12.70	B				
		12.70	CPT	50 (25/ 25,25 for 50mm)			
							End of Borehole at 12.76 m

Remarks: Chisel: 12.7 - 12.76m / 1hr Stopped on possible rock obstruction. Water strike at 12.3m, rose to 9.5m after 20mins.



BH-1061A-02-03-04-05-06-07-08-09-10-11-12-13-14-15-16-17-18-19-20




Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH1063
Sheet 1 of 1

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 172299E - 65590N	Hole Type Cable
Location: Ringaskiddy, Cork		Level: 87.74 m AOD	Scale 1:50
Client: Cork County Council		Dates: 14/03/2008	Logged By SC

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00-0.50	B				TOPSOIL described as brown, slightly gravelly (fine to coarse, sub-angular), slightly sandy (fine to medium) SILT with occasional cobbles (sub-rounded).	
		0.50	SPT	50 (6,8/ 33,17 for 24mm)	0.50	87.24	Very stiff to stiff, brown, slightly gravelly (fine to medium, sub-angular), slightly sandy (fine to medium) SILT.	
		1.00-1.50	B					
		1.50	SPT	N=28 (1,7/ 7,6,7,8)				
		2.00-2.50	B		2.00	85.74	Brown, very silty, very sandy (medium) GRAVEL (fine to coarse, sub-angular), with many cobbles (sub-angular).	
		2.50	CPT	50 (8,8/	2.50	85.24	Weathered SILTSTONE recovered as medium dense, brown, gravelly (fine to coarse, sub-angular), very silty SAND (medium) with cobbles (sub-angular).	
		2.50-3.00	B	16,19,15 for 41mm)				
		3.00	CPT	50	3.00	84.74		
		3.00	D	(25 for 41mm/ 50)			End of Borehole at 3.00 m	

Remarks: Chiselling from 0.75m to 0.95m for 20 minutes; from 2.90m to 3.00m for 1 hour. Borehole terminated at 3.00m, siltstone obstruction.

 PRIORITY GEOTECHNICAL			Priority Geotechnical Tel: 021 4631600 Fax: 021 4638690 email: geotechnical@priority.ie				Borehole No BH1068 Sheet 1 of 1	
Project Name: N28-Bloomfield to Ringaskiddy, Add. Works			Project No. PC6006A		Co-ords: 172923E - 64353N		Hole Type Cable	
Location: Ringaskiddy, Cork			Level: 24.84 m AOD				Scale 1:50	
Client: Cork County Council			Dates: 27/03/2008				Logged By MK	
Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00-0.50	B				TOPSOIL described as brown, slightly sandy (fine to coarse), slightly gravelly (fine to coarse, angular to sub-angular) SILT.	
		0.50-1.00	U	72				
		1.00	SPT	N=27	1.00	23.84		
		1.00	D	(4,4)			Medium dense, brown, gravelly (fine to coarse, angular to sub-rounded), very silty SAND (fine to medium).	
		1.00-1.45	SPTLS	6,6,7,8				
		1.00-1.45	B					
		2.00	SPT	N=5	2.00	22.84		
		2.00-2.45	SPTLS	(1,0)			Very loose, brown, very gravelly (fine to coarse, angular to sub-rounded), very silty, SAND (fine) with some cobbles.	
		2.00-2.45	B	1,1,1,2				
		3.00	SPT	N=33	3.00	21.84		
		3.00-3.45	SPTLS	(1,9)			Medium dense, brown, very sandy (fine), very silty, GRAVEL (fine to coarse, angular to sub-rounded) with occasional cobbles.	
		3.00-3.45	B	9,9,9,6				
		4.00	CPT	50	4.00	20.84		
		4.00	D	(25 for 16mm/ 50 for 6mm)			End of Borehole at 4.00 m	
			Type	Results				
Remarks: Waterstrike at 4.00m, rose to 3.90m after 5 minutes, remained at 3.90m after 20 minutes. Chiselling from 3.90m to 4.00m for 1 hour. Borehole terminated due to limestone obstruction. Sample at 4.0m recovered as angular, fine to coarse grained GRAVEL.								

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Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH1071
Sheet 1 of 2

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 173751E - 64340N	Hole Type Cable
Location: Ringaskiddy, Cork		Level: 26.48 m AOD	Scale 1:50
Client: Cork County Council		Dates: 02/04/2008	Logged By AM

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.00-0.50	B		0.50	25.98		Brown-pink slightly sandy (fine to coarse) gravelly (coarse, angular to sub-angular) SILT, occasional cobbles rare rootlets.
		0.50-1.00	U	75				Stiff, brown slightly gravelly (coarse, angular to sub-angular), slightly sandy (fine to medium), CLAY, with some cobbles rare rootlets.
		1.00	SPT	N=13				
		1.00	U	(3,3)				
		1.00-1.45	B	4,5,2,2)				
		1.00-1.45	D					
		2.00	SPT	N=16				Rare sub-angular cobbles between 3.0m to 3.45m
		2.00-2.45	B	(3,3)				
		2.00-2.45	D	3,4,5,4)				
		3.00	SPT	N=15				CLAY firm below 4.0m
		3.00-3.45	B	(3,3)				
		3.00-3.45	D	3,3,4,5)				
		3.50-4.00	B					
		4.00	SPT	N=12				
		4.00-4.45	B	(3,3)				
		4.00-4.45	D	3,3,3,3)				
		5.00	SPT	N=12				
		5.00-5.45	B	(3,3)	5.45	21.03		Stiff, brown, slightly gravelly (sub-angular, fine to coarse), slightly sandy (fine) SILT.
		5.00-5.45	D	3,3,3,3)				
		6.00	SPT	N=15				
		6.00-6.45	B	(1,3)				
		6.00-6.45	D	3,3,4,5)				
		7.00-7.50	B					
		7.50	SPT	N=20				
		7.50-7.95	D	(3,4)				
		7.50-7.95	D	5,5,5,5)	8.00	18.48		Medium dense, very sandy, very silty, GRAVEL.
		8.00-8.45	B					
		9.00	SPT	N=25				
		9.00-9.45	B	(4,7)	9.45	17.03		Pink-brown silty gravelly (fine to medium) SAND (fine to medium)
		9.00-9.45	D	5,6,7,7)				

Remarks: Completed at 18.1m Limestone obstruction. Chiselling: 14.75m to 14.95m 35 min; 17.6m to 17.8m 25 min, 18.0m to 18.1m 1 hour. Waterstrike 13.5m rose to 12.5m after 20 minutes.

Continued next sheet



Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
BH1071
Sheet 2 of 2

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 173751E - 64340N	Hole Type Cable
Location: Ringaskiddy, Cork		Level: 26.48 m AOD	Scale 1:50
Client: Cork County Council		Dates: 02/04/2008	Logged By AM

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		10.00-10.45 10.00-10.45 10.50	B D SPT	N=26 (5,6/ 6,6,7,7)	10.00	16.48	Medium dense, brown silty SAND (fine to medium) and GRAVEL (fine to coarse, sub-angular to angular)	
		11.00-11.45	B					
		12.00 12.00-12.45 12.00-12.45	SPT B D	N=25 (4,5/ 6,6,6,7)	12.45	14.03	Very stiff, brown-orange slightly sandy (fine to medium), gravelly (fine to coarse, angular to sub-angular) SILT.	
		13.00-13.45 13.00-13.45 13.50	B D SPT	N=25 (2,2/ 5,7,7,6)	13.45	13.03	Very stiff, brown-yellow sandy (fine to coarse) gravelly (fine to coarse, angular to sub-angular) CLAY	
		14.00-14.45	B					
		15.00 15.00-15.45	SPT B	N=28 (5,6/ 7,7,7,7)	15.00	11.48	Very stiff, white-grey slightly sandy (fine to medium) slightly gravelly (angular, fine to coarse) SILT with angular cobbles.	
		16.00-16.45	D		16.00	10.48	Loose, white-brown, sandy (fine to medium), very silty, GRAVEL (angular, fine to coarse) with many cobbles.	
		16.50	SPT	N=8 (1,-/ 2,2,2,2)				
		17.00-17.45	B					
		17.60-18.10 18.00 18.00 18.10	B SPT D CPT	(75 (75 for 40mm) (75 (75 for 31mm)	18.00 18.10	8.48 8.38	Dense, brown GRAVEL (coarse, angular to sub-angular) with many Cobbles (angular to sub-rounded)	
							End of Borehole at 18.10 m	

Remarks: Completed at 18.1m Limestone obstruction. Chiselling: 14.75m to 14.95m 35 min; 17.8m to 17.8m 25 min, 18.0m to 18.1m 1 hour. Waterstrike 13.5m rose to 12.5m after 20 minutes.

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Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1005
 Sheet 1 of 4

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171724E - 68835N	Hole Type Rotary
Location: Cork		Level: 62.62 m AOD	Scale 1:50
Client: Cork County Council		Dates: 09/11/2006-17/11/2006	Logged By P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.50	62.12	Driller describes - stiff CLAY and broken rock	
					1.30	61.32	Stiff, brown, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY.	1
		1.30-2.10	100	0			Moderately strong, purple, MUDSTONE. Weathering - orange, black discolouration along fracture surfaces, highly weathered between 1.3 - 2.1m. Fractures: 2.1 - 30.65m 50 degrees, very closely spaced, planar / undulating, smooth, medium persistence. 13.1 - 17.95m 20 degrees, closely spaced, planar, rough, medium persistence. Detail: 1.3-2.1m NI & AZCL due to weathering and fracturing 4.4 - 4.65m NI & AZCL due to weathering and fracturing 9.05 - 9.25m NI & AZCL due to weathering and fracturing 9.65 - 9.8m NI & AZCL due to weathering and fracturing 11.7 - 12.15m NI & AZCL due to weathering and fracturing 24.30 - 30.65m highly fractured	2
		2.10-2.70	100	48				3
		2.70-3.35	100	86				4
		3.35-3.75	100	95				5
		3.75-4.40	100	92				6
		4.40-4.50	100	0				7
		4.50-4.65	100	0				8
		4.65-5.05	100	100				9
		5.05-5.35	100	80				
		5.35-6.00	100	95				
		6.00-6.20	100	100				
		6.20-7.20	100	94				
		7.20-7.60	100	100				
		7.60-7.95	100	0				
		7.95-8.45	100	100				
		8.45-8.65	100	100				
		8.65-9.05	100	58				
		9.05-9.25	100	0				
		9.25-9.65	100	55				
		9.65-9.80	100	0				
		TCR	SCR	RQD	FI			

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.

Continued next sheet





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No

RC-1005

Sheet 2 of 4

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 171724E - 68835N

Hole Type
 Rotary

Location: Cork

Level: 62.62 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 09/11/2006-17/11/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		9.80-10.20	100	100	0				Moderately strong, purple, MUDSTONE. Weathering - orange, black discolouration along fracture surfaces, highly weathered between 1.3 - 2.1m. Fractures: 2.1 - 30.65m 50 degrees, very closely spaced, planar / undulating, smooth, medium persistence. 13.1 - 17.95m 20 degrees, closely spaced, planar, rough, medium persistence. Detail: 1.3-2.1m NI & AZCL due to weathering and fracturing 4.4 - 4.65m NI & AZCL due to weathering and fracturing 9.05 - 9.25m NI & AZCL due to weathering and fracturing 9.65 - 9.8m NI & AZCL due to weathering and fracturing 11.7 - 12.15m NI & AZCL due to weathering and fracturing 24.30 - 30.65m highly fractured
		10.20-11.00	90	44	0				
		11.00-12.15	100	51	0				
		12.15-13.70	100	89	0				
		13.70-15.00	100	77	16				
		15.00-16.35	94	59	9	NI 60 130			
		16.35-17.95	100	21	0				
		17.95-19.10	78	78	0				
		19.10-20.30	100	62	0				
			TCR	SCR	RQD	FI			

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



Form AGS 11 (Rev 03) Standard Borehole Log of 270 Size 03



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1005
Sheet 3 of 4

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171724E - 68835N	Hole Type Rotary
Location: Cork		Level: 62.62 m AOD	Scale 1:50
Client: Cork County Council		Dates: 09/11/2006-17/11/2006	Logged By P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		20.30-21.10	100	57	0			Moderately strong, purple, MUDSTONE. Weathering - orange, black discolouration along fracture surfaces, highly weathered between 1.3 - 2.1m. Fractures: 2.1 - 30.65m 50 degrees, very closely spaced, planar / undulating, smooth, medium persistence. 13.1 - 17.95m 20 degrees, closely spaced, planar, rough, medium persistence. Detail: 1.3-2.1m NI & AZCL due to weathering and fracturing 4.4 - 4.65m NI & AZCL due to weathering and fracturing 9.05 - 9.25m NI & AZCL due to weathering and fracturing 9.65 - 9.8m NI & AZCL due to weathering and fracturing 11.7 - 12.15m NI & AZCL due to weathering and fracturing 24.30 - 30.65m highly fractured	
		21.10-22.30	50	50	0				
		22.30-23.30	100	57	0				
		23.30-24.30	100	60	0				
		24.30-25.40	100	66	16				
		25.40-26.35	95	77	0				
		26.35-27.85	87	87	0				
						27.85	34.77	No Recovery	
		27.85-29.35	0	0	0				
						29.35	33.27		
								Moderately strong, purple, MUDSTONE. Weathering - orange, black discolouration along fracture surfaces Fractures: 2.1 - 30.65m 50 degrees, very closely spaced, planar / undulating, smooth,	

Remarks: Core diameter: H Rig type used: Bort Longyear Deltabase 520 Tracked.

Continued next sheet



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1009
Sheet 1 of 1

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 171419E - 68304N

Hole Type
Rotary

Location: Cork

Level: 73.01 m AOD

Scale
1:50

Client: Cork County Council

Dates: 20/09/2006-21/09/2006

Logged By
FL

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20	72.81	TOPSOIL - drillers description FILL - drillers description, stiff clay and fill		
					0.70	72.31			
					1.15	71.86	Stiff, brown, sandy (fine-coarse grained, sub-angular to sub-rounded), gravelly (fine-coarse grained, angular to sub-rounded) CLAY	1	
		1.15-2.05	61	7	0	2.05	70.96	Assumed weathered SILTSTONE.	
		2.05-2.55	80	60	0				
		2.55-3.40	100	85	0	Moderately strong to moderately weak, purple, thinly laminated, SILTSTONE, weathering - brown discolouration along fracture surfaces from 2.05 - 10.0m; Fractures: 2.05 - 6.3m 65-75 degrees, very closely spaced, undulating smooth, low persistence. 6.3 - 10.0m, 45 degrees, very closely spaced, undulating smooth, low persistence. Detail: 5.4 - 5.7m NI. 6.3 - 6.45m NI. 7.53 - 7.59m Clay band present due to weathering 8.5 - 8.65m NI. 9.25 - 9.5m Moderately weak NI. 9.6 - 10.0m NI. AZCL due to weathering 9.72 - 9.77m clay band	NI NL 70	2	
		3.40-4.30	100	100	0				
		4.30-5.15	100	82	0				
		5.15-5.60	100	67	0				
		5.60-6.30	100	71	0				
		6.30-7.30	95	50	0				
		7.30-8.50	100	75	0				
		8.50-9.50	90	45	0				
9.50-10.00	90	30	0						
	TCR	SCR	RQD	FI					

End of Borehole at 10.00 m

Remarks: Standpipe Installed at 10.0m. Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



TrackSAFE 9 (Rev 002) Standard Borehole Log of data (LTH) Rev 03



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1013
 Sheet 1 of 2

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 171106E - 67775N

Hole Type
 Rotary

Location: Cork

Level: 70.76 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 26/09/2006-27/09/2006

Logged By
 P K

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.60	70.16		Stiff clay and shaley rock - probable FILL.
								Medium dense to dense, brown, slightly sandy (fine-coarse grained, sub-angular to sub-rounded), silty, fine-coarse grained, sub-angular to sub-rounded GRAVEL.
		2.70-3.60	100	66	0			Moderately strong to moderately weak, grey, SILTSTONE, very thinly laminated, brown weathering along joints, Discontinuities - 35-45 degrees, very closely spaced, very low persistence, smooth Detail: mudstone band at 4.1-4.45m
		3.60-4.30	100	73	0			
		4.30-4.45	100	100	0			
		4.45-5.20	100	65	0			
		5.20-5.85	100	92	0			
					5.62	65.14		Moderately strong to moderately weak, purple, thinly laminated, fine grained SANDSTONE, brown weathering along joints, Fractures: 35-40 degrees, closely spaced, stepped, rough, low persistence. Detail: Moderately to highly weathered, light cream/ brown mudstone band 6.25 -6.55m.
		5.85-6.55	100	37	0			
		6.55-7.50	100	35	0			
		7.50-8.60	100	90	0			
		8.60-9.10	100	88	20			
		9.10-9.50	100	45	0			
			TCR	SCR	RQD	FI		

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



AGS 2004/05/06/07/08/09/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/00



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1013
 Sheet 2 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 171106E - 67775N	Hole Type Rotary
Location: Cork		Level: 70.76 m AOD	Scale 1:50
Client: Cork County Council		Dates: 26/09/2006-27/09/2006	Logged By P K

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	TCR	SCR	RQD						FI
		9.50-10.50	100	59	19			.....	Moderately strong to moderately weak, purple, thinly laminated, fine grained SANDSTONE, brown weathering along joints, Fractures: 35-40 degrees, closely spaced, stepped, rough, low persistence. Detail: Moderately to highly weathered, light cream/ brown mudstone band 6.25 -6.55m.	11
		10.50-11.80	92	83	9			.....		12
		11.80-12.40	100	37	0	12.26	58.50	.....	Moderately weak, grey, SILTSTONE, very thinly laminated, brown weathering along joints, Discontinuities - 35-45 degrees, very closely spaced, very low persistence, smooth	13
		12.40-13.95	94	19	0			.....		14
		13.95-15.60	48	26	19	13.95	56.81	.....	Purple, thinly laminated, fine grained SANDSTONE, brown weathering along joints, Fractures: 35-40 degrees closely spaced, stepped, rough, low persistence. 13.95 - 15m, NI.	15
						15.60	55.16	.....	15 - 15.1m. Highly fractured.	16
								End of Borehole at 15.60 m	17
									18
									19

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



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Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1025
 Sheet 1 of 3

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 172583E - 65575N	Hole Type Rotary
Location: Cork		Level: 78.00 m AOD	Scale 1:50
Client: Cork County Council		Dates: 18/10/2006-19/10/2006	Logged By P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30	77.70	TOPSOIL		
							Stiff, brown, gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY		1
					2.50	75.50	Recovered as purple siltstone and grey sandstone GRAVEL, with cobbles.		2
		2.50-4.00	15	0	0				3
		3.50	SPT		N=18 (1,2/ 2,4,5,7)				4
		4.50	SPT		N=23 (2,2/ 3,5,7,8)				5
		4.00-5.50	30	5	0				6
		5.50	SPT		N=24 (2,3/ 3,6,6,9)				7
		5.50-7.00	21	5	0				8
		7.00	SPT		N=26 (1,4/ 4,6,8,8)				9
		7.00-8.50	7	0	0				10
		8.50	SPT		N=29 (2,5/ 5,6,9,9)				11
		8.50-10.00	14	2	0				12
			TCR	SCR	RCD	FI			

Remarks: Core diameter: HQ. Rig type: Hilltwiner. SPT results: 3.5m: 1,2,2,4,5,7. 4.5m: 2,2,3,5,7,8. 5.5m: 2,3,3,6,6,9. 7m: 1,4,4,6,8,8. 8.5m: 2,5,5,6,9,9. 10m: 2,9,12,12,14,15. 11.5m: 4,11,25,36,38. 13m: 6,10,21,22,28,27. 14.5m: 2,5,8,11,13,13. 16m: 4,7,7,12,14,14. 17.5m: 5,8,12,12,13,17. 19.5m: 3,4,4,5,8,11. 21.5m: 4,11,12,22,26,35.

Continued next sheet



RC-1025 (1) (Rev. 001) (Revised) (Revised) Log of Borehole (17/10/06)



Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1025
Sheet 2 of 3

Project Name
N28 - Bloomfield to Ringaskiddy
Location: Cork

Project No.
PC6006

Co-ords: 172583E - 65575N

Hole Type
Rotary

Level: 78.00 m AOD

Scale
1:50

Client: Cork County Council

Dates: 18/10/2006-19/10/2006

Logged By
P R

Wall	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		10.00	SPT		N=53 (2,9/ 12,12,14,15)			Recovered as purple siltstone and grey sandstone GRAVEL with cobbles.	
		10.00-11.50	17	0	0				
		11.50	SPT		N=99 (4,11/ 25,36,38)	11.50	66.50	WEATHERED ROCK: Moderately weak to moderately strong purple siltstone with alternating grey sandstone, fine to medium spaced bedding. Fractures: sub-horizontal - 10 degrees, very closely spaced, undulating, rough, very high persistence. Details: 16 - 22 NI.	
		11.50-13.00	55	32	0				
		13.00	SPT		N=99 (6,10/ 21,22,28,27)				
		13.00-14.50	33	20	0				
		14.50	SPT		N=45 (2,5/ 8,11,13,13)				
		14.50-16.00	13	6	0				
		16.00	SPT		N=47 (4,7/ 7,12,14,14)				
		16.00-17.50	10	0	0				
		17.50	SPT		N=54 (5,8/ 12,12,13,17)				
		17.50-18.00	44	12	0				
		18.00-19.50	22	0	0				
		19.50	SPT		N=26 (3,4/ 4,5,8,11)				
			TCR	SCR	RQD	FI			

Continued next sheet

Remarks: Core diameter: HQ. Rig type: Hilltwiner. SPT results: 3.5m: 1,2,2,4,5,7. 4.5m: 2,2,3,5,7,8. 5.5m: 2,3,3,6,6,9. 7m: 1,4,4,6,8,8. 8.5m: 2,5,5,6,9,9. 10m: 2,9,12,12,14,15. 11.5m: 4,11,25,36,38. 13m: 6,10,21,22,28,27. 14.5m: 2,5,8,11,13,13. 16m: 4,7,7,12,14,14. 17.5m: 5,8,12,12,13,17. 19.5m: 3,4,4,5,8,11. 21.5m: 4,11,12,22,26,35.





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1025
 Sheet 3 of 3

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 172583E - 65575N

Hole Type
 Rotary

Location: Cork

Level: 78.00 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 18/10/2006-19/10/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		19.50-21.00	10	0	0				WEATHERED ROCK: Moderately weak to moderately strong purple siltstone with alternating grey sandstone, fine to medium spaced bedding. Fractures: sub-horizontal - 10 degrees, very closely spaced, undulating, rough, very high persistence. Details: 16 - 22 NI.
		21.00-22.00 21.50	14 SPT	0	0 N=95 (4,11/ 12,22,26,35)	22.00	56.00		
		22.00-23.00	70	42	14				Moderately weak, purple, SILTSTONE, no obvious bedding. Weathering: clay smearing along fractures. Fractures: 23.0-26.0m 40-50 degrees, sub-vertical, very closely spaced, undulating, smooth, low persistence; sub-horizontal - 10 degrees, very closely spaced, undulating, rough, very high persistence.
		23.00-24.50	79	30	0				
		24.50-26.00	87	49	0				
									8 40 90
						26.00	52.00		End of Borehole at 26.00 m

Remarks: Core diameter: HQ. Rig type: Hilltwiner. SPT results: 3.5m: 1,2,2,4,5,7. 4.5m: 2,2,3,5,7,8. 5.5m: 2,3,3,6,6,9. 7m: 1,4,4,6,8,8. 8.5m: 2,5,5,6,9,9. 10m: 2,9,12,12,14,15. 11.5m: 4,11,25,36,38. 13m: 6,10,21,22,28,27. 14.5m: 2,5,8,11,13,13. 16m: 4,7,7,12,14,14. 17.5m: 5,8,12,12,13,17. 19.5m: 3,4,4,5,8,11. 21.5m: 4,11,12,22,26,35.



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1028
Sheet 1 of 3

Project Name
N28 - Bloomfield to Ringaskiddy
Location: Cork

Project No.
PC6006

Co-ords: 172748E - 65003N

Hole Type
Rotary

Level: 54.56 m AOD

Scale
1:50

Client: Cork County Council

Dates: 06/10/2006-10/10/2006

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	54.26	TOPSOIL (drillers description)	
							Firm, brown, slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY	1
					2.50	52.06	Very stiff, brown, slightly gravelly (fine-medium grained, sub-angular to sub-rounded) CLAY	2
		4.35-4.80	100	0	0			3
		4.80-5.60	25	0	0			4
					5.60	48.96	Moderately weak, dark to light grey MUDSTONE, no visible structure. Weathering: orange discolouration along fracture surfaces. Fractures: 5.6-7.25m 90 degrees extremely closely spaced, rough, planar, very low persistence; 7.25-9.85m 70 degrees Very closely spaced, rough, stepped, very low persistence; 9.85-12.35m 45 degrees very closely spaced, rough, undulating, very low persistence. 5.6 - 9.85m, predominantly NL.	5
		5.60-6.45	88	33	0			6
		6.45-7.25	100	15	0			7
		7.25-8.35	100	48	0			8
		8.35-9.05	100	46	0		NI 30 200	9
		9.05-9.85	100	43	0			10
			TCR	SCR	RQD	FI		

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No

RC-1028

Sheet 2 of 3

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 172748E - 65003N

Hole Type
Rotary

Location: Cork

Level: 54.56 m AOD

Scale
1:50

Client: Cork County Council

Dates: 06/10/2006-10/10/2006

Logged By
P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		9.85-10.85	100	75	15			Moderately weak, dark to light grey MUDSTONE, no visible structure. Weathering: orange discolouration along fracture surfaces. Fractures: 5.6-7.25m 90 degrees extremely closely spaced, rough, planar, very low persistence; 7.25-9.85m 70 degrees Very closely spaced, rough, stepped, very low persistence; 9.85-12.35m 45 degrees very closely spaced, rough, undulating, very low persistence. 5.6 - 9.85m, predominantly NI.	
		10.65-11.65	100	46	0				
		11.65-12.35	100	10	0				
		12.35-13.10	100	64	13	12.35	42.21	Moderately weak, grey / purple SANDSTONE, quartz veining, no visible structure. Weathering - Yellow and purple discolouration along fracture planes. Fractures: 12.35-25.0m 20-30 degrees predominantly closely spaced, rough, undulating, low persistence. Detail: 12.16-12.35m NI due to weathering 15.4-15.66m NI & AZCL due to weathering 14.7-14.9m NI & AZCL due to weathering	
		13.10-13.45	100	29	0				
		13.45-14.05	100	0	0				
		14.05-14.90	88	9	0				
		14.90-15.80	78	13	0				
		15.80-16.65	100	24	0				
		16.65-17.80	100	66	29				
		17.80-18.60	100	49	19				
		18.60-19.40	88	41	21		NI 50 280		
		19.40-20.15	100	79	19				
			TCR	SCR	RQD	FI			

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1028
 Sheet 3 of 3

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 172748E - 65003N

Hole Type
 Rotary

Location: Cork

Level: 54.56 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 06/10/2006-10/10/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		20.15-20.90	100	49	19			Moderately weak, grey / purple SANDSTONE, quartz veining, no visible structure. Weathering - Yellow and purple discolouration along fracture planes. Fractures: 12.35-25.0m 20-30 degrees predominantly closely spaced, rough, undulating, low persistence. Debit: 12.16-12.35m NI due to weathering 15.4-15.66m NI & AZCL due to weathering 14.7-14.9m NI & AZCL due to weathering	
		20.90-21.20	0	0	0				
		21.20-22.40	100	50	8				
		22.40-23.90	100	80	39				
		23.90-25.00	100	78	44				
						25.00	29.56	End of Borehole at 25.00 m	

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No

RC-1041

Sheet 1 of 2

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 175175E - 64033N

Hole Type
Rotary

Location: **Cork**

Level: **38.94 m AOD**

Scale
1:50

Client: **Cork County Council**

Dates: **23/10/2006**

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30	38.64		TOPSOIL (Drillers description)
								Loose, brown, very silty, very sandy (fine-coarse grained), fine-coarse grained, sub-angular GRAVEL.
					3.45	35.49		Stiff, brown, slightly sandy CLAY
					6.00	32.94		Stiff, brown, slightly sandy (fine to coarse grained), slightly gravelly (fine to coarse grained, sub-angular to sub-rounded) SILT
					9.00	29.94		Medium dense, brown, clayey, fine to medium grained SAND

Remarks: Core diameter: HQ Rig type used: Hilltwinster.

Continued next sheet



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1041
Sheet 2 of 2

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 175175E - 64033N

Hole Type
Rotary

Location: Cork

Level: 38.94 m AOD

Scale
1:50

Client: Cork County Council

Dates: 23/10/2006

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					11.30	27.64		Medium dense, brown, clayey, fine to medium grained SAND
		11.50-13.00	0	0				Dense, dark brown, clayey, fine to coarse grained SAND
		13.00	SPT	N=16 (2,2/ 3,4,4,5)	13.00	25.94		OVERBURDEN: Sandstone and mudstone GRAVEL (predominantly coarse, angular to subangular) with rare mudstone cobble.
		13.00-14.50	40	0				
		14.50-15.00	20	0				
		15.00	SPT	N=24 (3,4/ 4,6,6,8)				
		15.00-18.00	9	0				
		18.00	SPT	N=33 (3,5/ 6,8,8,11)	18.00	20.94		End of Borehole at 18.00 m
			TCR	SCR	RQD	FI		

Remarks: Core diameter: HQ Rig type used: Hilltwinster.



Track&Log 2.0 (Rev 002) Sampled Borehole Log of 4800 (100) No. 03



Priority Geotechnical Ltd
 Tel: 021 4631800
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1045
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 176049E - 64019N	Hole Type Rotary
Location: Cork		Level: 32.97 m AOD	Scale 1:50
Client: Cork County Council		Dates: 01/11/2006	Logged By P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		0.00-1.50	60	35	0				OVERBURDEN: Boulder CLAY with frequent cobbles.
						1.50	31.47		
						1.63	31.34		Moderately weak, Ni, MUDSTONE
		1.50-3.00	93	44	0				Moderately weak, purple MUDSTONE, no fabric. Weathering: orange discolouration and clay smearing on fracture surfaces. Fractures: 1.63 - 8.35m 20 degrees, very closely to closely spaced, undulating, rough, medium persistence; 1.7 - 6.9m 70 - 80 degrees, closely spaced, planar, rough, medium persistence. 2.64 - 3.0m NI & AZCL due to weathering; 4.66 - 4.8m NI & AZCL due to weathering and intersecting fractures; 6.47 - 8.35m Quartz veining
		3.00-4.30	100	64	0				
		4.30-4.80	60	0	0				NI 100 230 NI 90
		4.80-6.25	97	82	21				
		6.25-6.75	100	84	0				
		6.75-7.75	100	52	18				
		7.75-8.35	100	37	0				
						8.35	24.62		End of Borehole at 8.35 m

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



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Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1057
 Sheet 1 of 4

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 177235E - 63862N

Hole Type
 Rotary

Location: Cork

Level: 21.84 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 02/11/2007

Logged By
 P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30	D		0.30	21.54	TOPSOIL - Drillers Description	
		0.50	SPT	N=13 (5,6)			Stiff, brown, slightly sandy (fine to coarse grained), gravelly (fine to coarse grained, sub-angular) CLAY, with rare angular cobbles	
		0.50-0.95	SPTLS	4,3,3,3				
		0.50-1.00	B					
		0.50-1.00	D					
		1.20	D		1.30	20.54	Brown, clayey, slightly sandy, fine to coarse grained, angular to sub-angular GRAVEL	
		1.50	SPT	52 (7,4)				
		1.50-1.95	SPTLS	9,11,15,17 for 0mm)	1.95	19.89	Strong, purple MUDSTONE, with clay smearing on fracture surfaces. Fracture at 45 - 60 degrees are very closely to closely spaced (becoming widely spaced with depth), have high persistence, are predominantly undulating and rough. Fractures at 10 - 20 degrees are smooth, planar, widely spaced and have medium persistence.	
		2.50-4.00	100	72	8			
		4.00-5.50	100	96	11			
		5.50-7.00	100	73	19			
		7.00-8.50	100	80	30			
		8.50-10.00	100	90	27			
			TCR	SCR	RQD	FI		

Remarks: Core diameter: HQ. Rig type used: Hilltwister.

Continued next sheet



Form BORE-01 (Rev. 002) Standard Borehole Log of 100mm ID, 150mm Dia. 02/11/2007



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1057
 Sheet 3 of 4

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 177235E - 63862N

Hole Type
 Rotary

Location: Cork

Level: 21.84 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 02/11/2007

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		20.50-22.00	100	83	25			Strong, purple MUDSTONE, with clay smearing on fracture surfaces. Fracture at 45 - 60 degrees are very closely to closely spaced (becoming widely spaced with depth), have high persistence, are predominantly undulating and rough. Fractures at 10 - 20 degrees are smooth, planar, widely spaced and have medium persistence.	
		22.00-23.50	100	100	24				
		23.50-25.00	100	85	62				
		25.00-26.50	100	86	56				
		26.50-28.00	100	100	44				
		28.00-29.50	100	69	40				

Remarks: Core diameter: HQ. Rig type used: Hilltwister.

Continued next sheet



HEADAGE 01 (2nd AOD) Standard Borehole Log 10 (sheet 3) Rev 03



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1057
 Sheet 4 of 4

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 177235E - 63862N

Hole Type
 Rotary

Location: Cork

Level: 21.84 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 02/11/2007

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		29.50-31.00	100	100	1			<p>Strong, purple MUDSTONE, with clay smearing on fracture surfaces. Fracture at 45 - 60 degrees are very closely to closely spaced (becoming widely spaced with depth), have high persistence, are predominantly undulating and rough. Fractures at 10 - 20 degrees are smooth, planar, widely spaced and have medium persistence.</p>	
		31.00-32.50	100	100	62				
		32.50-34.00	100	100	69				
		34.00-35.50	100	95	44				
						35.50	-13.66	End of Borehole at 35.50 m	

Remarks: Core diameter: HQ. Rig type used: Hilltwister.



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1058
Sheet 1 of 5

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 178559E - 64095N

Hole Type
Rotary

Location: Cork

Level: 34.30 m AOD

Scale
1:50

Client: Cork County Council

Dates: 02/11/2006-06/11/2006

Logged By
P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.40	33.90	TOPSOIL (Drillers description)	
					1.30	33.00	Medium dense to dense, silty, sandy (fine-coarse grained), fine-coarse grained, angular to sub-angular GRAVEL	1
		1.30-2.35	95	0	0		Purple / grey, bedded, MUDSTONE. Weathering: Orange discolouration along fracture surfaces and clay smearing. 1.3 - 3.85m well weathered + NI. Fractures: 4.6 - 40.45m 45 - 50 degrees, very closely to closely spaced, undulating and planar, rough, high persistence; 7.85 - 11.9m 70 - 90 degrees, closely spaced, planar, smooth, low persistence; 29.15 - 29.9m 70 - 0-90 degrees, closely spaced, planar smooth. Detail: 1.3 - 3.85m NI & AZCL due to weathering and intersecting fractures; 11.85 - 12.05m NI & AZCL due to intersecting fractures; 10.35 - 14.15m AZCL due to intersecting fractures; 15.85 - 17.45m AZCL due to intersecting fractures; 33.15 - 34.3m AZCL due to intersecting fractures; 37.4 - 38.4m AZCL due to intersecting fractures; 25.5 - 26.35m AZCL due to intersecting fractures.	2
		2.35-3.85	100	0	0			3
		3.85-5.45	91	76	0		4m. MUDSTONE is moderately weak.	4
		5.45-6.35	100	100	0		6m. MUDSTONE is weak to moderately weak.	6
		6.35-6.95	100	92	23			7
		6.95-7.95	100	91	38			7
		7.95-9.40	100	79	29		8m. MUDSTONE is moderately weak.	8
		9.40-10.35	100	87	16			9
			TCR	SCR	RQD	FI		

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1058
 Sheet 2 of 5

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 178559E - 64095N

Hole Type
 Rotary

Location: Cork

Level: 34.30 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 02/11/2006-06/11/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
						10.00	24.30		Weak to moderately weak, purple / grey, bedded, MUDSTONE. Weathering: Orange discolouration along fracture surfaces and clay smearing. 1.3 - 3.85m well weathered + NI. Fractures: 4.6 - 40.45m 45 - 50 degrees, very closely to closely spaced, undulating and planar, rough, high persistence; 7.85 - 11.9m 70 - 90 degrees, closely spaced, planar, smooth, low persistence; 23.15 - 29.9m 70 - 0-90 degrees, closely spaced, planar smooth. Detail: 1.3 - 3.85m NI & AZCL due to intersecting fractures; 11.85 - 12.05m NI & AZCL due to intersecting fractures; 10.35 - 14.15m AZCL due to intersecting fractures; 15.85 - 17.45m AZCL due to intersecting fractures; 33.15 - 34.3m AZCL due to intersecting fractures; 37.4 - 38.4m AZCL due to intersecting fractures; 25.5 - 26.35m AZCL due to intersecting fractures.
		10.35-11.85	70	71	20				
		11.85-12.35	80	52	30				
		12.35-12.65	100	89	50				
		12.65-14.15	100	87	11				
		14.15-15.15	100	97	60				
		15.15-15.85	100	90	29				
		15.85-17.45	100	86	22				
		17.45-18.35	100	66	0				
		18.35-19.95	100	87	43				
			TCR	SCR	RQD	FI			

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.





Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1058
Sheet 3 of 5

Project Name
N28 - Bloomfield to Ringaskiddy

Project No.
PC6006

Co-ords: 178559E - 64095N

Hole Type
Rotary

Location: Cork

Level: 34.30 m AOD

Scale
1:50

Client: Cork County Council

Dates: 02/11/2006-06/11/2006

Logged By
P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		19.95-21.25	100	92	54			<p>Weak to moderately weak, purple / grey, bedded, MUDSTONE. Weathering: Orange discolouration along fracture surfaces and clay smearing. 1.3 - 3.85m well weathered + NI. Fractures: 4.6 - 40.45m 45 - 50 degrees, very closely to closely spaced, undulating and planar, rough, high persistence; 7.85 - 11.9m 70 - 90 degrees, closely spaced, planar, smooth, low persistence; 29.15 - 29.9m 70 - 0-90 degrees, closely spaced, planar smooth.. Detail: 1.3 - 3.85m NI & AZCL due to weathering and intersecting fractures; 11.85 - 12.05m NI & AZCL due to intersecting fractures; 10.35 - 14.15m AZCL due to intersecting fractures; 15.85 - 17.45m AZCL due to intersecting fractures; 33.15 - 34.3m AZCL due to intersecting fractures; 37.4 - 38.4m AZCL due to intersecting fractures; 25.5 - 28.35m AZCL due to intersecting fractures.</p>	
		21.25-22.35	91	78	19				
		22.35-23.95	100	99	53		NI 150 601		
		23.95-25.50	100	97	7				
		25.50-26.35	47	47	27				
		26.35-26.85	100	90	0				
		26.85-27.65	100	76	47				
		27.65-29.15	97	78	40				
		29.15-30.35	83	78	10				
			TCR	SCR	RQD	FI			

28m. MUDSTONE is weak.

Continued next sheet

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1058

Sheet 4 of 5

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 178559E - 64095N

Hole Type
 Rotary

Location: Cork

Level: 34.30 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 02/11/2006-06/11/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
						30.00	4.30		Weak to moderately weak, purple / gray, bedded, MUDSTONE. Weathering: Orange discolouration along fracture surfaces and clay smearing. 1.3 - 3.85m well weathered + NI. Fractures: 4.6 - 40.45m 45 - 50 degrees, very closely to closely spaced, undulating and planar, rough, high persistence; 7.85 - 11.9m 70 - 90 degrees, closely spaced, planar, smooth, low persistence; 29.15 - 29.9m 70-90 degrees, closely spaced, planar smooth. Data: 1.3 - 3.85m NI & AZCL due to weathering and intersecting fractures; 11.85 - 12.05m NI & AZCL due to intersecting fractures; 10.35 - 14.15m AZCL due to intersecting fractures; 15.85 - 17.45m AZCL due to intersecting fractures; 33.15 - 34.3m AZCL due to intersecting fractures; 37.4 - 38.4m AZCL due to intersecting fractures; 25.5 - 26.35m AZCL due to intersecting fractures.
		30.35-31.55	100	100	46				
		31.55-32.35	0	0	0				
		32.35-32.55	100	100	0				
		32.55-33.15	100	100	0				
		33.15-34.30	87	63	18				
		34.30-35.80	100	100	57				
		35.80-37.40	94	84	6				
		37.40-38.40	100	85	0				
		38.40-38.80	100	87	0				
		38.80-40.45	100	80	40				
			TCR	SCR	RQD	FI			

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.

Continued next sheet



P:\MAGNET 8 (REV 4/02) Standard Borehole Log of Sheet 2701.dwg 33



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1058
 Sheet 5 of 5

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 178559E - 64095N	Hole Type Rotary
Location: Cork		Level: 34.30 m AOD	Scale 1:50
Client: Cork County Council		Dates: 02/11/2006-06/11/2006	Logged By P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
						40.45	-6.15		Weak to moderately weak, purple / grey, bedded, MUDSTONE. Weathering: Orange discolouration along fracture surfaces and clay smearing. 1.3 - 3.85m well weathered + NI. Fractures: 4.6 - 40.45m 45 - 50 degrees, very closely to closely spaced, undulating and planar, rough, high persistence; 7.85 - 11.9m 70 - 90 degrees, closely spaced, planar, smooth, low persistence; 29.15 - 29.9m 70-90 degrees, closely spaced, planar smooth. Detail: 1.3 - 3.85m NI & AZCL due to weathering and intersecting fractures; 11.85 - 12.05m NI & AZCL due to intersecting fractures; 10.35 - 14.15m AZCL due to intersecting fractures; 15.85 - 17.45m AZCL due to intersecting fractures; 33.15 - 34.3m AZCL due to intersecting fractures; 37.4 - 38.4m AZCL due to intersecting fractures; 25.5 - 26.35m AZCL due to intersecting fractures. End of Borehole at 40.45 m

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked.



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Priority Geotechnical Ltd
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC-1062
Sheet 1 of 2

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 174025E - 64313N	Hole Type Rotary
Location: Cork		Level: 44.89 m AOD	Scale 1:50
Client: Cork County Council		Dates: 21/11/2006-23/11/2006	Logged By P R

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
							No Recovery.	
		1.30-2.30	10	6	0	1.30	43.59	OVERBURDEN: Very stiff, gravelly (fine to coarse, angular to subangular) CLAY with frequent cobbles.
		2.30	GPT					
		2.30-3.85	45	0	0			
		3.85	GPT					
		3.85-4.10	0	0				
		4.10-5.00	22	10	0			
		5.00	GPT					
		5.00-6.10	27	9	0			
		6.10	GPT					
		6.10-6.70	83	52		6.10	38.79	Weak to moderately weak, very weathered light grey/ white LIMESTONE, recovered as angular gravel and non intact limestone
		6.70-7.70	45	18	0			
		7.70-8.70	100	91	78	7.70	37.19	Moderately strong to moderately weak, grey LIMESTONE. Weathering: orange discolouration and clay smearing along fracture surfaces. Fractures: 7.7 - 20.0m 10 degrees, closely to medium spaced, undulating, rough, high persistence; 8.65 - 20.0m, 50-60 degrees, closely spaced, planar, rough, medium persistence. Detail: 13.1 - 13.4m Calcite veining.
		8.70-10.00	92	89	63			

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked. CPT results: 2.3m: 12,14,10,15,25. 3.85m: 4,6,7,7,9,10. 5m: 14,11/50,50/0. 6.1m: 4,6,7,8,8,9.

Continued next sheet



10/06/07 11:44:03 Standard Borehole Log v1 of 04/01/2006 h.w.43



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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Borehole No
RC-1062
 Sheet 2 of 2

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 174025E - 64313N

Hole Type
 Rotary

Location: Cork

Level: 44.89 m AOD

Scale
 1:50

Client: Cork County Council

Dates: 21/11/2006-23/11/2006

Logged By
 P R

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		10.00-11.60	69	69	64				Moderately strong to moderately weak, grey LIMESTONE. Weathering: orange discolouration and clay smearing along fracture surfaces. Fractures: 7.7 - 20.0m 10 degrees, closely to medium spaced, undulating, rough, high persistence; 8.65 - 20.0m, 50-60 degrees, closely spaced, planar, rough, medium persistence. Detail: 13.1 - 13.4m Calcite veining.
		11.60-13.10	93	91	63				
		13.10-14.70	100	93	14				
		14.70-16.20	100	95	53				
		16.20-17.70	93	80	57				
		17.70-18.90	100	86	12				
		18.90-20.00	91	67	55				

Remarks: Core diameter: H Rig type used: Boart Longyear Deltabase 520 Tracked. CPT results: 2.3m: 12,14,10,15,25. 3.85m: 4,6,7,7,9,10. 5m: 14,11/50,50/0. 6.1m: 4,6,7,8,8,9.



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Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC1063
Sheet 1 of 2

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 172299E - 65590N	Hole Type Rotary
Location: Ringaskiddy, Cork		Level: 87.74 m AOD	Scale 1:50
Client: Cork County Council		Dates: 21/04/2008	Logged By MK

Well	Water Strikes	Samples & In Situ Testing				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results					
								OVERBURDEN. Open hole boring. (See BH1063 for OVERBURDEN details.)	
		4.10	GPT	(26) (25)	4.10	83.64		Weak to moderately weak, pink, moderately strong / moderately weak, fine-grained SANDSTONE.	
		4.10-5.50	100	54	22			Between 4.1m and 5.6m: SANDSTONE is porous. Weathering: rock is slightly weathered (all along cross section) to a pink / red colour. Occasional orange-brown and black product of weathering is visible. From 4.1m to 11.0m. Fractures: rock is strongly fractured. There are two sets of fractures: I) Dip of 60 to 70 degrees; closely spaced to medium spaced; undulating smooth surfaces. II) Vertical dip of circa 90 degrees; planar surfaces. There are numerous irregular fractures. There are observable laminations in MUDSTONE (dip of circa 60 degrees).	
		5.50-7.10	97	53	0	6.70	81.04	Weak to moderately weak MUDSTONE.	
						7.05	80.69	Pink, moderately strong / moderately weak, fine-grained SANDSTONE.	
		7.10-8.50	96	0	0	7.50	80.24	Weak to moderately weak MUDSTONE.	
		8.50-10.10	100	54	29	9.10	78.64	Pink, moderately strong / moderately weak, fine-grained SANDSTONE.	
						9.65	78.09	Moderately strong to moderately weak MUDSTONE.	
			TCR	SCR	RQD	FI		Continued next sheet	

Remarks: -



Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC1064
Sheet 1 of 2

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 172468E - 65578N	Hole Type Rotary
Location: Ringaskiddy, Cork		Level: 85.07 m AOD	Scale 1:50
Client: Cork County Council		Dates: 22/04/2008-23/04/2008	Logged By MK

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
							OVERBURDEN. Open hole boring. (See BH1064 for OVERBURDEN details.)	
		4.00	GPT	(25) (25)	4.00 4.15	81.07 80.92	Moderately weak, weathered, fine-grained, rust/pink SANDSTONE. Weathering: rust/pink colour across all of rock. From 4.0m to 18.0m. Fractures: vertical and sub-vertical fractures (dip of 75 degrees to 90 degrees). Weak cleavage is observable. Fractures are parallel to surface of cleavage. Surfaces of fractures are undulating smooth.	
		4.00-5.60	88	41 41			Moderately weak, pink SILTSTONE with occasional pieces of green/ grey MUDSTONE and numerous pores filled by younger material (MUDSTONE including carbonaceous).	
		5.60-7.20	100	58 11	6.10	78.97	Weak to moderately strong pink MUDSTONE with numerous pores fill by younger solid material (MUDSTONE) including carbonaceous, and occasional pieces of older green/ grey MUDSTONE with occasional SILTSTONE lenses and occasional fine-grained crystals of mica.	
		7.20-8.70	100	42 0				
		8.70-9.90	100	76 16				
			TCR	SCR	RQD	FI		

Continued next sheet

Remarks: -



Priority Geotechnical
Tel: 021 4631600
Fax: 021 4638690
email: geotechnical@priority.ie

Borehole No
RC1064
Sheet 2 of 2

Project Name: N28-Bloomfield to Ringaskiddy, Add. Works	Project No. PC6006A	Co-ords: 172468E - 65578N	Hole Type Rotary
Location: Ringaskiddy, Cork		Level: 85.07 m AOD	Scale 1:50
Client: Cork County Council		Dates: 22/04/2008-23/04/2008	Logged By MK

Well	Water Strikes	Rotary Coring				Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	TCR	SCR	RQD					FI
		9.90-10.90	100	85	45			Weak to moderately strong pink MUDSTONE with numerous pores fill by younger solid material (MUDSTONE) including carbonaceous, and occasional pieces of older green/ grey MUDSTONE with occasional SILTSTONE lenses and occasional fine-grained crystals of mica.	
		10.90-12.40	100	60	23				
		12.40-13.70	100	69	55				
		13.70-14.40	100	46	24				
		14.40-15.50	100	62	0				
		15.50-17.00	100	71	56				
		17.00-18.00	100	83	56				
						18.00	67.07	End of Borehole at 18.00 m	

Remarks: -

10:00:00 11:00:00 12:00:00 13:00:00 14:00:00 15:00:00 16:00:00 17:00:00 18:00:00



Priority Geotechnical Ltd.
Tel: 021 4631600
Fax: 021 4638690
www.prioritygeotechnical.ie

Drilled By
DC
Logged By
JMS

Borehole No
RC102
Sheet 1 of 2


Project Name: N28 Cork to Ringaskiddy	Project No.: P14054	Co-ords: 174052E - 64473N	Hole Type: Rotary Cored
Client: RPS	Dates: 03/12/2014-04/12/2014	Level: 23.25 m AOD	Scale: 1:50

Well / Backfill	Water Cuts	Samples & In Situ Testing				Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		Depth (m)	Type	Results						
						100.00%			Open hole boring. Driller described gravelly Clay.	
		0.70	GPT	(25)	39	0.00	22.55	0.70	Lithology: Moderately strong, light grey LIMESTONE with clay bands. Weathering: Slightly weathered with common oxidation colouration and minor loss of strength on fragmented areas. Fractures: 2 sets. Set 1 dipping 50-70 degrees with undulating rough fracture surfaces and close spacing. Set 2 dipping 20-40 degrees with undulating rough fracture surfaces and medium spacing.	
		0.70-1.70	100	100	100					
		1.70-2.70	100	94	94					
		2.70-3.70	100	94	94					
		3.70-4.70	91	89	46					
		4.70-5.70	95	42	25					
		5.70-6.70	28	20	20					
		6.70-7.70	18	0	0	50mm min 180mm avg 900mm max		6.70m - 7.70m: Slightly sandy CLAY with fragmented Limestone.		
		7.70-8.70	20	0	0			7.70m - 8.70m: Slightly sandy CLAY with fragmented Limestone		
		8.70-9.70	29	20	0			8.70m - 9.70m: Slightly sandy CLAY with fragmented Limestone		

Groundwater: Struck: - Rose to: - After: - Sealed: - Comment: -None encountered.	Hole Information: Hole Depth: 9.70m Hole Diameter: 12.70m Casing Diameter: 131mm Casing Diameter: 76mm	Chiselling: Depths (m) to: Time (hhmm): Tool:
--	---	---

Remarks: Hole terminated at 12.70m.	Shift Data:																				
	<table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>03/12/2014</td> <td>0.70m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>03/12/2014</td> <td>8.70m</td> <td>End of shift</td> </tr> <tr> <td>-</td> <td>04/12/2014</td> <td>12.70m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>04/12/2014</td> <td>12.70m</td> <td>End of borehole</td> </tr> </tbody> </table>	Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	03/12/2014	0.70m	Start of shift	-	03/12/2014	8.70m	End of shift	-	04/12/2014	12.70m	Start of shift	-	04/12/2014	12.70m	End of borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																		
-	03/12/2014	0.70m	Start of shift																		
-	03/12/2014	8.70m	End of shift																		
-	04/12/2014	12.70m	Start of shift																		
-	04/12/2014	12.70m	End of borehole																		

Equipment & Methods: Deltabase 520

 PRIORITY GEOTECHNICAL		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie			Drilled By DC		Borehole No RC102																				
				Logged By JMS		Sheet 2 of 2																					
Project Name: N28 Cork to Ringaskiddy				Project No. P14054		Co-ords: 174052E - 64473N		Hole Type Rotary Cored																			
Client: RPS				Dates: 03/12/2014-04/12/2014		Level: 23.25 m AOD		Scale 1:50																			
Well / Backfill	Water Strikes	Rotary Coring				Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																	
		Depth (m)	TCR	SCR	RQD						Fractures																
		9.70-10.70	98	66	66		9.70		Lithology: Moderately strong, light grey LIMESTONE with clay bands. Weathering: Slightly weathered with common oxidation colouration and minor loss of strength on fragmented areas. Fractures: 2 sets. Set 1 dipping 50-70 degrees with undulating rough fracture surfaces and close spacing. Set 2 dipping 20-40 degrees with undulating rough fracture surfaces and medium spacing. 10.00m - 10.30m: Mostly non intact.	10																	
		10.70-11.70	100	90	26					11																	
		11.70-12.70	100	68	0					12																	
							10.48	12.77	End of Borehole at 12.70 m	13																	
										14																	
										15																	
										16																	
										17																	
Groundwater: Struck - Rose to - After - Sealed - Comment -None encountered.		Hole Information: Hole Depth 9.70m / 12.70m Hole Diameter 131mm / 76mm Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool																						
Remarks: Hole terminated at 12.70m.				Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>03/12/2014</td> <td>0.70m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>03/12/2014</td> <td>0.70m</td> <td>End of shift</td> </tr> <tr> <td>-</td> <td>04/12/2014</td> <td>0.70m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>04/12/2014</td> <td>12.70m</td> <td>End of Borehole</td> </tr> </tbody> </table>				Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	03/12/2014	0.70m	Start of shift	-	03/12/2014	0.70m	End of shift	-	04/12/2014	0.70m	Start of shift	-	04/12/2014	12.70m	End of Borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																								
-	03/12/2014	0.70m	Start of shift																								
-	03/12/2014	0.70m	End of shift																								
-	04/12/2014	0.70m	Start of shift																								
-	04/12/2014	12.70m	End of Borehole																								
Equipment & Methods: Deltabase 520																											

Well / Water Backfill		Samples & In Situ Testing				Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend	
Depth (m)	Type	Results									
1.50	CPT	N=59 (6,9,11,14,16,18)		100.00%	29.75	1.70	Open hole boring. Driller described: Boulders and Gravel.				
2.00	CPT	(25 for 0mm) 67		2.00	29.45	2.00	Driller described: Rock. Blasted 0.30m to prove encounter.				
2.00-3.00	100	95	95				Lithology: Light grey brown thinly laminated SILTSTONE. Weathering: Slightly weathered with oxidation colouration on fracture surfaces. Colour bleaching common throughout. Fractures: 2 sets. Set 1. Dipping 10-20 degrees with planar rough fracture surfaces and medium spacing. Set 2. Dipping 80-90 degrees with planar rough fracture surfaces and close spacing.				
3.00-4.00	100	97	59				4.00m - 4.17m: Non intact.				
4.00-5.00	100	60	25				4.70m - 5.10m: Non intact.				
5.00-6.00	100	73	44								
6.00-7.00	100	84	84								
7.00-8.00	100	69	10								
8.00-9.00	100	78	55	50mm min 120mm avg 950mm max							
Water		Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth	Continued next sheet	
Groundwater: Struck - Rose to - After - Sealed - Comment -None encountered.			Hole Information: Hole Depth 2.00m Hole Diameter 131mm Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool					
Remarks: Hole terminated at required depth.							Shift Data:				
							Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	
							-	26/11/2014	-	Start of shift	
							-	26/11/2014	2.00m	End of shift	
							-	27/11/2014	2.00m	Start of shift	
									2.00m	End of borehole	
Equipment & Methods: Deitabase 520											



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Tel: 021 4631600
Fax: 021 4638690
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Drilled By
DS
Logged By
JMS

Borehole No
RC103
Sheet 2 of 2

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 174135E - 64526N

Hole Type
Rotary Cored

Client: RPS

Dates:
26/11/2014-27/11/2014

Level: 31.45 m AOD

Scale
1:50

Well / Water Backfill	Strikes	Rotary Coring				Fractures	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend	
		Depth (m)	TCR	SCR	RQD							
[Cross-hatched pattern]		9.00-10.00	100	50	0					Remaining Detail : 9.00m - 9.70m : 9.00m - 9.70m: Non Intact.	[Vertical lines]	
		10.00-11.00	100	70	13							10.35m - 10.48m: Non Intact.
		11.00-12.00	100	87	56							12.00m - 12.25m: Non Intact.
		12.00-13.00	100	31	0							12.60m - 13.60m: Non Intact.
		13.00-14.00	100	45	0							
		14.00-15.00	100	85	65							
						16.45	15.00		End of Borehole at 15.00 m			


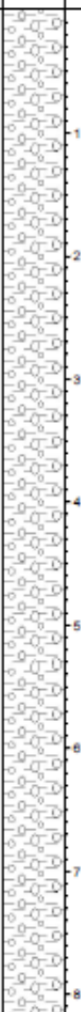
Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth
Groundwater:								
Struck	Rose to	After	Sealed	Comment	Hole Information:			Chiselling:
-	-	-	-	-None encountered.	Hole Depth	Hole Diameter	Casing Diameter	Depths (m)
					2.00m	131mm	131mm	to
					15.00m	76mm		Time (hhmm)
								Tool


Remarks: Hole terminated at required depth.


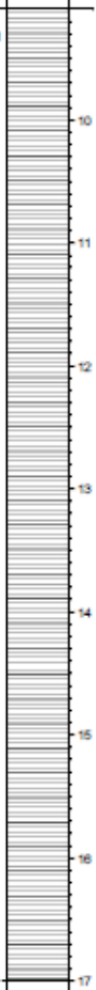
Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	26/11/2014	-	Start of shift
-	26/11/2014	2.00m	End of shift
-	27/11/2014	2.00m	Start of shift
-	27/11/2014	2.00m	End of Borehole

Equipment & Methods: Deitabase 520

 PRIORITY GEOTECHNICAL		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie				Drilled By DS		Borehole No RC104																					
						Logged By		Sheet 1 of 2																					
Project Name: N28 Cork to Ringaskiddy				Project No.: P14054		Co-ords: 174301E - 64491N		Hole Type: Rotary																					
Client: RPS				Dates: 25/11/2014-26/11/2014		Level: 22.07 mOD		Scale: 1:50																					
Well / Backfill	Water Strikes	Samples & In Situ Testing			Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																				
		Depth (m)	Type	Results																									
					100.00%		Open hole boring. Driller described: Boulder Clay.																						
		1.50	CPT	N=35 (4,6,7,8,10,10)	0.00																								
		3.00	CPT	N=41 (6,7,9,9,11,12)	0.00																								
		4.50	CPT	(25 for 0mm)	0.00																								
		6.00	CPT	N=58 (5,5,9,13,17,19)	0.00																								
		7.50	CPT	N=61 (9,13/13,14,16,18)	0.00																								
		8.60	CPT	(25 for 0mm)	0.00	13.87	8.20	Driller described: Rock. Blasted rock from 8.20m - 8.60m to prove encounter.																					
					0.00	13.47	8.60	Lithology: Light grey thinly laminated SILTSTONE. Weathering: Slightly weathered with orange oxidation																					
Continued next sheet																													
Groundwater: Struck - Rose to - After - Sealed - Comment -None encountered.		Hole Information: Hole Depth 8.60m / 11.60m Hole Diameter 131 / 76 Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool																								
Remarks: Hole terminated at required depth.				Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>25/11/2014</td> <td>8.60m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>26/11/2014</td> <td>8.60m</td> <td>End of shift</td> </tr> <tr> <td>-</td> <td>26/11/2014</td> <td>8.60m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>26/11/2014</td> <td>8.60m</td> <td>End of borehole</td> </tr> </tbody> </table>						Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	25/11/2014	8.60m	Start of shift	-	26/11/2014	8.60m	End of shift	-	26/11/2014	8.60m	Start of shift	-	26/11/2014	8.60m	End of borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																										
-	25/11/2014	8.60m	Start of shift																										
-	26/11/2014	8.60m	End of shift																										
-	26/11/2014	8.60m	Start of shift																										
-	26/11/2014	8.60m	End of borehole																										
Equipment & Methods: Delabase 520																													

 PRIORITY GEOTECHNICAL		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie			Drilled By WD		Borehole No RC110 Sheet 1 of 2																											
		Logged By JMS		Project Name: N28 Cork to Ringaskiddy		Project No. P14054		Co-ords: 171125E - 67456N																										
Client: RPS		Dates: 08/04/2015-10/04/2015			Level: 102.49 mOD		Hole Type Rotary																											
Well / Backfill	Water Strikes	Samples & In Situ Testing				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																								
		Depth (m)	Type	Results																														
		1.30	CPT	(50 for 95mm) 126		100.00%	101.19	1.30	Inspection pit dug to 1.20m.																									
		1.30-2.30	100	0	0	1.30 0.00			Lithology: Moderately weak, brown / red MUDSTONE. Weathering: Weathered with minor orange oxidation on fracture surfaces and minor loss of strength. Fractures: Dipping 50-70 degrees with undulating rough fracture surfaces and close spacing. 1.30m - 4.00m: Non intact. 8.50m - 9.30m: Non intact.																									
		2.30-3.30	80	0	0																													
		3.30-4.20	100	29	0																													
		4.20-5.20	97	10	0																													
		5.20-6.10	97	44	0																													
		6.10-7.60	100	80	0																													
		7.60-8.50	100	53	0																													
		8.50-9.30	100	23	0																													
Continued next sheet																																		
Water		Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth																									
Groundwater: Struck - Rose to - After - Sealed - Comment - See shift data.			Hole Information: Hole Depth 1.30m / 17.00m Hole Diameter 131 / 76 Casing Diameter 131mm				Chiselling: Depths (m) to Time (hhmm) Tool																											
Remarks: Inspection pit dug to 1.20m. Hole terminated at required depth.						Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>08/04/2015</td> <td>1.30m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>09/04/2015</td> <td>1.30m</td> <td>End of shift</td> </tr> <tr> <td>8.50m</td> <td>09/04/2015</td> <td>1.30m</td> <td>Start of shift</td> </tr> <tr> <td>8.50m</td> <td>10/04/2015</td> <td>1.30m</td> <td>End of shift</td> </tr> <tr> <td>16.10m</td> <td>10/04/2015</td> <td>1.30m</td> <td>End of Borehole</td> </tr> </tbody> </table>					Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	08/04/2015	1.30m	Start of shift	-	09/04/2015	1.30m	End of shift	8.50m	09/04/2015	1.30m	Start of shift	8.50m	10/04/2015	1.30m	End of shift	16.10m	10/04/2015	1.30m	End of Borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																															
-	08/04/2015	1.30m	Start of shift																															
-	09/04/2015	1.30m	End of shift																															
8.50m	09/04/2015	1.30m	Start of shift																															
8.50m	10/04/2015	1.30m	End of shift																															
16.10m	10/04/2015	1.30m	End of Borehole																															
Equipment & Methods: Delrabase 520																																		

 PRIORITY GEOTECHNICAL		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie			Drilled By WD		Borehole No RC110 Sheet 2 of 2																																
Project Name: N28 Cork to Ringaskiddy				Project No. P14054		Co-ords: 171125E - 67456N		Hole Type Rotary																															
Client: RPS				Dates: 08/04/2015-10/04/2015		Level: 102.49 mOD		Scale 1:50																															
Well / Backfill	Water Strikes	Rotary Coring				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																													
		Depth (m)	TCR	SCR	RQD						Fractures																												
		9.30-10.30	100	70	30	20mm min 50mm avg 220mm max	85.49	17.00	Lithology: Moderately weak, brown / red MUDSTONE. Weathering: Weathered with minor orange oxidation on fracture surfaces and minor loss of strength. Fractures: Dipping 50-70 degrees with undulating rough fracture surfaces and close spacing.																														
		10.30-11.20	100	94	61																																		
		11.20-12.10	100	79	0																																		
		12.10-12.80	100	64	40																																		
		12.80-14.00	86	63	0																																		
		14.00-14.80	100	14	0																																		
		14.80-15.50	100	85	0																																		
		15.50-16.50	94	81	0																																		
		16.50-17.00	100	40	0																																		
									12.10m - 11.60m: Non Intact.																														
									16.50m - 17.00m: Mostly non-intact.																														
									End of Borehole at 17.00 m																														
Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth																															
Groundwater: Struck - Rose to - After - Sealed - Comment - See shift data.						Hole Information: Hole Depth 1.30m / 17.00m Hole Diameter 131 / 76 Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool																														
Remarks: Inspection pit dug to 1.20m. Hole terminated at required depth.						Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>08/04/2015</td> <td>-</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>08/04/2015</td> <td>1.30m</td> <td>End of shift</td> </tr> <tr> <td>8.20m</td> <td>09/02/2015</td> <td>1.30m</td> <td>Start of shift</td> </tr> <tr> <td>8.80m</td> <td>10/02/2015</td> <td>1.30m</td> <td>End of shift</td> </tr> <tr> <td>16.10m</td> <td>10/02/2015</td> <td>1.30m</td> <td>Start of shift</td> </tr> <tr> <td></td> <td></td> <td></td> <td>End of Borehole</td> </tr> </tbody> </table>						Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	08/04/2015	-	Start of shift	-	08/04/2015	1.30m	End of shift	8.20m	09/02/2015	1.30m	Start of shift	8.80m	10/02/2015	1.30m	End of shift	16.10m	10/02/2015	1.30m	Start of shift				End of Borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																																				
-	08/04/2015	-	Start of shift																																				
-	08/04/2015	1.30m	End of shift																																				
8.20m	09/02/2015	1.30m	Start of shift																																				
8.80m	10/02/2015	1.30m	End of shift																																				
16.10m	10/02/2015	1.30m	Start of shift																																				
			End of Borehole																																				
Equipment & Methods: Delrabase S20																																							



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Drilled By
WD
Logged By
JMS

Borehole No
RC112
Sheet 1 of 3

Project Name: N28 Cork to Ringaskiddy	Project No. P14054	Co-ords: 171252E - 67418N	Hole Type Rotary
Client: RPS	Dates: 01/04/2015-03/04/2015	Level: 116.63 mOD	Scale 1:50

Well / Backfill	Water Strikes	Samples & In Situ Testing				Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend	
		Depth (m)	Type	Results							
		1.00	CPT	N=49 (9,11/10,13,17,9)		100.00%			Open hole boring: Driller described: Clay with boulder content.	1	
		2.00	CPT	64 (11,19/14,25 for 50mm)		0.00					2
		2.60-4.00	36	0	0	2.60	114.03	2.60	Lithology: Moderately weak SHALE with fine grained Sandstone unit between 2.60m - 7.80m and Siltstone unit between 7.80m - 13.30m. Weathering: Slightly weathered with minor oxidation colouration on fracture surfaces. Minor loss of strength apparent on fractured areas. Fractures: 2 sets. Set 1 is dipping 0-15 degrees with planar rough fracture surfaces and close spacing. Set 2 is dipping 50-70 degrees with planar to stepped rough fracture surfaces and close spacing. 2.60m - 4.00m: Non intact.	3	
		4.00-5.00	96	90	0						4
		5.00-6.30	100	69	0						5
		6.30-7.80	94	88	11						6
		7.80-9.20	100	100	54						7
										8	

Continued next sheet

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater: Struck - Rose to - After - Sealed - Comment - See shift data.				Hole Information: Hole Depth 2.60m / 20.00m Hole Diameter 131 / 76 Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool		
--	--	--	--	--	--	--	--	--	--

Remarks: Hole terminated at required depth.	Shift Data:																												
	<table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>01/04/2015</td> <td>2.60m</td> <td>Start of shift</td> </tr> <tr> <td>-</td> <td>02/04/2015</td> <td>2.60m</td> <td>End of shift</td> </tr> <tr> <td>12.60m</td> <td>02/04/2015</td> <td>2.60m</td> <td>Start of shift</td> </tr> <tr> <td>13.10m</td> <td>02/04/2015</td> <td>2.60m</td> <td>End of shift</td> </tr> <tr> <td>13.20m</td> <td>03/04/2015</td> <td>2.60m</td> <td>Start of shift</td> </tr> <tr> <td></td> <td></td> <td></td> <td>End of Borehole</td> </tr> </tbody> </table>	Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	01/04/2015	2.60m	Start of shift	-	02/04/2015	2.60m	End of shift	12.60m	02/04/2015	2.60m	Start of shift	13.10m	02/04/2015	2.60m	End of shift	13.20m	03/04/2015	2.60m	Start of shift				End of Borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																										
-	01/04/2015	2.60m	Start of shift																										
-	02/04/2015	2.60m	End of shift																										
12.60m	02/04/2015	2.60m	Start of shift																										
13.10m	02/04/2015	2.60m	End of shift																										
13.20m	03/04/2015	2.60m	Start of shift																										
			End of Borehole																										

Equipment & Methods: Deltabase 520

Well / Backfill		Rotary Coring				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
Water Strikes	Depth (m)	TCR	SCR	RQD	Fractures					
	9.20-10.50	100	84	42	40mm min 150mm avg 680mm max			Lithology: Moderately weak SHALE with fine grained Sandstone unit between 2.60m - 7.80m and Siltstone unit between 7.80m - 13.30m. Weathering: Slightly weathered with minor oxidation colouration on fracture surfaces. Minor loss of strength apparent on fractured areas. Fractures: 2 sets. Set 1 is dipping 0-15 degrees with planar rough fracture surfaces and close spacing. Set 2 is dipping 50-70 degrees with planar to stepped rough fracture surfaces and close spacing.		
	10.50-11.90	78	71	13						
	11.90-13.30	50	25	0			11.90m - 12.30m: Non Intact.			
	13.30-14.80	100	93	31			13.00m - 13.30m: Non Intact.			
	14.80-16.30	100	100	69			13.90m - 14.00m: Non Intact.			
	16.30-17.70	100	100	74						
<i>Continued next sheet</i>										
Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth		
Groundwater:					Hole Information:			Chiselling:		
Struck	Rose to	After	Sealed	Comment	Hole Depth	Hole Diameter	Casing Diameter	Depths (m)	Time (hhmm)	Tool
-	-	-	-	See shift data.	2.60m 20.00m	131 76	131mm	to		
Remarks: Hole terminated at required depth.					Shift Data:					
Equipment & Methods: Deltabase 520					Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks		
					-	01/04/2015	-	Start of shift		
					-	02/04/2015	2.60m	End of shift		
					12.60m	02/04/2015	4.50m	Start of shift		
14.10m	03/04/2015	4.50m	End of shift							
14.20m	03/04/2015	2.50m	End of Borehole							

Well / Backfill		Rotary Coring				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
Water Strikes	Depth (m)	TCR	SCR	RQD	Fractures					
	17.70-19.20	100	75	55				Lithology: Moderately weak SHALE with fine grained Sandstone unit between 2.60m - 7.80m and Siltstone unit between 7.80m - 13.30m. Weathering: Slightly weathered with minor oxidation colouration on fracture surfaces. Minor loss of strength apparent on fractured areas. Fractures: 2 sets. Set 1 is dipping 0-15 degrees with planar rough fracture surfaces and close spacing. Set 2 is dipping 50-70 degrees with planar to stepped rough fracture surfaces and close spacing.	19	
	19.20-20.00	100	100	0		96.63	20.00			20
								End of Borehole at 20.00 m	21	
									22	
									23	
									24	
									25	
									26	

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:					Hole Information:			Chiselling:		
Struck	Rose to	After	Sealed	Comment	Hole Depth	Hole Diameter	Casing Diameter	Depths (m)	Time (hhmm)	Tool
-	-	-	-	See shift data.	2.60m 20.00m	131 76	131mm			

Remarks:		Shift Data:			
Hole terminated at required depth.		Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
		-	01/04/2015	-	Start of shift
		-	01/04/2015	2.60m	End of shift
		-	02/04/2015	2.60m	Start of shift
		12.60m	02/04/2015	2.60m	End of shift
		-	03/04/2015	2.60m	Start of shift
		14.20m	03/04/2015	2.60m	End of borehole

Equipment & Methods:
Deltabase 520



Priority Geotechnical Ltd.
Tel: 021 4631600
Fax: 021 4638690
www.prioritygeotechnical.ie

Drilled By
DS
Logged By
JMS

Borehole No
RC01
Sheet 1 of 2

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 172453E - 65225N

Hole Type
Rotary

Client: RPS


Dates:
13/11/2014-14/11/2014




Level: 83.93 mOD

Scale
1:50

Well / Backfill	Water Strikes	Samples & In Situ Testing				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend		
		Depth (m)	Type	Results								
	▽	1.50	CPT	N=42 (4,6/8, 10, 10, 14)		100.00%			Open hole boring. Driller encountered rock at 2.40m. Blasted 0.30m to prove rock.			
		2.70	CPT	(25)	76		0.00	81.23	2.70	See 7.70m - 20.00m Interval for detailed lithology description.		
		2.70-3.70	100	93	0				80.23	3.70	Open hole boring. Driller encountered hard strata. Unable to progress hole, blasted 3.70m 4.70m interval. 3.70m - 3.75m: Non Intact.	
		4.70-5.70	95	91	58				79.23	4.70	See 7.70m - 20.00m Interval for detailed lithology description.	
		5.70-6.70	95	85	77					6.70	Open hole boring. Driller encountered hard strata. Unable to progress hole, blasted 6.70m 7.70m interval.	
		7.70-8.70	90	83	24			7.70	76.23	7.70	Lithology: Moderately weak, grey green Interbedded SILTSTONE with minor quartz veins. Weathering: Slightly weathered. Oxidation colouration prevalent along fracture surfaces. Apparent loss of strength. Evidence of dissolution in quartz veins. Fractures: 2 sets. Set 1 is dipping 60-70 degrees with planar and undulating rough fracture surfaces. Fractures are closely spaced. Set 2 is dipping 5-15 degrees with undulating rough fracture surfaces and medium	
		25mm min 110mm avg										
		Continued next sheet										

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth	
Groundwater: Struck Rose to After Sealed Comment 2.00m - - - See shift data.						Hole Information: Hole Depth Hole Diameter Casing Diameter 7.70m 131 131mm 15.70m 76		Chiselling: Depths (m) Time (hhmm) Tool to	
Remarks: Hole terminated at 15.70m.						Shift Data: Groundwater Shift (dd/mm/yyyy) Casing depth Remarks - 11/11/2014 2.70m End of shift - 12/11/2014 2.70m Start of shift 2.00m 12/11/2014 2.70m End of shift 2.00m 13/11/2014 2.70m Start of shift 2.00m 13/11/2014 2.70m End of shift			
Equipment & Methods: Dellabase 520.									

 PRIORITY GEOTECHNICAL		Priority Geotechnical Ltd. Tel: 021 4631600 Fax: 021 4638690 www.prioritygeotechnical.ie					Drilled By DS		Borehole No RC01 Sheet 2 of 2																										
Project Name: N28 Cork to Ringaskiddy			Project No. P14054		Co-ords: 172453E - 65225N			Hole Type Rotary																											
Client: RPS			Dates: 13/11/2014-14/11/2014		Level: 83.93 mOD			Scale 1:50																											
Well / Backfill	Water Strikes	Rotary Coring					Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																								
		Depth (m)	TCR	SCR	RQD	Fractures																													
		8.70-9.70	95	74	59	430mm max				spacing.																									
		9.70-10.70	96	79	65						10																								
		10.70-11.70	96	95	72						11																								
		11.70-12.70	96	70	0					12.14m - 15.00m: Purple red Mudstone.	12																								
		12.70-13.70	97	97	64						13																								
		13.70-14.70	85	85	52						14																								
		14.70-15.70	100	100	100						15																								
							68.23	15.70		End of Borehole at 15.70 m	16																								
											17																								
Water		Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth																										
Groundwater: Struck 2.00m Rose to - After - Sealed - Comment - See shift data.			Hole Information: Hole Depth 7.70m 15.70m Hole Diameter 131 76 Casing Diameter 131mm			Chiselling: Depths (m) to Time (hhmm) Tool																													
Remarks: Hole terminated at 15.70m.						Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>11/11/2014</td> <td>2.70m</td> <td>End of shift</td> </tr> <tr> <td>-</td> <td>12/11/2014</td> <td>2.70m</td> <td>Start of shift</td> </tr> <tr> <td>2.00m</td> <td>12/11/2014</td> <td>2.70m</td> <td>End of shift</td> </tr> <tr> <td>2.00m</td> <td>13/11/2014</td> <td>2.70m</td> <td>Start of shift</td> </tr> <tr> <td>2.00m</td> <td>13/11/2014</td> <td>2.70m</td> <td>End of shift</td> </tr> </tbody> </table>						Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	11/11/2014	2.70m	End of shift	-	12/11/2014	2.70m	Start of shift	2.00m	12/11/2014	2.70m	End of shift	2.00m	13/11/2014	2.70m	Start of shift	2.00m	13/11/2014	2.70m	End of shift
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																																
-	11/11/2014	2.70m	End of shift																																
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2.00m	12/11/2014	2.70m	End of shift																																
2.00m	13/11/2014	2.70m	Start of shift																																
2.00m	13/11/2014	2.70m	End of shift																																
Equipment & Methods: Deltabase 520.																																			

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Project Name: N28 Cork to Ringaskiddy				Project No. P14054		Co-ords: 172462E - 65028N		Hole Type Rotary																						
Client: RPS				Dates: 17/11/2014-20/11/2014		Level: 77.93 mOD		Scale 1:50																						
Well / Backfill	Water Strikes	Samples & In Situ Testing				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend																				
		Depth (m)	Type	Results																										
 		1.50	CPT	N=37 (6,7,7,9,10,11)		100.00%		1.50	Open hole boring. Driller described: Gravely sandy CLAY.	1																				
		3.00	CPT	(25 for 0mm)		0.00	76.43	3.00	Open hole boring. Driller described: Bouldery CLAY.	2																				
		4.00	CPT	(25 for 0mm)		0.00		4.00		3																				
		4.00-5.00	98	98	25	66	4.00	73.93	4.00	4																				
		5.00-6.00	96	76	66		0.00		5.00	5																				
		6.00-7.00	95	85	70				6.00	6																				
		7.00-8.00	94	94	30				7.00	7																				
		8.00-9.00	100	100	80				8.00	8																				
										9																				
										10																				
<i>Continued next sheet</i>																														
Groundwater: Struck: 3.00m Rose to: 3.20m		Hole Information: Hole Depth: 4.00m / 16.50m Hole Diameter: 131 / 76 Casing Diameter: 131mm				Chiselling: Depths (m): to 4.00m Time (hhmm): Tool:																								
Remarks: Hole terminated at 16.50m						Shift Data: <table border="1"> <thead> <tr> <th>Groundwater</th> <th>Shift (dd/mm/yyyy)</th> <th>Casing depth</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>17/11/2014</td> <td>0.00m</td> <td>Start of Borehole</td> </tr> <tr> <td>3.00m</td> <td>20/11/2014</td> <td>4.00m</td> <td>End of shift</td> </tr> <tr> <td>3.00m</td> <td>20/11/2014</td> <td>4.00m</td> <td>Start of shift</td> </tr> <tr> <td>4.00m</td> <td>20/11/2014</td> <td>16.50m</td> <td>End of Borehole</td> </tr> </tbody> </table>					Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks	-	17/11/2014	0.00m	Start of Borehole	3.00m	20/11/2014	4.00m	End of shift	3.00m	20/11/2014	4.00m	Start of shift	4.00m	20/11/2014	16.50m	End of Borehole
Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks																											
-	17/11/2014	0.00m	Start of Borehole																											
3.00m	20/11/2014	4.00m	End of shift																											
3.00m	20/11/2014	4.00m	Start of shift																											
4.00m	20/11/2014	16.50m	End of Borehole																											
Equipment & Methods: Deltabase 520																														



Priority Geotechnical Ltd.
Tel: 021 4631600
Fax: 021 4638690
www.prioritygeotechnical.ie

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DS
Logged By
JM

Borehole No
RC02
Sheet 2 of 2

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 172462E - 65028N

Hole Type
Rotary

Client: RPS

Dates:
17/11/2014-20/11/2014

Level: 77.93 mOD

Scale
1:50

Well / Backfill	Water Strikes	Rotary Coring				Fractures	Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		Depth (m)	TCR	SCR	RQD						
		9.00-10.00	92	60	0	130mm min 100mm avg 1000mm max			Lithology: Moderately weak, purple red MUDSTONE with bed of Siltstone at top of unit. Weathering: Slightly weathered with minor oxidation on fracture surfaces and minor loss of strength. Fractures: 2 Sets. Set 1 is dipping 5-15 degrees with planar and undulating rough fracture surfaces and medium fracture spacing. Set 2 dipping 60 degrees with planar and stepped rough fracture surfaces with close spacing. 10.00-10.15m Mostly non intact.		
		10.00-11.00	100	96	68						
		11.00-12.00	98	72	0						
		12.00-13.00	95	86	60						
		13.00-14.00	96	96	36						
		14.00-15.00	100	100	100						
		15.00-16.00	100	85	35						
							61.43	16.50	End of Borehole at 16.50 m		

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth			
Groundwater:						Hole Information:			Chiselling:		
Struck	Rose to	After	Sealed	Comment		Hole Depth	Hole Diameter	Casing Diameter	Depths (m)	Time (hhmm)	Tool
3.00m	-	-	-			4.00m	131	131mm	to		
3.20m	-	-	-			16.50m	76				
Remarks: Hole terminated at 16.50m						Shift Data:					
						Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks		
						3.00m	17/11/2014	0.00m	Start of Borehole		
						3.00m	20/11/2014	4.00m	End of shift		
						4.00m	20/11/2014	16.50m	Start of shift		
									End of Borehole		
Equipment & Methods: Deltabase 520											



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Tel: 021 4631600
Fax: 021 4638690
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Borehole No
RC03
Sheet 1 of 3

Project Name: N28 Cork to Ringaskiddy	Project No. P14054	Co-ords: 172594E - 64735N	Hole Type Rotary
Client: RPS	Dates: 21/11/2014-22/11/2014	Level: 63.42 mOD	Scale 1:50

Well / Backfill	Water / Strikes	Samples & In Situ Testing				Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		Depth (m)	Type	Results						
 		1.50	CPT	N-31 (6,8,9,10,4)		0.00	61.92	1.50	Open hole boring. Driller described: Gravelly sandy CLAY.	1
		3.00	CPT	(25 for 0mm)		0.00	60.42	3.00	Open hole boring. Driller described: Boulders.	2
		4.00	CPT	(25 for 0mm)		4.00	59.42	4.00	Open hole boring. Driller described: Weathered rock.	3
		4.00-5.00	100	70	39	36mm-min 120mm avg 1000mm max 103			Lithology: Moderately strong, light grey brown SILTSTONE with minor calcite veins. Sequence is coarsening downward to fine Sandstone. Sandstone has carbonaceous laminations. Weathering: Slightly weathered, with apparent loss of strength in upper meters and minor oxidation colouration on fracture surfaces. Fractures: 2 Sets. Set 1 dipping 0-10 degrees with undulating rough fracture surfaces and medium spacing. Set 2 dipping with undulating and planar fracture surfaces with close spacing. 4.00-4.20m Non Intact	4
		5.00-6.00	97	74	11			5.80-6.00m Non Intact		5
		6.00-7.00	96	88	21					6
		7.00-8.00	93	82	57			7.00-7.10m Non Intact		7
		8.00-9.00	94	94	67				8	

Continued next sheet

Groundwater: Struck 3.00m Rose to 3.50m After 20min Sealed - Comment	Hole Information: Hole Depth 4.00m 20.00m Hole Diameter 131 76 Casing Diameter 131mm	Chiselling: Depths (m) to Time (hhmm) Tool
--	--	--

Remarks: Hole terminated at 20.00m

Shift Data: Groundwater 3.90m
Shift (dd/mm/yyyy) 21/11/2014
Casing depth 2.00m
Remarks Start of shift
End of shift

Equipment & Methods: Deltabase 520



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Tel: 021 4631600
Fax: 021 4638690
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Logged By
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Borehole No
RC03
Sheet 3 of 3

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 172594E - 64735N

Hole Type
Rotary

Client: RPS

Dates:
21/11/2014-22/11/2014

Level: 63.42 mOD

Scale
1:50

Well / Backfill	Water Strikes	Rotary Coring				Casing Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		Depth (m)	TCR	SCR	RQD						Fractures
		18.00-19.00	93	93	60			Lithology: Moderately strong, light grey brown SILTSTONE with minor calcite veins. Sequence is coarsening downward to fine Sandstone. Sandstone has carbonaceous laminations. Weathering: Slightly weathered, with apparent loss of strength in upper meters and minor oxidation colouration on fracture surfaces. Fractures: 2 Sets. Set 1 dipping 0-10 degrees with undulating rough fracture surfaces and medium spacing. Set 2 dipping with undulating and planar fracture surfaces with close spacing.		
		19.00-20.00	100	100	100					
							43.42	20.00	End of Borehole at 20.00 m	

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth		
Groundwater: Struck 3.00m Rose to 3.50m After 20min Sealed - Comment						Hole Information: Hole Depth 4.00m Hole Diameter 131 Casing Diameter 76 131mm			Chiselling: Depths (m) to Time (hhmm) Tool	

Remarks: Hole terminated at 20.00m

Shift Data: Groundwater 3.00m to 3.50m, Shift (dd/mm/yyyy) 21/11/2014, Casing depth 0.00m, Remarks Start of shift End of shift

Equipment & Methods: Database 520



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Trialpit No
TP-2001
 Sheet 1 of 1

Project Name
 N26 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 171619E - 69137N
 Level: 17.30 m AOD

Date
 05/09/2006

Location: Cork

Dimensions: 4.10m

Scale
 1:25

Depth
 4.10m

0.65m

Logged By
 FL

Client: Cork County Council

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	D					TOPSOIL - Dark brown, slightly sandy, slightly gravelly CLAY with rootlets
0.30	B		0.25	17.05		MADE GROUND - Firm, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained) CLAY with occasional angular to sub-rounded cobbles (siltstone/ sandstone), concrete and glass
0.30	D		0.40	16.90		
1.50	B					Brown, sandy (fine-coarse grained), silty, fine-coarse grained, sub-angular to sub-rounded GRAVEL with some angular to sub-rounded cobbles (siltstone/ sandstone).
1.50	D					
2.50	B					
2.50	D					
3.50	B					
3.50	D					
4.00	B					
4.00	D		4.10	13.20		

Trialpit Complete at 4.10 m

Remarks: Stopped at limit of excavator

Stability: Moderate

Groundwater:





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 Tel: 021 4631600
 Fax: 021 4638690
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Trialpit No
TP-2013
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 172780E - 64896N
 Level: 47.52 m AOD

Date
 10/10/2006

Location: Cork

Dimensions: 1.90m

Scale
 1:25

Depth
 2.70m

1.10m

Client: Cork County Council

Logged By
 P R

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10			0.10	47.42		Grass over tarmac - old road
0.30			0.30	47.22		FILL - Light beige, clayey, sandy (fine-coarse grained), fine to coarse grained, angular GRAVEL
0.50 0.50-0.70 0.50-0.70	CBR B D	5				FILL - Soft, slightly sandy, slightly gravelly CLAY, with occasional cobbles
1.50 1.50	B D					
2.70 2.70	B D		2.70	44.82		

Trialpit Complete at 2.70 m

Remarks: Stopped at 2.7m because of buried pipe. In situ CBR at 0.5m: 5%

Stability: Good

Groundwater: Water at 1.0m, rose 15cm after 20 mins.





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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Trialpit No
TP-2016
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 172907E - 64467N
 Level: 26.87 m AOD

Date
 08/09/2006

Location: Cork

Dimensions: 1.90m

Scale
 1:25

Depth
 3.60m

0.60m

Client: Cork County Council

Logged By
 MH

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.40-0.60 0.40-0.60	B D		0.20	26.67		TOPSOIL - Dark brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-rounded) CLAY with numerous roots/rootlets
1.40-1.60 1.40-1.60	B D		1.30	25.57		Firm purple brown, slightly mottled yellow/orange, sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) CLAY
2.40-2.60 2.40-2.60	B D		2.20	24.67		Purple brown, silty sandy (fine-coarse grained), fine to coarse grained angular to sub-angular GRAVEL, with occasional cobbles
3.30-3.50 3.30-3.50	B D		2.20	24.67		Stiff light brown, yellowish, slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-rounded) CLAY with rare cobbles
			3.59 3.60	23.28 23.27		LIMESTONE

Remarks: Stopped on presumed Limestone bedrock.

Stability: Good

Groundwater: Water strike at 2.3m, inflowing slowly. Water strike at 3.5m, standing.



PREPARED BY: (B) (A) (S) Drawn: (B) (A) (S) Checked: (B) (A) (S) Date: 27th Nov 06



Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Trialpit No
TP-2020
 Sheet 1 of 1

Project Name N28 - Bloomfield to Ringaskiddy	Project No. PC6006	Co-ords: 175075E - 64028N Level: 38.29 m AOD	Date 06/10/2006
Location: Cork	Dimensions: 3.50m Depth 4.00m		Scale 1:25
Client: Cork County Council			Logged By MH

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.50	CBR	3	0.40	37.89		TOPSOIL - soft brown
0.50-0.80 0.50-0.80	B D		1.00	37.29		Slightly sandy (fine-medium grained), slightly gravelly (fine-coarse grained, sub-angular to subrounded) CLAY
1.50-1.80 1.50-1.80	B D		2.80	35.49		Dense, brown, silty, very sandy (fine-coarse grained), fine-coarse grained, sub-angular to sub-rounded GRAVEL - large pockets of fine sand with rare cobbles
2.80-2.90 2.80-2.90	B D		3.80	34.49		Brown, slightly gravelly (fine-coarse grained, sub-rounded) predominantly fine grained SAND, with rare cobbles
3.80-4.00 3.80-4.00	B D		4.00	34.29		Brown, sandy (predominantly fine grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) SILT.
Trialpit Complete at 4.00 m						

Remarks: In situ CBR at 0.5m: 3%.

Stability:
 Groundwater:





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 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Trialpit No
TP-2021
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 175497E - 63979N
 Level: 36.78 m AOD

Date
 13/10/2006

Location: Cork

Dimensions: 4.00m

Scale
 1:25

Client: Cork County Council

Depth
 4.20m

1.00m

Logged By
 P R

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.30	36.48		TOPSOIL Firm, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained sub-angular to sub-rounded) CLAY with occasional cobbles
0.30-1.50	B					Firm, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained angular to sub-angular) CLAY with occasional cobbles
30-1.80	D					
			1.80	34.98		Soft, brown / light brown, slightly sandy, slightly gravelly (fine-coarse grained angular to sub-angular) CLAY with occasional cobbles
1.80-2.30	B					
1.80-2.30	D					
			2.50	34.28		Firm, brown purple, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained sub-angular to sub-rounded) CLAY, with occasional siltstone cobbles
2.30-2.80	B					
2.30-2.80	D					
			2.80	33.98		Brown / Light-purple, slightly sandy (fine-coarse grained), gravelly (fine-coarse grained sub-angular to sub-rounded) CLAY, with possible black weathered rock
			4.00			
4.00	B					
4.00	D					
			4.20	32.58		Trialpit Complete at 4.20 m

Remarks: Stopped at 4.2m because excavator getting stuck

Stability: Good

Groundwater: At 3.5m, very slight seepage of water.





Priority Geotechnical Ltd
 Tel: 021 4631600
 Fax: 021 4638690
 email: geotechnical@priority.ie

Trialpit No
TP-2036
 Sheet 1 of 1

Project Name
 N28 - Bloomfield to Ringaskiddy

Project No.
 PC6006

Co-ords: 178726E - 64311N
 Level: 2.16 m AOD

Date
 12/09/2006

Location: Cork

Dimensions: 4.00m

Scale
 1:25

Depth
 2.50m

0.65m

Client: Cork County Council

Logged By
 F L

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	D		0.30	1.86		TOPSOIL - Firm, brown, slightly sandy, slightly gravelly, CLAY with rootlets
0.80	B					Firm, brown, slightly sandy (fine-coarse grained), slightly gravelly (fine-coarse grained, sub-angular to sub-rounded) SILT with occasional cobbles (siltstone). At 1.2m, silt becoming wet and soft.
1.40	B					
2.40	B					
2.40	W		2.50	-0.34		Trialpit Complete at 2.50 m

Remarks: Stopped due to instability

Stability: Poor

Groundwater: Seepage at 1.4m. Water at 2.1m, rose to 1.8m in 20mins.





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Fax: 021 4638690
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Trial Pit No
TP01
Sheet 1 of 1

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 177454E - 63858N
Level: 14.90 m AOD

Date
26/06/2014

Location: Ringaskiddy, Co. Cork.

Dimensions: 3.00m

Scale
1:25

Client: RPS

Depth
2.60m

1.00m

Logged By
DMC

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				14.60	0.30	(MADE GROUND) Topsoil.	
	0.50-1.00 0.50-1.00	B D				Medium dense, brown, silty very sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to medium, subangular.	
	1.10-1.50 1.10-1.50	B D		13.80	1.10	Medium dense to dense, light brown, silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse, subangular. Silt content decreases with depth. Possible weathered Mudstone recovered as GRAVEL with high cobble content.	
	2.00-2.50	B					
				12.30	2.60	Trial pit completed at 2.60 m	

Water	Depth (m)	Type	Results	Level	Depth	
Stability: Good Plant: JCB Backfill: Arisings						Groundwater:

Remarks: Trial pit terminated due to obstruction.



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Trial Pit No

TP02

Sheet 1 of 1

Project Name: N28 Cork to Ringaskiddy	Project No. P14054	Co-ords: 177681E - 63846N Level: 13.31 m AOD	Date 26/06/2014
Location: Ringaskiddy, Co. Cork.		Dimensions: 3.00m Depth 2.30m 1.00m	Scale 1:25
Client: RPS			Logged By DMC

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				13.01	0.30	(MADE GROUND) Topsoil.	
	0.50-1.00 0.50-1.00	B D				Medium dense to dense brown, slightly sandy silty GRAVEL with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are subrounded, 60-80mm dia.	
	1.50-2.00 1.50-2.00	B D					
	2.10-2.30	B		11.21	2.10	Limestone recovered as COBBLES. Cobbles are angular, 60-150mm dia.	
				11.01	2.30	Trial pit completed at 2.30 m	

Stability: Good	Groundwater:
Plant: JCB	
Backfill: Arisings	

Remarks: Trial pit terminated due to obstruction.



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Trial Pit No
TP03
Sheet 1 of 1

Project Name:
N28 Cork to Ringaskiddy

Project No.
P14054

Co-ords: 177775E - 63903N
Level: 13.10 m AOD

Date
26/06/2014

Location: Ringaskiddy, Co. Cork.

Dimensions: 4.00m

Scale
1:25

Client: RPS

Depth
4.50m

1.00m

Logged By
DMC

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				12.80	0.30	Topsail.	
	0.50-1.00 0.50-1.00	B D				Firm, brown, slightly sandy gravelly SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular. Cobbles are subangular to subrounded, 60-100mm dia.	
	1.50-2.00 1.50-2.00	B D		11.40	1.70	Soft, light brown, slightly sandy gravelly SILT and low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular.	
	2.50-3.00 2.50-3.00	B D					
	3.50-4.00 3.50-4.00	B D		10.00	3.10	Possible weathered Carbonate Mudstone recovered as: brown/green, laminated sandy silty GRAVEL.	
	4.00-4.50	B					
				8.60	4.50		
Trial pit completed at 4.50 m							

Stability: Good
Plant: JCB
Backfill: Arisings

Groundwater:

Remarks: Trial pit terminated at required depth.



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Fax: 021 4638690
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Slit Trench No
ST02
Sheet 1 of 1

Project Name: N28 Cork to Ringaskiddy	Project No. P14054	Co-ords: 178440E - 63829N Level: 26.31 m AOD	Date 05/06/2014
Location: Ringaskiddy, Co. Cork.		Dimensions: 15.10m Depth: 1.50m	Scale: 1:25 Logged By: DMC
Client: RPS			

Water Strikes	Samples & In Situ Testing			Level (m AOD)	Depth (m)	Stratum Description	Legend
	Depth (m)	Type	Results				
				26.19	0.12	(MADE GROUND) Bituminous surfacing.	
				25.91	0.40	(MADE GROUND) Fill described as slightly sandy gravelly Silt with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular. Cobbles are angular, limestone, 60-150mm dia.	
	0.50-0.60	B				SHALE	
	0.40-1.00	B					
	0.40-1.00	D					
				24.61	1.50	Slit Trench Complete at 1.50 m	

Waterstrike:

Remarks: See detailed section for utility plan.



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 Fax: 021 4638690
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Slit Trench No

ST03

Sheet 1 of 1

Project Name:
 N28 Cork to Ringaskiddy

Project No.
 P14054

Co-ords: 178366E - 64027N
Level: 20.51 m AOD

Date
 06/06/2014

Location: Ringaskiddy, Co. Cork.

Dimensions: 15.45m

Scale
 1:25

Client: RPS

Depth
 1.10m



Logged By
 DMC

Water Strikes	Sample & In Situ Testing			Level (m AOD)	Depth (m)	Stratum Description	Legend
	Depth (m)	Type	Results				
	0.40-0.60	B		20.39	0.12	(MADE GROUND) Bituminous surfacing.	
						(MADE GROUND) Clause 804 sub-base.	
					20.16	0.35	SHALE
				19.41	1.10	Slit Trench Complete at 1.10 m	

Water	Depth	Type	Results	Level	Depth

Waterstrike:

Remarks: See detailed section for utility plan.

C:\Users\dmcc\Documents\Projects\Ringaskiddy\Ringaskiddy\Ringaskiddy.dwg



APPENDIX 11B: GEOPHYSICAL SURVEY



APEX Geoservices Ltd.
Geophysical & Geological Consultants

**FINAL REPORT
ON THE
GEOPHYSICAL SURVEY
FOR THE
N28 BLOOMFIELD TO RINGASKIDDY,
CO. CORK
FOR
PRIORITY GEOTECHNICAL LTD & CORK CO. CO..**

**Kilnerin
Gorey
Co. Wexford**

**Tel. 01-2940057
Mobile: 087-9365000
Fax: 01-2940756
Email: info@apexgeoservices.ie**

PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOSERVICES LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THE REPORT.

PROJECT NUMBER	AGL06184		
AUTHOR	CHECKED	REPORT STATUS	DATE
YVONNE O'CONNELL P.GEO., M.Sc (GEOPHYSICS)	EURGEO. PETER O'CONNOR P.GEO., M.Sc (GEOPHYSICS), DIP EIA MGT.	FINAL	14 TH FEBRUARY 2007

1. INTRODUCTION

APEX Geoservices Ltd. was requested by Priority Geotechnical Ltd., on behalf of Cork County Council, to carry out a geophysical survey as part of the ground investigation for the N28 Bloomfield to Ringaskiddy, Co. Cork.

1.1 Survey Methodology

- ❖ Microgravity surveying to outline any negative density anomalies indicative of karstification and cavity development.
- ❖ 2D Resistivity profiling at selected locations to further indicate lateral and vertical overburden variations, the bedrock profile and to delineate areas of irregular bedrock topography and resistivity that indicate possible karstification and cavities.
- ❖ Seismic refraction to assist in profiling bedrock and estimating rock excavatability.
- ❖ Ground Penetrating Radar (GPR) profiles were recorded using a high frequency (1.5 GHz) antenna to determine asphalt layer thickness and to locate shallow services.

1.2 Site Background

The survey was carried out along the proposed route at the locations specified by the client as follows:

- ❖ Ch.40-340m on the Shannonpark Northbound Diverge at Ch.6+300-6+600m – Microgravity and 2D Resistivity (Map 2A – Section 1)
- ❖ Ch.8+100-8+400m – Microgravity and 2D Resistivity (Map 2B – Section 2)
- ❖ Ch.10+600-11+560m - Microgravity and 2D Resistivity with Seismics from Ch.10+600-10+800m. (Map 2C – Section 3)
- ❖ Ch.11935-12085 - Microgravity and 2D Resistivity. (Map 2D – Section 4)
- ❖ Ch.0-600m on Link Road - Seismics with Microgravity and 2D Resistivity from Ch.0-200m. (Map 2D – Section 5 & 6)
- ❖ Ch.400-2400m - Ground Penetrating Radar. (Map 2E & Map 2F – Appendix II)
- ❖ At proposed Roundabout on Link Road at Ch. 13000m - Ground Penetrating Radar. (Map 2G– Appendix II)

The geological map for the area (Geology of South Cork, Sheet 25, GSI Bedrock Series 1:100,000) indicates that the five survey areas are underlain by the Cuskiny Member of the Kinsale Formation, comprising flaser-bedded sandstone and mudstone and Waulsortian Limestone which is known to be prone to karstification. The Waulsortian Limestones underlying Section 1 to the north form part of the Cloyne Syncline while the Kinsale Formation Cuskiny Member forms the Ringaskiddy Anticline. Both formations are extensively faulted in a NNW-SSE direction.

2. INTERPRETED RESULTS

2D Resistivity Survey: 2D Resistivity surveying involves the recording of a large number of resistivity readings along a profile in order to map lateral and vertical changes in material types. The recorded resistivity readings are inverted using specialized software to obtain a 2D depth model of the resistivities. An interpretation of the depth model is then made based on typical geophysical responses of ground materials, geological maps, observed site information, available ground investigation data and the experience of the author (Sections 1, 2, 3, 4 and 6).

The resistivity data have generally been interpreted as follows:

Resistivity (Ohm-m)	Interpretation
50 - 260	Sandy Gravelly Clay/Silt or Boulder Clay
260 - 800	Silty/Clayey Sand and/or Gravel
50 - 260	Weathered Sandstone/Limestone
260 - 800	Weathered Mudstone/Shale
50 - 260	Mudstone/Shale
260 - 800	Sandstone/Limestone

Microgravity Survey: Microgravity surveying involves the measurement of the Earth's Gravitational Field at fixed survey locations along the earth's surface. At each location the elevation and time of each reading is taken and accurately recorded. Corrections are then applied to the recorded data to eliminate effects of local and regional factors including; topography, elevation, tidal effects, latitude and density of the underlying material, which have varying influences on the measured microgravity value.

The recorded data were processed to eliminate earth tide, elevation and location (latitude) effects. The resulting Bouguer microgravity data are plotted on Sections 1, 2, 3, 4 and 6. Variations in the microgravity readings will reflect any anomalous density variations in the underlying geology. These density changes can be caused by features such as air, water or sediment filled cavities, or variations in the nature of the subsurface material and bedrock or in the bedrock topography. The presence of these features results in anomalous depressions in the microgravity field.

Seismic Survey: Seismic surveying measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. The recorded readings are interpreted using specialized software to obtain a 2D depth model of velocity layers. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities. An interpretation of the depth model is then made based on typical geophysical responses of ground materials, geological maps, observed site information, available ground investigation data and the experience of the author (Section 3 and 5).

GPR Survey: GPR involves the measurement of the amplitude versus traveltime of a high frequency pulse of electromagnetic energy from the ground surface to a subsurface layer or body and back. Partial reflections of the electromagnetic pulse occur at the boundaries of materials with different geoelectric properties. A recording time from 0 to 20 ns was used. The distance along each profile was recorded in the GPR record header by the odometer. Depth penetration was of the order of 1.0 – 1.5 m bgl. Each profile was adjusted to its correct length to account for odometer error and converted to depth using an asphalt velocity of 14 cm/ns. The interpreted asphalt thickness has been annotated on each profile (Appendix II).

3.1 Section 1 – 2D Resistivity & Microgravity

300m of 2D Resistivity profiles (R6-R7) and microgravity were recorded from Ch.40-340m on the Shannonpark Northbound Diverge from approx. Ch.6+300-6+600m (Map 2a, Section 1).

The geological map for the area indicates that this section is underlain by Cuskiny Member flaser-bedded sandstone and mudstone from 0-180m and by Waulsortian Limestone from 180-320m.

The resistivity data have been interpreted as indicating shallow rock comprising sandstone/mudstone/shale to the west of the section and Waulsortian limestone to the east (Interpreted Sections: Section 1). In addition, weathered rock has been interpreted to the west of the profile. No very high resistivity values indicative of air-filled cavities were recorded. No very high resistivity values indicative of air-filled cavities were recorded.

The microgravity values for this section lie within a range of 369 microGals and generally decrease from decrease from Ch.0-320m (from W-E). A significant decrease in microgravity values was recorded from Ch.100-250m (approx. 260 microGals). It is likely that this decrease is related to faulting between the Cuskiny sandstone/ mudstone/shale to the west and Waulsortian limestone to the east and would be rated medium to high in terms of possible underlying cavitation.

An additional minor decrease in microgravity values was recorded from Ch.260-320m. It is likely that this decrease is related to a gradual increase in overburden thickness and would be rated low in terms of possible underlying cavitation.

3.2 Section 2 – 2D Resistivity & Microgravity

300m of 2D Resistivity profiles (R9-R10) and microgravity were recorded from Ch.8+100-8+400m (Map 2b, Section 2).

The geological map for the area indicates that this section is underlain by Cuskiny Member flaser-bedded sandstone and mudstone from Ch.8100-8125m and by Waulsortian Limestone from Ch.8125-8400m.

The resistivity data have been interpreted as indicating sandy gravelly clay/silt and clayey/silty sand/gravel overlying Waulsortian limestone. No very high resistivity values indicative of air-filled cavities were recorded (Interpreted Sections: Section 2).

The microgravity values for this section lie within a range of 261 microGals and generally decrease from Ch.8100-8400m (from NW-SE). A number of minor decreases in microgravity values (from 40 to 70 microGals) have been recorded from Ch.8230-8290m and from Ch.8290-8330m. It is likely that these decreases are related to localised bedrock depressions and would be rated low in terms of possible underlying cavitation.

3.3 Section 3 – 2D Resistivity, Microgravity & Seismics

960m of 2D Resistivity profiles (R4, R5, R8, R1T, RT2 & R3T) and microgravity were recorded from Ch.10600-11560m and 200m of Seismic profiles (S11-S14, S1T & S2T) were recorded from Ch.10600-10800m (Map 2c, Sections 3a, 3b and 3c). 2D Resistivity profiles R1T, RT2 & R3T, Seismic profiles S1T & S2T and 150m of microgravity were recorded during the trial survey carried out in August 2006 in order to determine the preferred survey techniques for the main geophysical investigation.

The geological map for the area indicates that this section is underlain by Cuskinny Member flaser-bedded sandstone and mudstone from Ch.0-500m and by Waulsortian Limestone from Ch.500-600m.

The combined 2D-resistivity, microgravity and seismic data have been interpreted on the following basis:

Layer	Velocity Range (m/s)	Resistivity Range (Ohm-m)	Interpretation	Estimated Stiffness/ Rock Quality	Estimated Excavatability
1	333-870	50-260	Sandy Gravelly Clay/Silt	Soft-Firm	Diggable
		260-800	Silty/Clayey Sand and/or Gravel	Loose-Med. Dense	
2	1159-1500	50 - 260	Boulder Clay	Stiff	Diggable
3	690-1500	50-800	Completely to Highly Weathered Rock	Poor	Rippable
4	1435-1683	50-800	Moderately Weathered Rock	Fair	Marginally Rippable-
5	2225-3609	50-260	Moderately to slightly weathered Mudstone/Shale	Fair-Good	Break/Blast
		260-800	Moderately to slightly weathered Sandstone or Moderately to slightly weathered/karstified Limestone		

The geophysical data in conjunction with the borehole data have been interpreted as indicating sandstone/mudstone/shale to the NW of this section, from Ch.10+600-10+830m. The resistivity data have been interpreted as indicating a change in bedrock lithology across R3 (Trial) to Waulsortian Limestone. Overburden thickness increases from CH.10830-11050m with up to 23m of stiff boulder clay interpreted.

A large zone of possible karstic weathering of the bedrock has been interpreted on profile R1(Trial) between Ch. 10+980 and 11+050m. The data shows low bedrock resistivity and relatively low seismic velocities coinciding with an anomalous decrease in microgravity values of the scale of approx. 100 microGal. A surface depression was noted on the map to the NE of the proposed route ac. Ch.11+180m.

No very high resistivity values indicative of air-filled cavities were recorded across this survey area.

Very thick (>30m) low resistivity boulder clay or saturated sediments were recorded in the tidal flats surrounding Profile R5. The bedrock level shallows significantly from Ch.11+320m through to Ch.11+560m. The geological map for the area indicates that this section is underlain by Cuskinny Member flaser-bedded sandstone and mudstone however, the high bedrock resistivities have been interpreted as indicating that this area remains underlain by Waulsortian Limestone.

The microgravity values for this section lie within a range of 1006 microGals and generally decrease from Ch.10+600-11+560m (from NW-SE). A number of small to medium decreases in microgravity values (from 50 to 130 microGals) have been recorded as follows:

No.	Ch. from	Ch. to	Amplitude	Possible Source	Cavitation Risk
1	10630	10670	65	Sandstone/mudstone area– possibly related to increased weathering of rock	Low
2	10690	10740	90	Sandstone/mudstone area– possibly related to increased weathering of rock	Low
3	10850	10890	60	Limestone area – possible bedrock depression	Medium
4	10890	10950	70	Limestone area – possible bedrock depression	Medium
5	10980	11050	65	Over possible zone of possible karstic limestone	High
6	11190	11230	50	Limestone area – possible bedrock depression	Medium
7	11250	11330	130	Limestone area – possible bedrock depression	Medium
8	11380	11440	60	Limestone area – over shallow bedrock depression	Low

3.4 Section 4 – 2D Resistivity & Microgravity

150m of 2D Resistivity profiles (R3) and microgravity were recorded from Ch.11+935-12+085m (Map 2d, Section 4).

The geological map for the area indicates that this section is underlain by Waulsortian Limestone lying parallel to a geological boundary with the Cuskinny Member.

The resistivity data in conjunction with the microgravity data have been interpreted as indicating generally sandy gravelly clay/silt.

The microgravity values for this section lie within a range of 109 microGals and increase from Ch.11+950-12+100m (from W-E). Although the geological map indicates underlying Waulsortian Limestone, the low amplitude decrease in microgravity values to the west of the section is not likely to reflect highly karstified low resistivity limestone and therefore this low resistivity material has been interpreted as mudstone/shale. This decrease to the west may be associated with the change in lithology and would be rated low in terms of possible underlying cavitation.

No very high resistivity values indicative of air-filled cavities were recorded.

1.3 Report Outline

- ❖ The survey results are discussed in Part 2.
- ❖ Recommendations are made in Part 3.
- ❖ The locations of the geophysical readings are shown on Map 1.
- ❖ The interpreted Microgravity, 2D-resistivity and Seismic data are shown on Sections 1-5.
- ❖ The geophysical methodology is discussed in Appendix I.
- ❖ The interpreted GPR Profiles are plotted in Appendix II.

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MAPS

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Map 2a to2g	Geophysical Survey Locations	1:2500

INTERPRETED SECTIONS

Section 1	Ch.40-340m on Slip Road from approx. Ch.6300-6600m	1:1000
Section 2	Ch.8100-8400m	1:1000
Section 3	Ch.10600-11560m	1:1000
Section 4	Ch.11935-12085m	1:1000
Section 5	Ch.0-600m on the Link Road at Ch.13000m	1:1000
Section 6	Ch.0-200m on the Link Road at Ch.13000m	1:1000

APPENDICES

Appendix I	Geophysical Methodology
Appendix II	Interpreted GPR Profiles

3.5 Section 5 - Seismics

600m of Seismic profiles (S1-S10) were recorded from Ch.0-600m from the Loughbeg Roundabout at circa Ch. 12+000m (Map 2d, Interpreted Sections: Section 5).

The geological map for the area indicates that this section is underlain by Cuskinny Member flaser-bedded sandstone and mudstone from 0-500m and by Waulsortian Limestone from 500-600m.

Three velocity layers have been interpreted from the seismic data as follows (Section 5):

Layer	Velocity range (m/s)	Average Velocity (m/s)	Thickness range (m)	Average Thickness (m)	Interpretation	Estimated Stiffness/Rock Quality	Estimated Excavatability
1	385-1000	645	0.6-4.7	1.6	Overburden	Firm-Stiff or Medium dense-Dense	Diggable
2	1000-2138	1471	0.3-11.1	4.5	Highly-Slightly Weathered Rock	Fair-Good	Rippable or Break/Blast
3	2271-4627	3094			Slightly weathered-Fresh Rock	Good	Break/Blast

Recorded Layer 1 velocities range from 385-1000m/s with an average velocity of 645m/s. In conjunction with the borehole data, the recorded velocities have been interpreted as indicating firm to stiff sandy gravelly clay/silt and medium dense to dense clayey/silty sand and/or gravel which should be diggable. Layer 1 ranges in thickness from 0.6 to 4.7m with an average thickness of 1.6m.

Layer 2 velocities range from 1000 to 2138 m/s with an average velocity of 1471 m/s, and has been interpreted, in conjunction with boreholes BH1056, BH1057 and BH1058 as indicating highly to slightly weathered rock. This layer has been interpreted up to 11.1m thick with an average thickness of 4.5 m. Layer 3 is likely to be rippable to marginally rippable where the recorded velocities are less than 1800 m/s (i.e. Layer 3 is likely to be rippable where velocities are <1500m/s on spreads S2, S3, S4, S5, S8 and S9 and marginally rippable where velocities range from 1500-1800m/s – S6 and S7). However, where the recorded velocities exceed 1800 m/s (i.e. S1 and S10) excavation of this layer is likely to require breaking.

Layer 3 has been interpreted as indicating slightly weathered to fresh rock with an average velocity of 3094m/s which indicates that excavation of this layer will require breaking/blasting. Velocities are lowest between S5 and S8 (from Ch.255-475m).

3.6 Section 6 – 2D Resistivity & Microgravity

200m of 2D Resistivity profiles (R1 & R2) and microgravity were recorded from Ch.0-200m from the Loughbeg Roundabout at circa Ch. 12+000m (Map 2d, Interpreted Sections: Section 6).

The geological map for the area indicates that this section is underlain by Cuskinny Member flaser-bedded sandstone and mudstone.

The resistivity data in conjunction with the overlapping seismic data have been interpreted as indicating shallow weathered rock underlain by fresh rock comprising low resistivity mudstone/shale and higher resistivity probable sandstone. No very high resistivity values indicative of air-filled cavities were recorded.

The microgravity values for this section lie within a range of 282 microGals and decrease from 0-200m (from S-N). This gradual decrease may be associated with an increase in weathering or weathered layer thickness to the north and would be rated low in terms of possible underlying cavitation.

3.7 Section 7 – Ground Penetrating Radar

4km of GPR profiles were recorded from Ch.400-2+400m. A local chainage has been used by to illustrate the profile locations (Maps 2e and 2f, Appendix II).

A total of 35 profiles were recorded. A typical asphalt velocity of 14 cm/ns has been used to convert the two-way travelttime. 36 pavement core logs were supplied by the client and have been drawn on to the interpreted profiles.

The interpreted surface base has been annotated (red) on each profile. The surface thickness varies from generally around 0.3m to 0.4m. A reflection from the base of the binder is visible on most profiles at a depth of approx. 1m bgl. This reflection (blue) has been marked on each profile. Some additional layering also occurs within the surface and binder. These reflections (pink) have been marked, where interpreted, on each profile.

A change in surface thickness is evident at the bridge locations at Ch. 625-675m and Ch.2+200-2+240m and at the slip road at Ch.1345-1375m. The surface and binder thicknesses are relatively constant across the areas surveyed with location undulations occasionally present.

3.8 Section 8 – Ground Penetrating Radar

Approx. 600m of GPR profiles were recorded across the proposed roundabout at Ch.800m on the Link Road at Ch. 13+000 (Map 2g, Appendix II).

A total of 7 profiles were recorded. A typical asphalt velocity of 14 cm/ns has been used to convert the two-way travelttime. 6 pavement core logs were supplied by the client and have been drawn on to the interpreted profiles.

The interpreted surface base has been annotated (red) on each profile. The surface thickness varies from 0.1m to 0.2m thick averaging at 0.15m. A reflection from the beneath the surface assumed to be from the bottom of the sub-base, is visible on most profiles at depths ranging from 0.2m to 0.4m bgl. This reflection (blue) has also been marked on each profile. Some additional layering also occurs below the interpreted bottom of the sub-base. These reflections (pink) have been marked, where interpreted, on each profile.

The surface thickness is relatively constant across the areas surveyed while the sub-base thickness undulates and cannot be determined in places.

A possible service has been interpreted at 37m on Profile 1-2.

3. CONCLUSIONS AND RECOMMENDATIONS

The geophysical survey has successfully outlined variations in overburden thickness, lateral variations in overburden type, bedrock profile, rock quality, variations in bedrock lithology and zones of possible karstification.

Boreholes are recommended at a number of survey locations to further investigate the zones of possible karstification as follows:

- ❖ On Section 1 a significant decrease in microgravity values was recorded centred at Ch.175m on the slip road from approx. Ch.6+300-6+600m and would be rated medium to high in terms of possible underlying cavitation.
- ❖ On Section 3 small to medium decreases were recorded centered at Chainages 11+870m, 10+910m, 11+015m, 11+210m and 11+280m and would be rated medium to high in terms of possible underlying cavitation.
- ❖ On Section 4 to investigate the bedrock lithology.

Drilling and pitting is recommended along Section 5 to confirm the composition and excavatability of Layer 2 material as indicated by the geophysical survey.

If any bedrock excavation is proposed a detailed assessment of excavatability should be carried out combining the results of the geophysical survey, rotary core drilling, strength testing, and trial excavation pits using a high powered excavator.

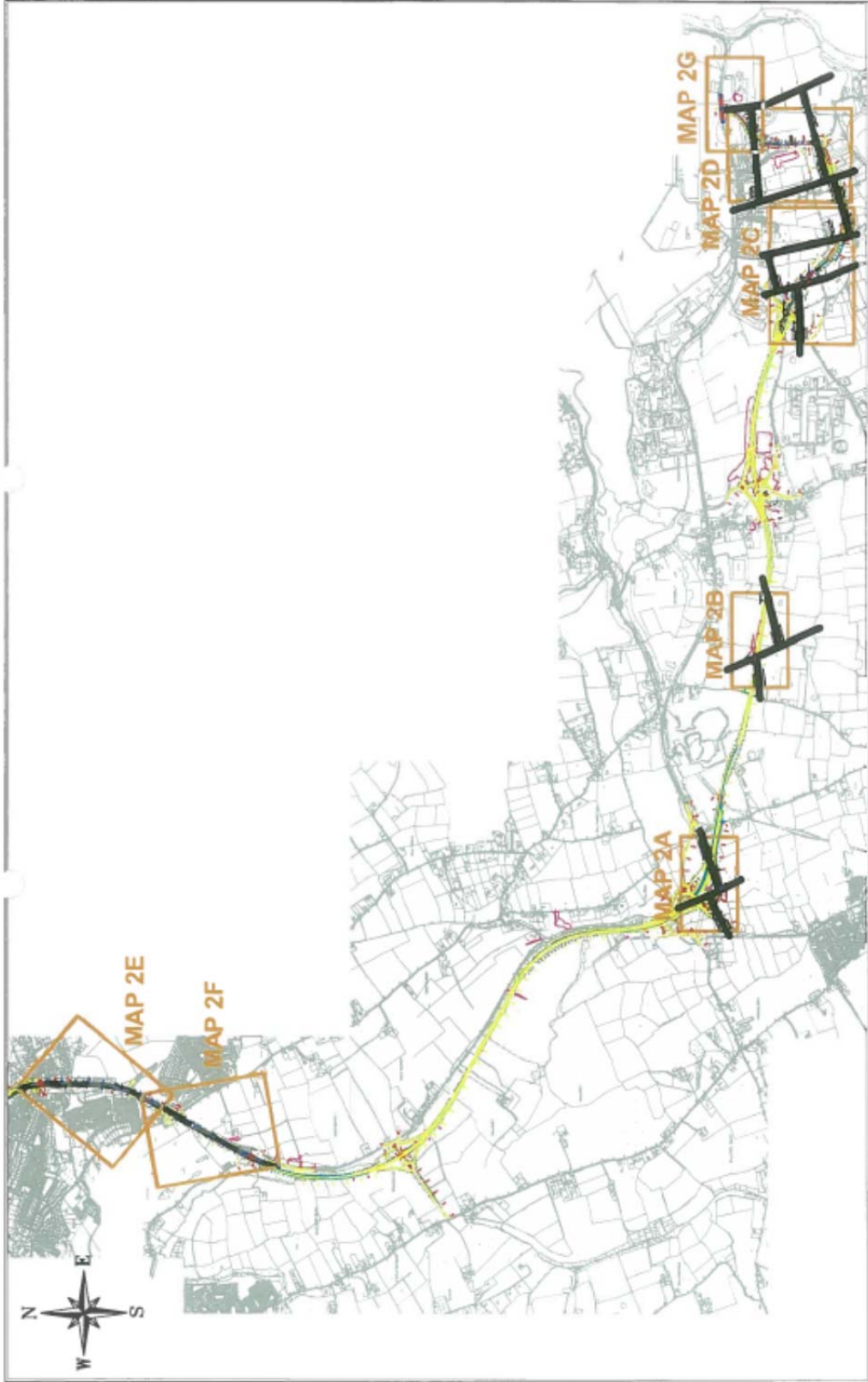
The geophysical interpretation should be reviewed based on the findings of any further direct investigation.

4. REFERENCES

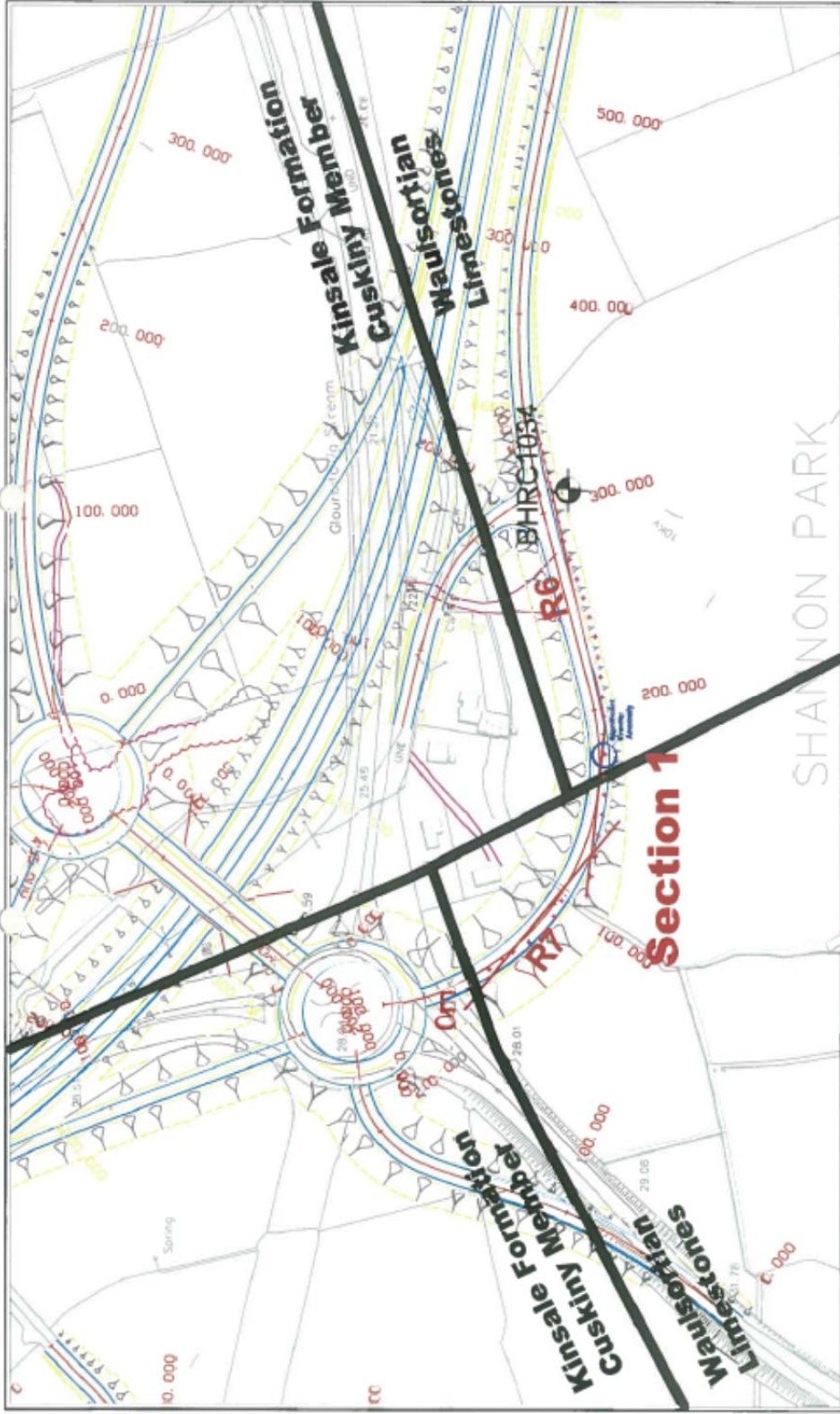
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MAPS





 APEX Geoservices Ltd. <small> Kildare County Co. Wick Co. Wick Tel: 353-402-21462 Fax: 353-402-21843 www.apexgeoservices.ie </small>	<p>Locations of Maps</p> 	Project: Bloomfield Geophysical Survey
		Drawing No.: Map 1 - Locations of Maps
		Date: December 2006
		Client: Cork County Council Scale: 1:25,000



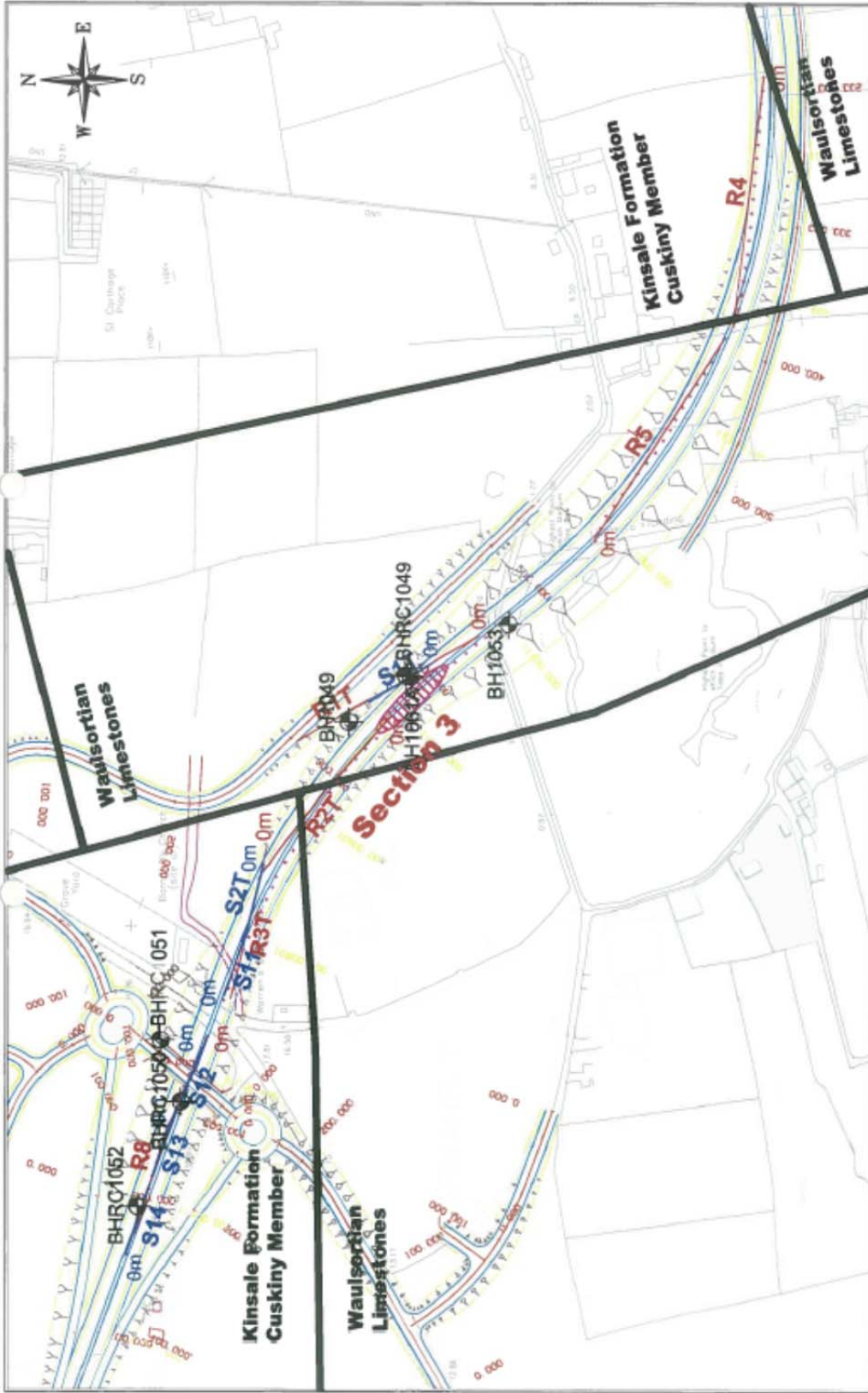
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APPROVAL TITLE:	Map 2A - Geophysical Survey Locations
DATE:	December 2006
CLIENT:	Cork County Council
SCALE:	1:2500

Section 1

— Resistivity Profile
 — Seismic Spread
 + Microgravity Survey Location
 + Conductivity Survey Location

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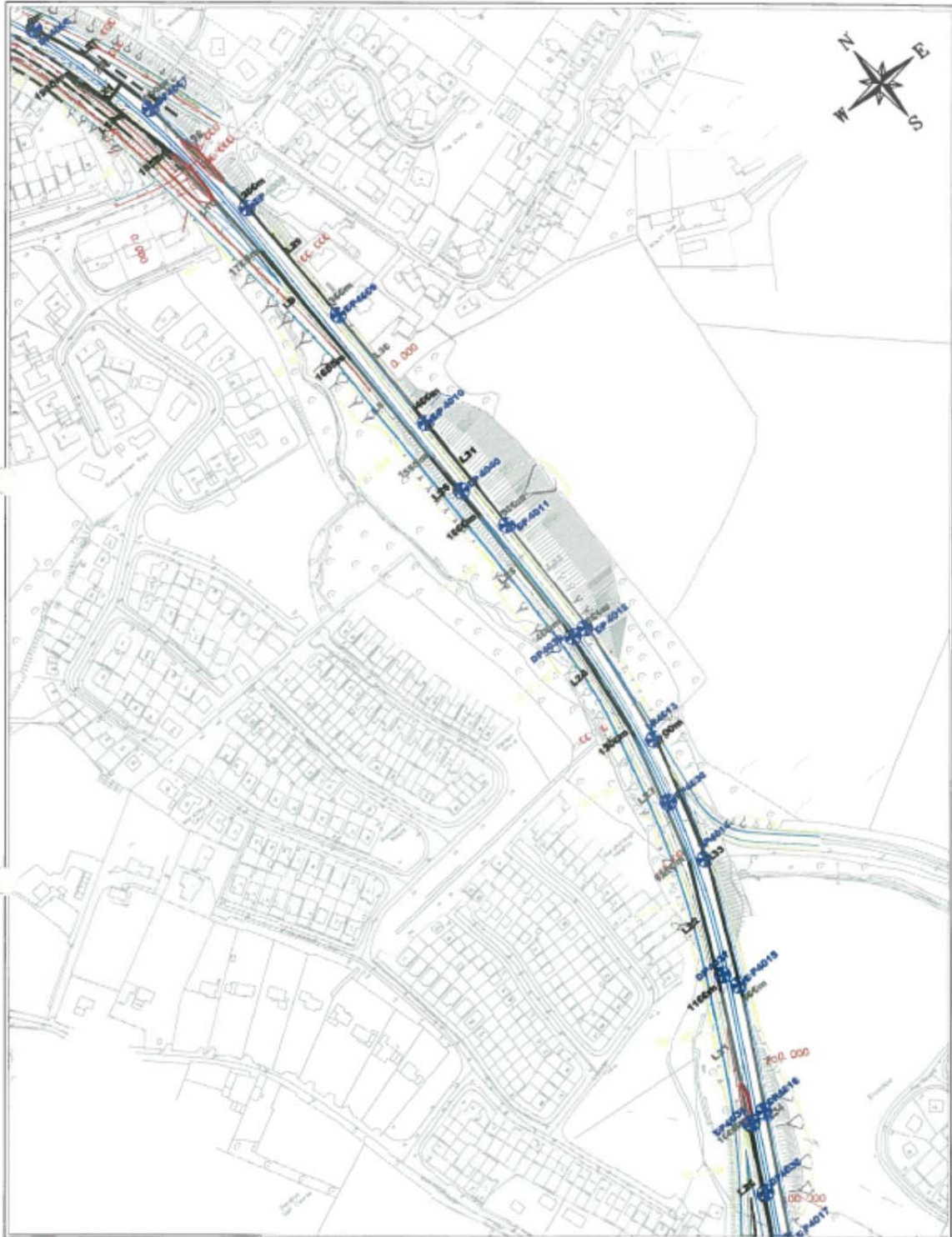
PROJECT:	Bloomfield Geophysical Survey
MAP TITLE:	Map 2C - Geophysical Survey Locations
DATE:	December 2006
CLIENT:	Cork County Council
SCALE:	1:2500

Legend

- Resistivity Profiles (colored lines)
- Seismic Screen (dashed line)
- Monitoring Survey Location (red cross)
- Conductivity Survey Location (red circle)
- Zone of Possible Karstic Weathering (pink shaded area)

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-  GPR Profile
-  Pavement Core
-  Bridge/Overpass

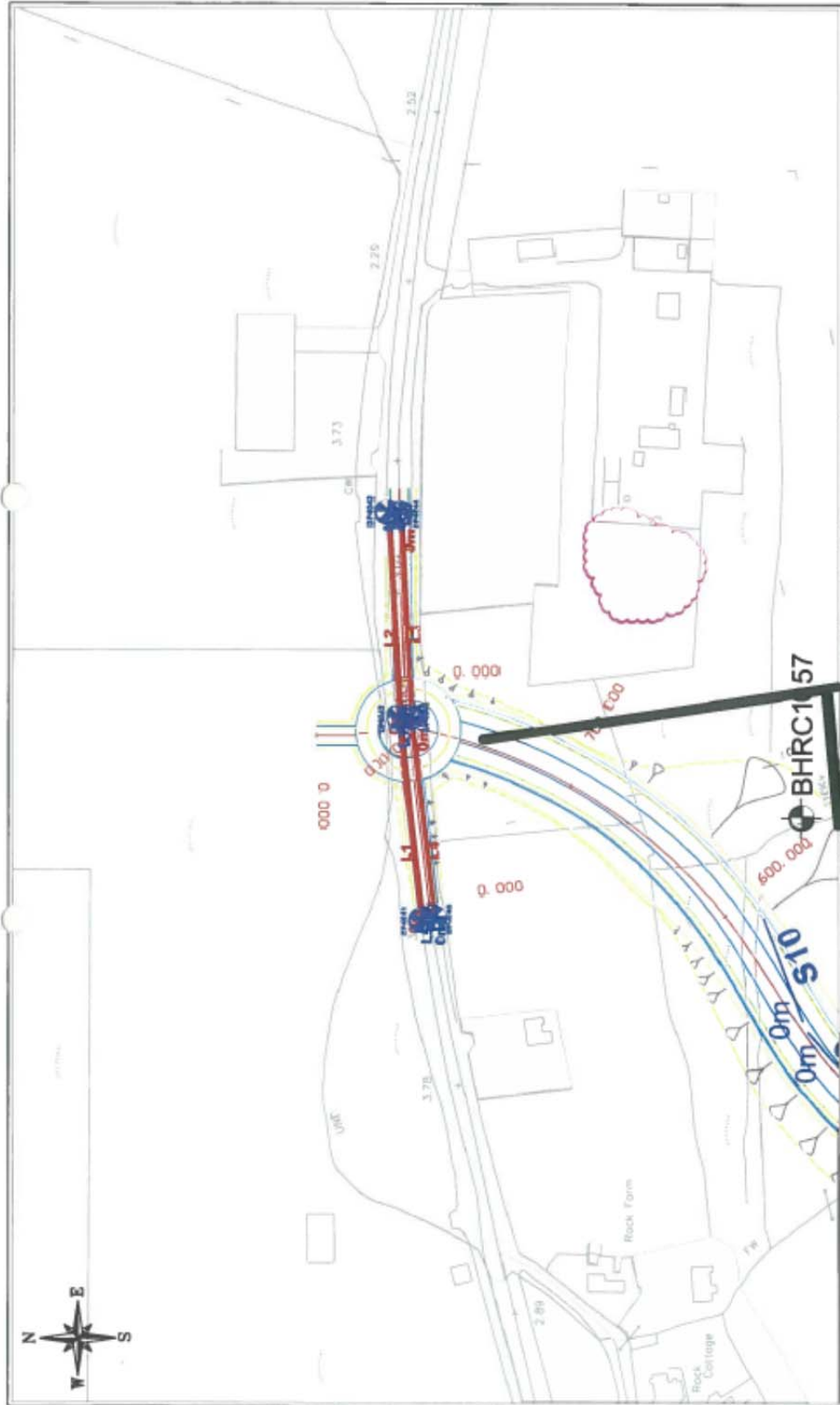
PROJECT	Bloomfield Geophysical Survey
MAP SHEET	Map 2E - Geophysical Survey Locations
DATE	December 2006
CLIENT	Cork County Council
SCALE	1:2500



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— GPR Profile
 Pavement Core
 Bridge/Overpass

PROJECT	Bloomfield Geophysical Survey
DATE	December 2006
CLIENT	Cork County Council
SCALE	1:2500



PROJECT:	Bloomfield Geophysical Survey
DRAWING TITLE:	Map 2G - Geophysical Survey Locations
DATE:	December 2006
CLIENT:	Cork County Council
SCALE:	1:2500

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GPR Profile

 Pavement Core

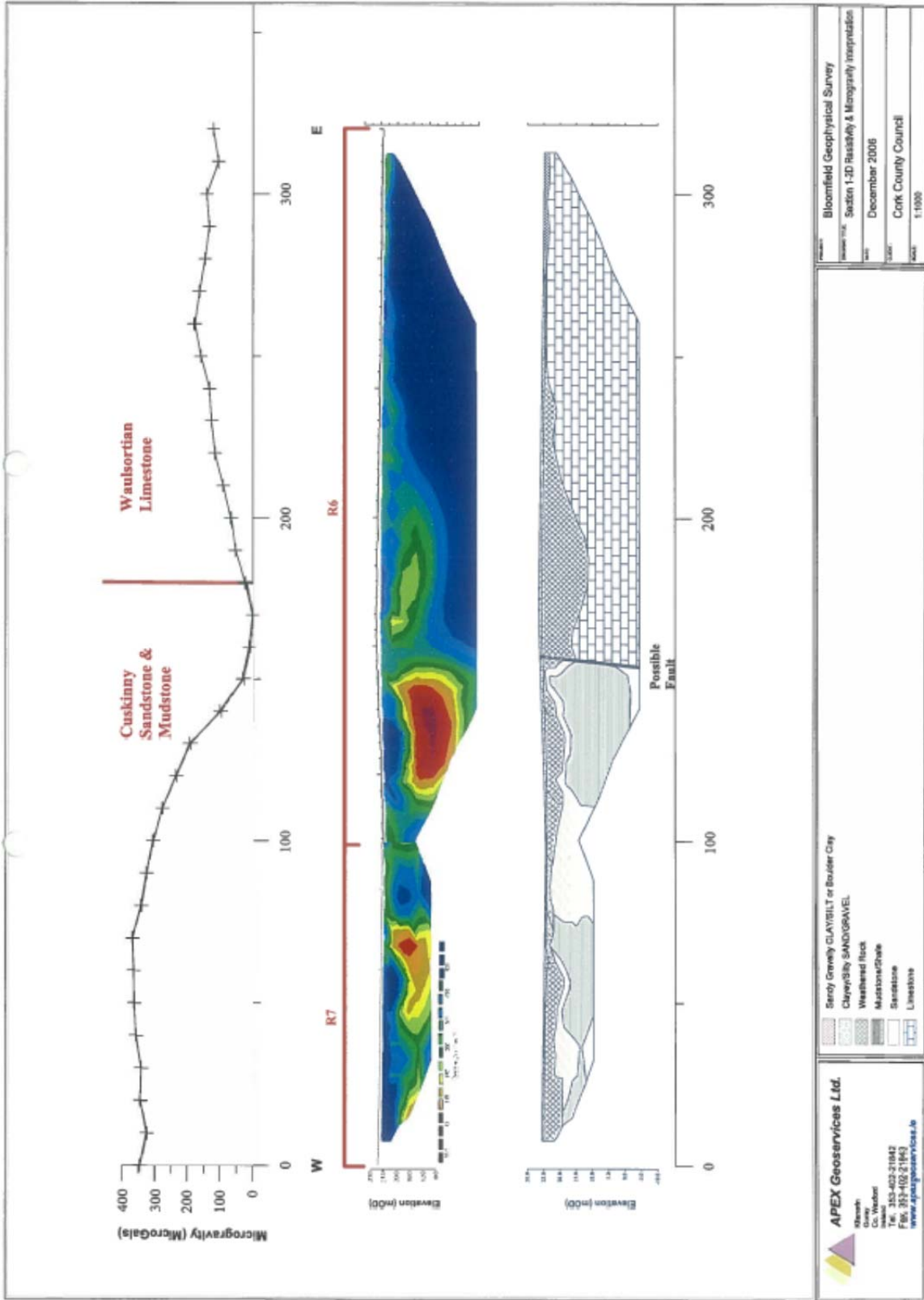
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INTERPRETED SECTIONS

C

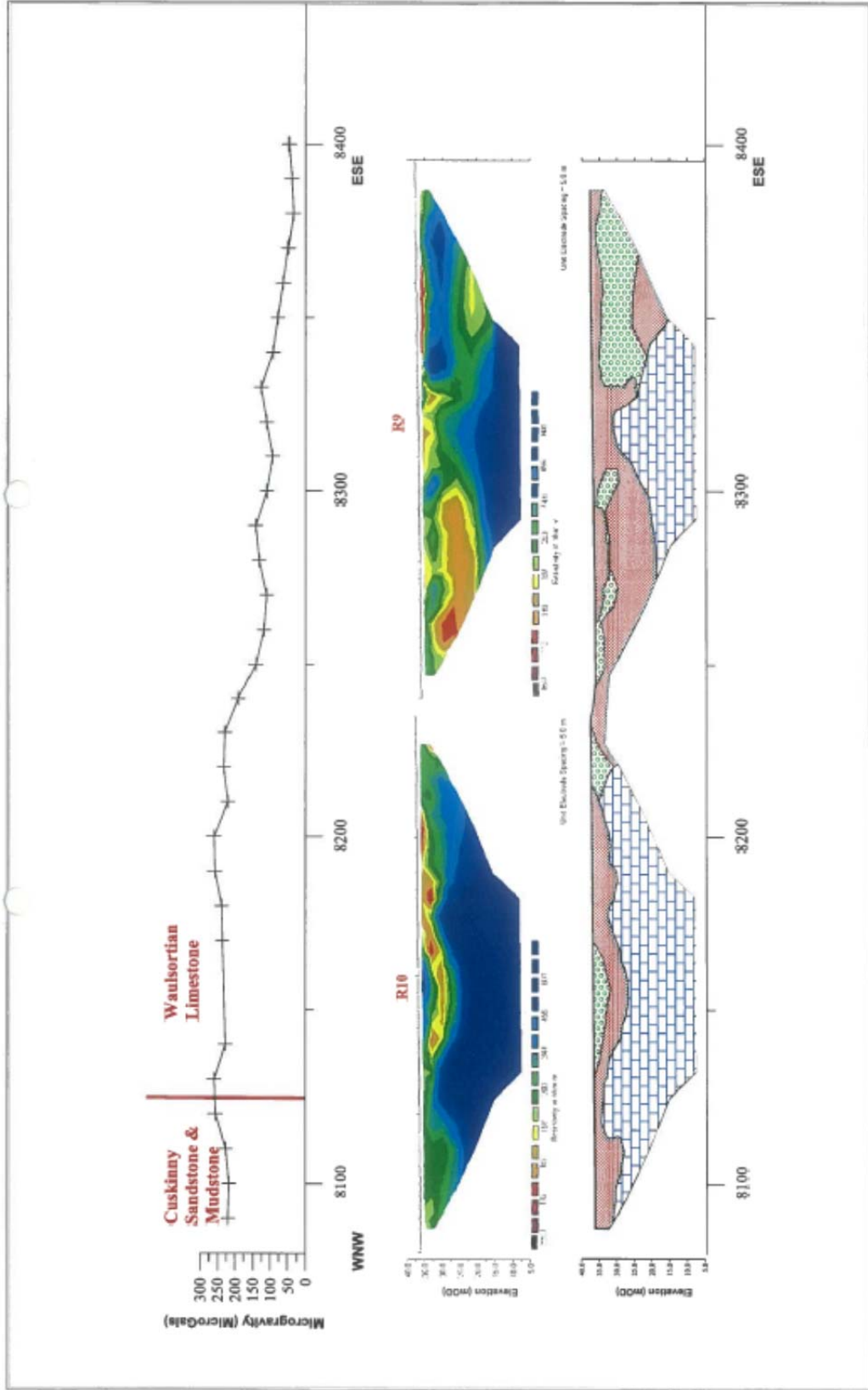
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Project: Bloomfield Geophysical Survey
 Section 1-D Resistivity & Microgravity Interpretation
 Date: December 2008
 Client: Cork County Council
 Scale: 1:1000

- Sandy Gravelly Clay/Silt or Boulder Clay
- Clayey/Silty Sand/Gravel
- Weathered Rock
- Mudstone/Shale
- Sandstone
- Limestone

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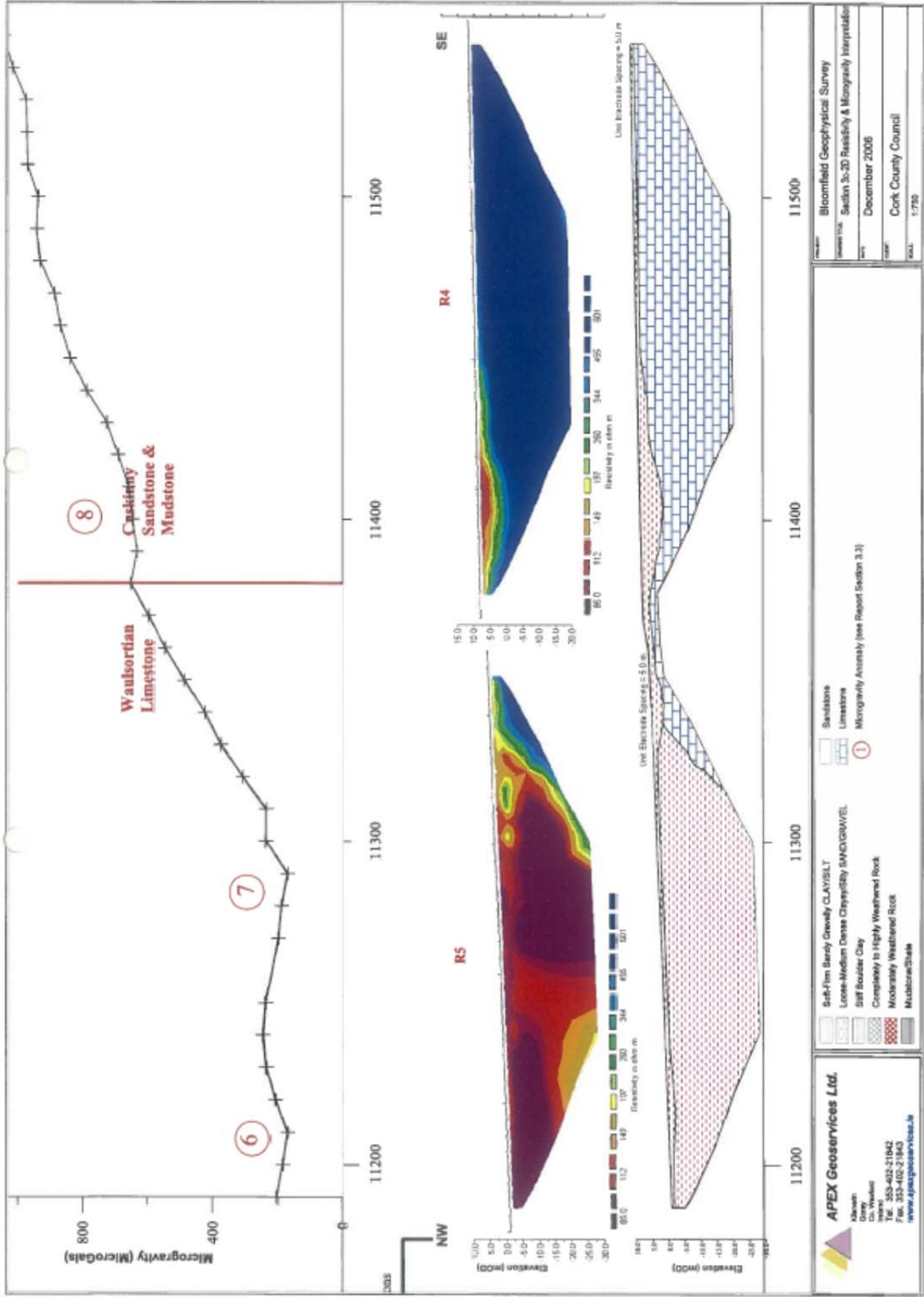


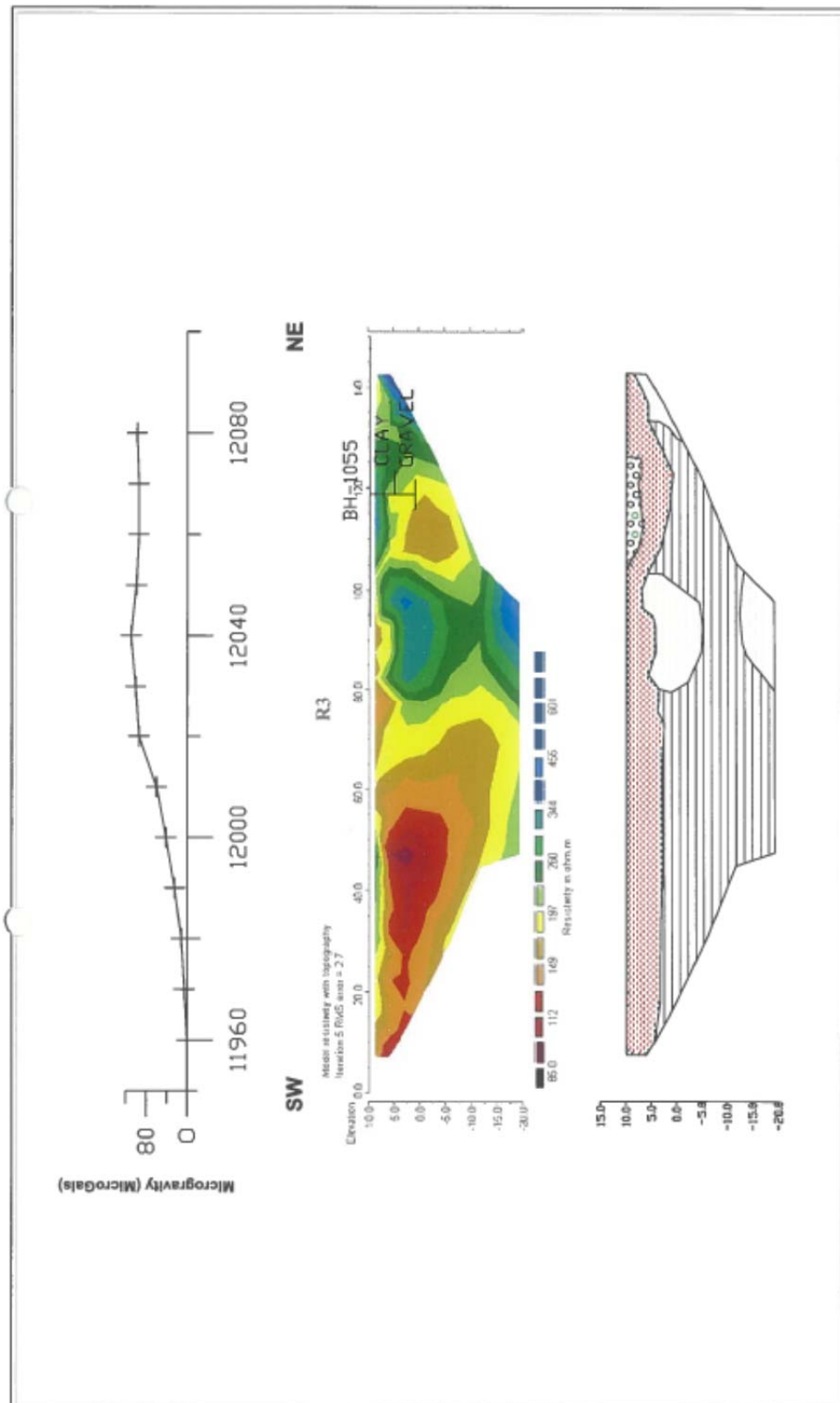
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Sandy Gravely CLAY/SILT or Boulder Clay
Clay/Silty SAND/GRAVEL
Weathered Rock
Mudstone/Shale
Sandstone
Limestone

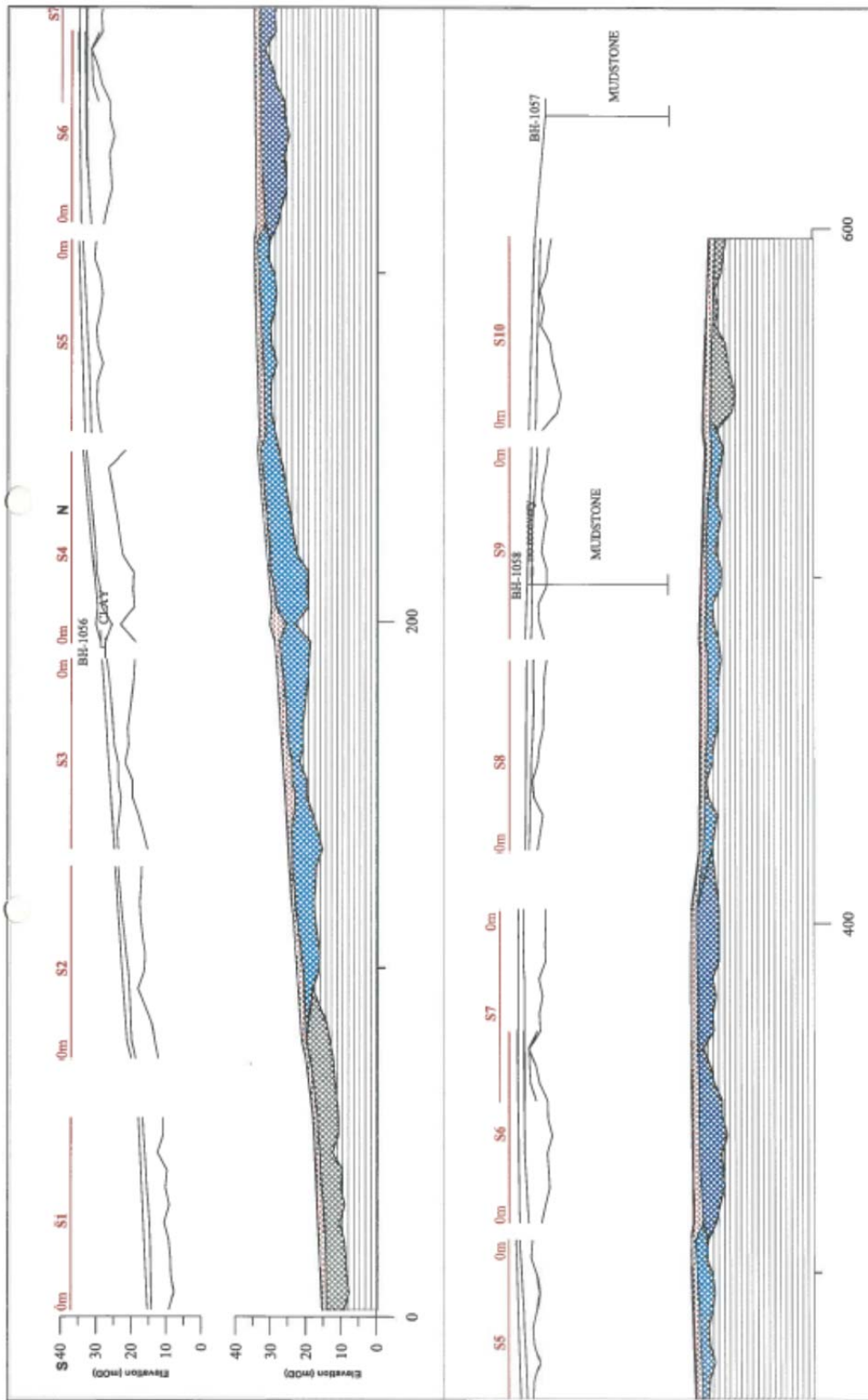
Bloomfield Geophysical Survey
Project No.: Section 2-D Resistivity & Microgravity Interpretation
Date: December 2006
Client: Cork County Council
Scale: 1:1000





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	<p>DRAWING TITLE: Section 4-2D Resistivity & Microgravity Interpretation</p>
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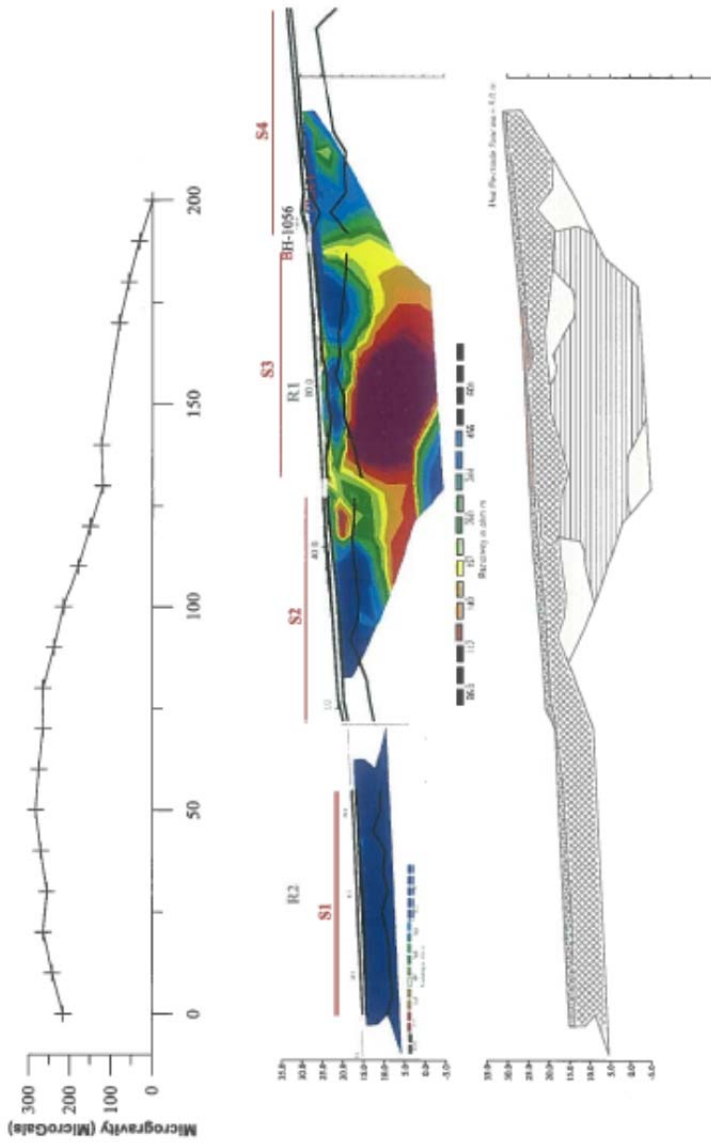
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	Clayey/Silty SAND/GRAVEL
	Weathered Rock
	Mudstone/Shale
	Sandstone
	Limestone



Project: Bloomfield Geophysical Survey
 Section: Section 5-Seismic Interpretation
 Date: December 2006
 Client: Priority/Cork County Council
 Scale: 1:1000

[Pattern] Fine-Stiff/Medium Dense-Dense Overburden
 [Pattern] Highly-Moderately Weathered Rock
 [Pattern] Moderately-Slightly Weathered Rock
 [Pattern] Slightly Weathered Rock
 [Pattern] Slightly Weathered-Fresh Rock

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PROJECT:	Bloomfield Geophysical Survey
DATE:	Section 6-2D Resistivity & Microgravity Interpretation
DATE:	December 2006
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Sandy Gravelly CLAYSILT or Boulder Clay Clayey/Silty SAND/GRAVEL Weathered Rock Mudstone/Shale Sandstone Limestone

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APPENDIX I GEOPHYSICAL METHODOLOGY

- | | |
|------------|------------------------------|
| M1. | Methods Used |
| 1.1 | Microgravity |
| 1.2 | 2D-Resistivity Profiling |
| 1.3 | Seismic Refraction Profiling |
| 1.4 | Ground Penetrating Radar |
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| 2.2 | 2D-Resistivity Profiling |
| 2.3 | Seismic Refraction Profiling |
| 2.4 | Ground Penetrating Radar |
| M3. | Field Procedure |
| 3.1 | Microgravity |
| 3.2 | 2D-Resistivity Profiling |
| 3.3 | Seismic Refraction Profiling |
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| M4. | Data Processing |
| 4.1 | Microgravity |
| 4.2 | 2D-Resistivity Profiling |
| 4.3 | Seismic Refraction Profiling |
| 4.4 | Ground Penetrating Radar |

M1. Methods Used

1.1 Microgravity

This method involves the measurement of the Earth's Gravitational Field at fixed survey locations along the earth's surface. At each location the elevation and time of each reading is taken and accurately recorded. Corrections are then applied to the recorded data to eliminate effects of local and regional factors including; topography, elevation, tidal effects, latitude and density of the underlying material, which have varying influences on measured microgravity value. When these factors have been corrected in the data, the resulting variations in the recorded gravity readings will reflect any anomalous density variations in the underlying geology.

These density changes can be caused by features such as air, water or sediment filled cavities, or variations in the nature of the subsurface material and bedrock or in the bedrock topography.

1.2 2D-Resistivity Profiling

This surveying technique also makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. The 2D-resistivity profiling method involves the use of up to 62 electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

1.3 Seismic Refraction Profiling

This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

1.4 Ground Penetrating Radar

Ground Probing Radar (GPR) involves the measurement of the amplitude versus travelttime (Two-Way-Time in Nanoseconds [ns]) of a high frequency pulse of electromagnetic energy from the ground surface to a subsurface layer or body and back. These pulses are transmitted with a high repetition rate as the antenna is towed along the ground and the reflected pulses build up a picture of the subsurface structure. Partial reflections of the electromagnetic pulse occur at the boundaries of materials with different geoelectric properties. .

To convert the measured Two-Way-Time into a depth an electromagnetic velocity has to be estimated for the material below a surveyed profile, and the following formula is used:

$$\text{Depth [m]} = \text{Velocity [cm/ns]} * \text{Two-Way-Time [ns]} * 0.005$$

The penetration of the GPR signal depends on the nature of the sub-surface material. Clay-rich and water saturated soils have a lower penetration than gravelly and dry soils. Signal penetration and resolution limits are also governed by the centre frequency of the transmitted electromagnetic pulse. High frequencies give good resolution and shallow penetration. Lower frequencies give lower resolution and deeper penetration.

M2. Equipment Used

2.1 Microgravity

The survey was carried out using a Scrintex CG-3 Gravity Meter. This meter is sensitive to small changes in gravity and single readings can be obtained with a precision of 1 microGal. The location and elevation of each microgravity survey station were recorded. A Sokkisha B2A Level with tripod and staff was used to record all station elevations. Vertical accuracy is of the order of +/- 10mm.

2.2 2D-Resistivity Profiling

The 2D Resistivity profiles were recorded using a Tigre resistivity meter, imaging software, two 32 takeout multicore cables and 64 stainless steel electrodes. The recorded data was processed and viewed immediately after the survey.

2.3 Seismic Refraction Profiling

The seismic spreads were recorded using a Ras-24 high resolution 24 channel digital seismograph with geophone spacings of 5m. The source of the seismic waves was a sledgehammer.

2.4 Ground Penetrating Radar

The radar survey was carried out using a GSSI SIR-2000, with a 1.5GHz antenna with built-in odometer.

M3. Field Procedure

3.1 Microgravity

Microgravity readings were recorded at 10m intervals. Two successive 1 min readings were taken. Where the difference between successive readings was greater than 10 microGal a third reading was taken. A base station was located in the survey grid with base station readings recorded at the start and end of the survey to correct for instrument and tidal drift. At each survey location notes were taken of the times, coordinates and instrument readings. Functional checks were carried out to check the meter was operating correctly.

3.2 2D-Resistivity Profiling

Three profiles were recorded on the 29th August 2006 and 10 profiles were recorded between the 28th November and the 1st December 2006. The 2D-Resistivity profiles consisted of up to 32 electrodes at 5m spacings. Resistances were measured for expanding arrays. 2 cycles were recorded to 3% repeatability. Saline solution was added around electrodes in areas of high contact resistance. Local conditions and variations were recorded. QC inversion of each profile was carried out before removal of electrodes.

3.3 Seismic Refraction Profiling

Three seismic spreads were recorded on the 29th August and fourteen seismic spreads were recorded between the 28th November and the 1st December 2006. Each seismic spread consisted of 12 collinear geophones at a spacing of 5m. Records from up to five different positions were taken on each spread (2 x off-end, 2 x end, 1 x middle) to ensure optimum coverage of all refractors. Ongoing estimation of refractor velocities was carried out to monitor refractor type and depth.

3.4 Ground Penetrating Radar

The profiles were recorded in December 2006. The position of each profile was surveyed to give Irish National Grid Co-ordinates by a Trimble RTK 4700 system.

Notes were taken of any surface features that were likely to interfere with the recorded GPR signal. A total of 69 profiles were recorded – 27 were test profiles and 42 were recorded for interpretation. A recording time from 0 to 20 ns was used. The distance along each profile was recorded in the GPR record header by the odometer.

The data was recorded on the hard disk in the operating console and later transferred to a computer for processing and printing. Depth penetration was of the order of 1.5 m bgl.

M4. Data Processing

4.1 Microgravity

A number of corrections were made to the recorded microgravity data in order to obtain the Bouguer Gravity, as follows:

1. gravity reading corrected for drift
2. addition of the free air correction = $308.6 * (\text{Elevation at Station} - \text{Elevation at Base})$
3. subtraction of the latitude correction = $0.8108 * \sin(2 * \text{latitude}) * (\text{Northing at Station} - \text{Northing at Base})$
4. subtraction of the Bouguer correction = $41.92 * 2.67 * (\text{Elevation at Station} - \text{Elevation at Base})$

No terrain corrections were applied. All corrections were calculated in microGals when distances and elevations were entered in metres.

4.2 2D-Resistivity Profiling

The field readings were stored in computer files and inverted using the RES2DINV package (Campus Geophysical Instruments, 1997) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-Depth model of the resistivities.

The inverted 2D-Resistivity models and corresponding interpreted geology are displayed on the Sections 1 to 6. The chainage is indicated along the horizontal axis of the profile and the depth below ground level is indicated on the vertical axis. All profiles have been contoured using the same contour intervals and colour codes.

It is important to note that the data displayed on the 2D-Resistivity profiles is real physical data however interpretation of the geophysical results is required to transform the resistivities directly into geological layers.

4.3 Seismic Refraction Profiling

First break picking in digital format was carried out using the FIRSTPIX software program to construct traveltimes plots for each spread. Velocity phases were selected from these plots using the GREMIX software program and were used to calculate the thickness of individual velocity units. Topographic data were input. Material types were assigned and estimation made of material properties, cross-referenced to the 2D Resistivity and borehole data. The processed seismic data and corresponding interpreted geology are displayed on Sections 3 and 5.

Approximate errors for velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

4.4 Ground Penetrating Radar

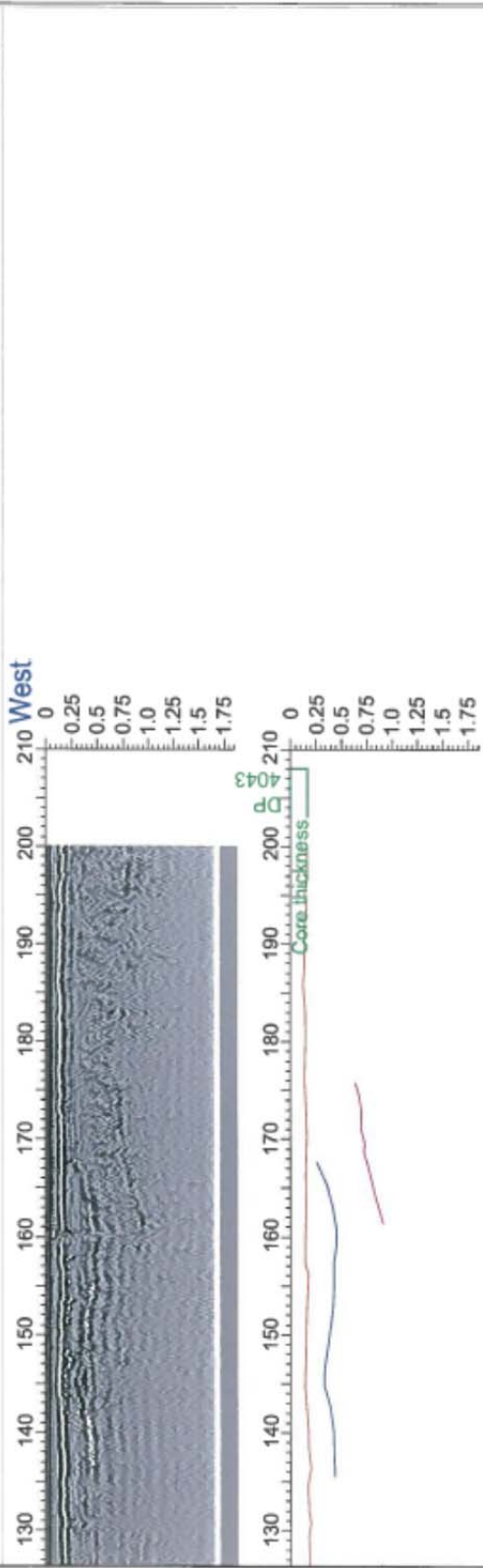
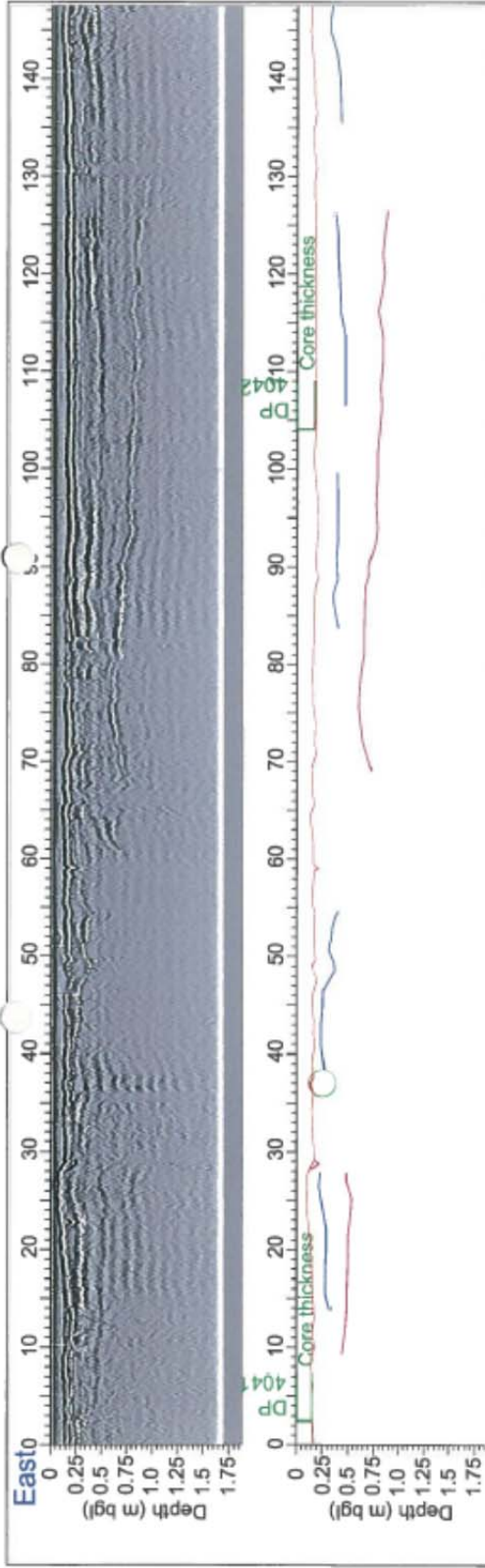
The recorded profiles were input into the RADAN software package. Each profile was adjusted to its correct length to account for odometer error and converted to depth using an asphalt velocity of 15 cm/ns. The depth and horizontal axes are graduated in metres. The interpreted asphalt thickness has been annotated on each plotted profile (Appendix II) and their locations are also shown on Maps 2e and 2f.

Note: The GPR anomalies were picked on-screen in the Autocad software packages. The on-screen resolution of the profiles is much greater than the resolution of the printed profiles.

APPENDIX II INTERPRETED GPR PROFILES

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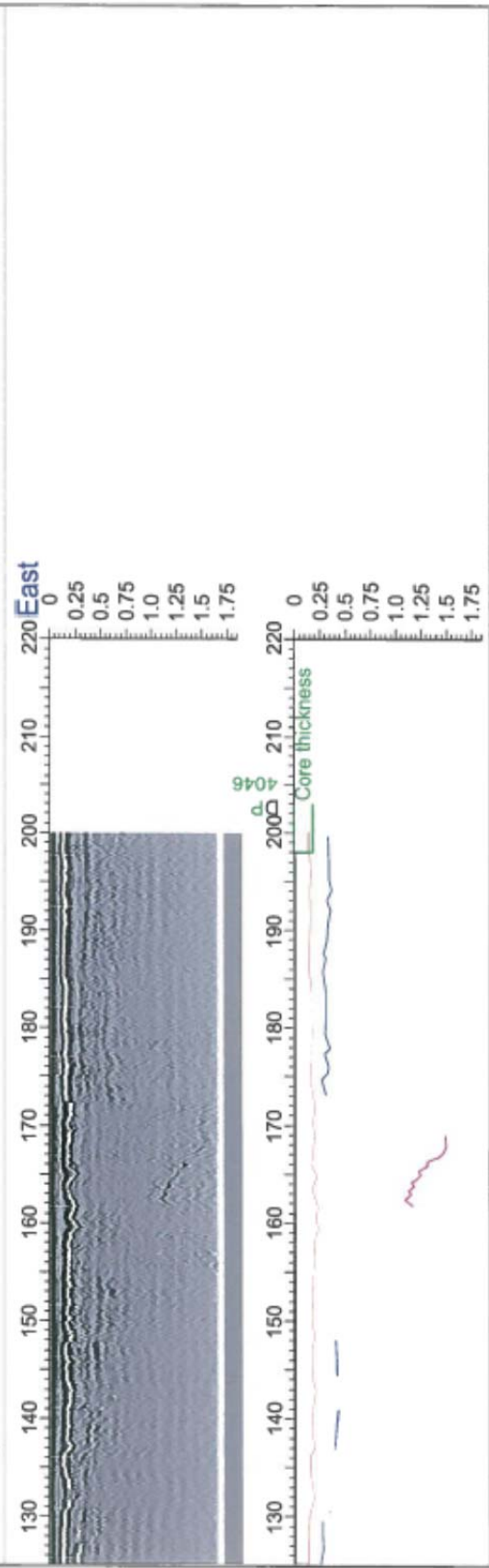
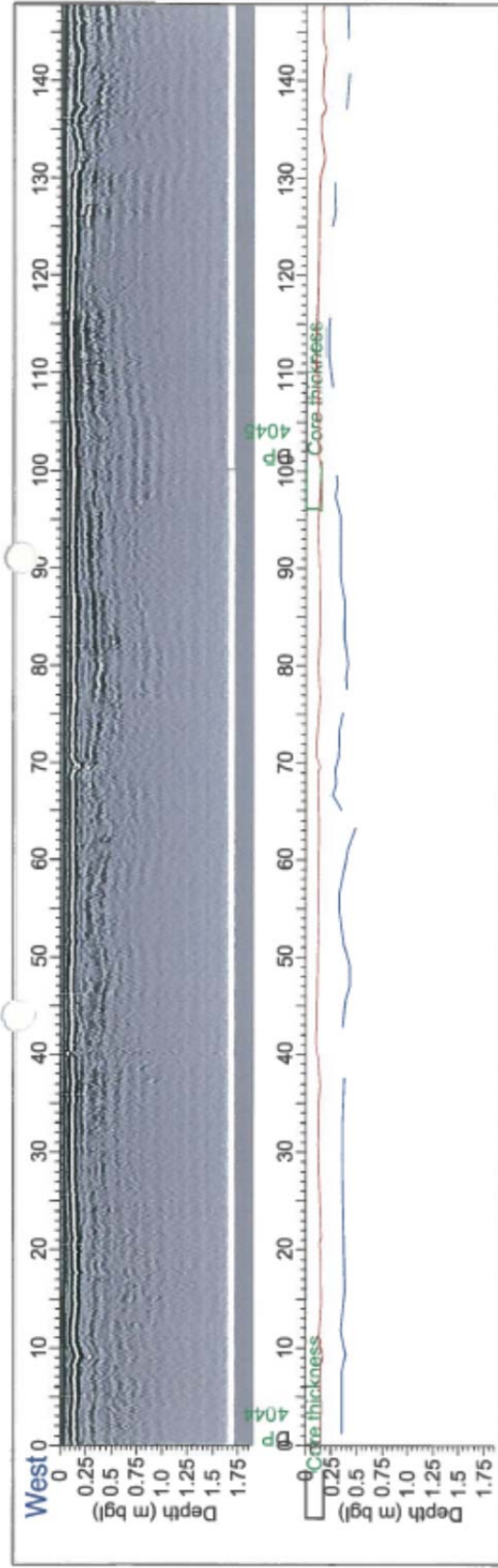
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- Surface Base
- Base of Hardcore
- Additional Layering
- Possible Services

Project: Bloomfield Geophysical Survey
 Survey Title: GPR Profiles 1 - 2
 Date: January 2007
 Client: Priority Geotechnical
 Scale: NSI 1:400, W/M 85

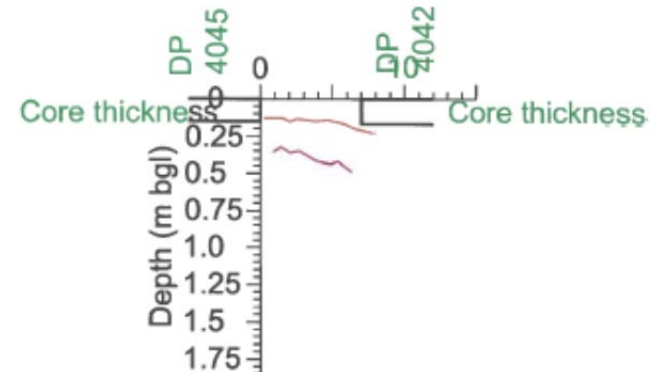
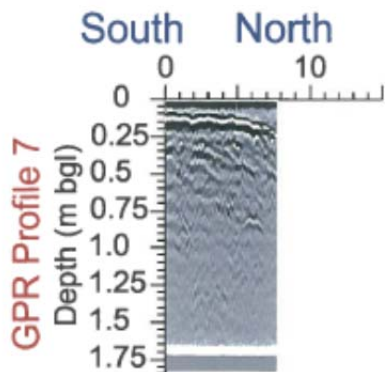
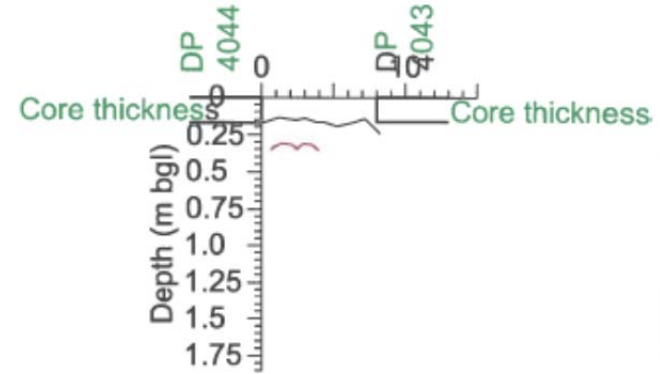
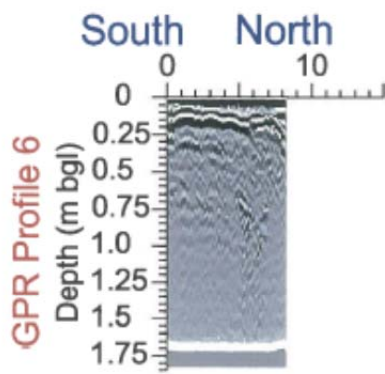
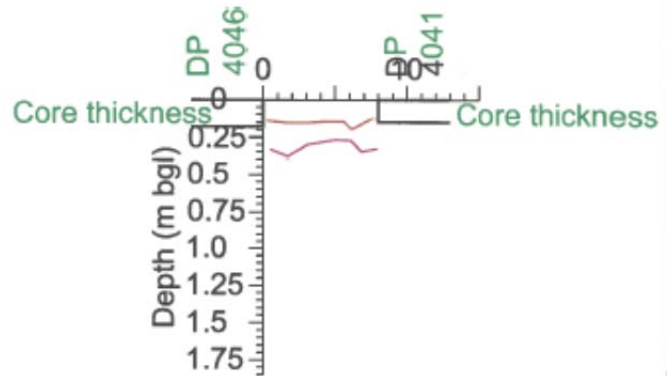
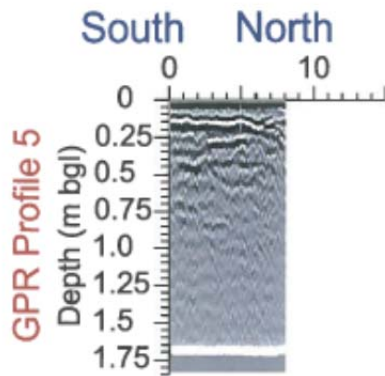




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Surface Base
Base of Hardcore
Additional Layering

Bloomfield Geophysical Survey
Project Title: GPR Profiles 3 - 4
Date: January 2007
Scale: Priority Geotechnical
Scale: 1:50.0, V6, NTS

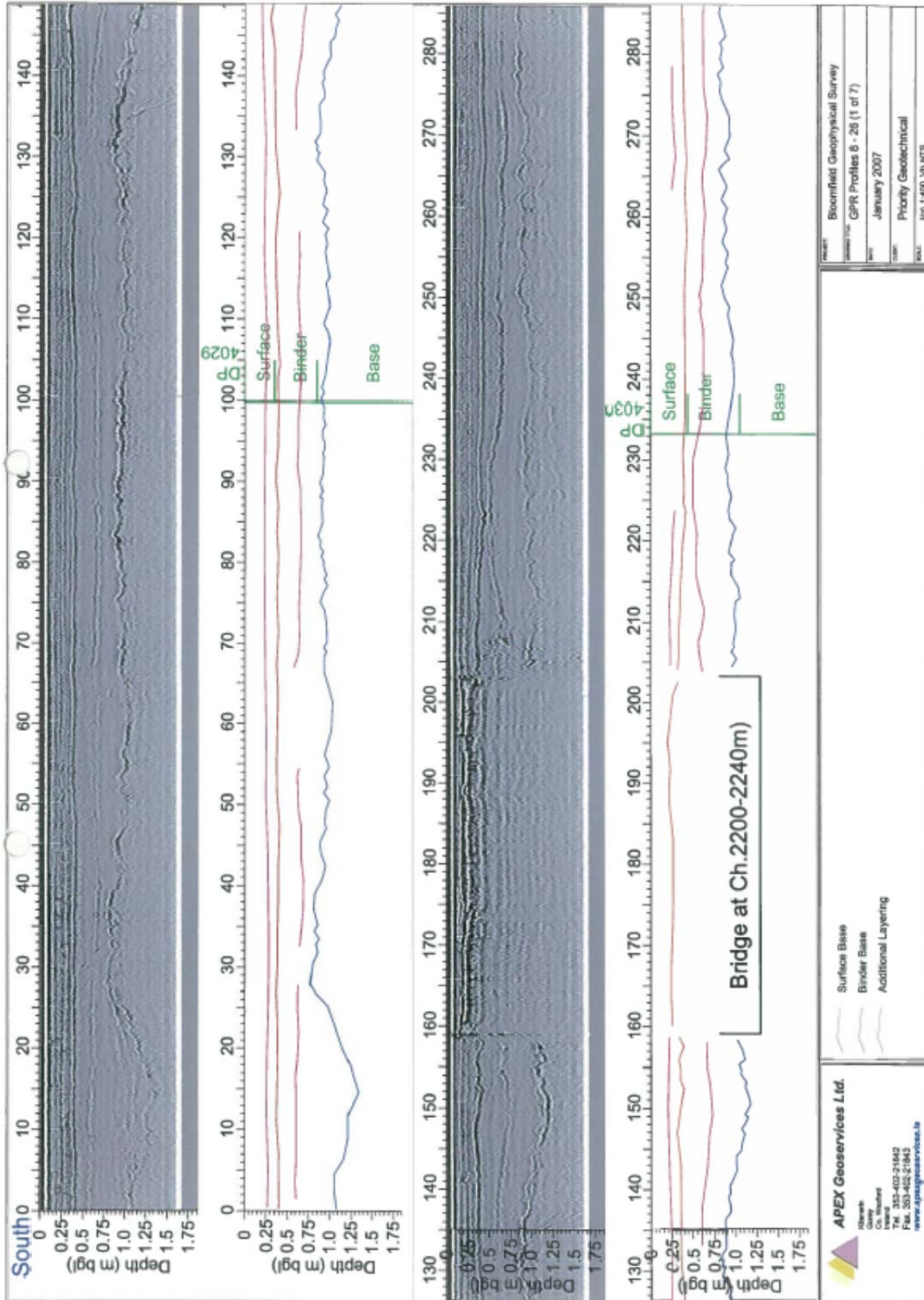


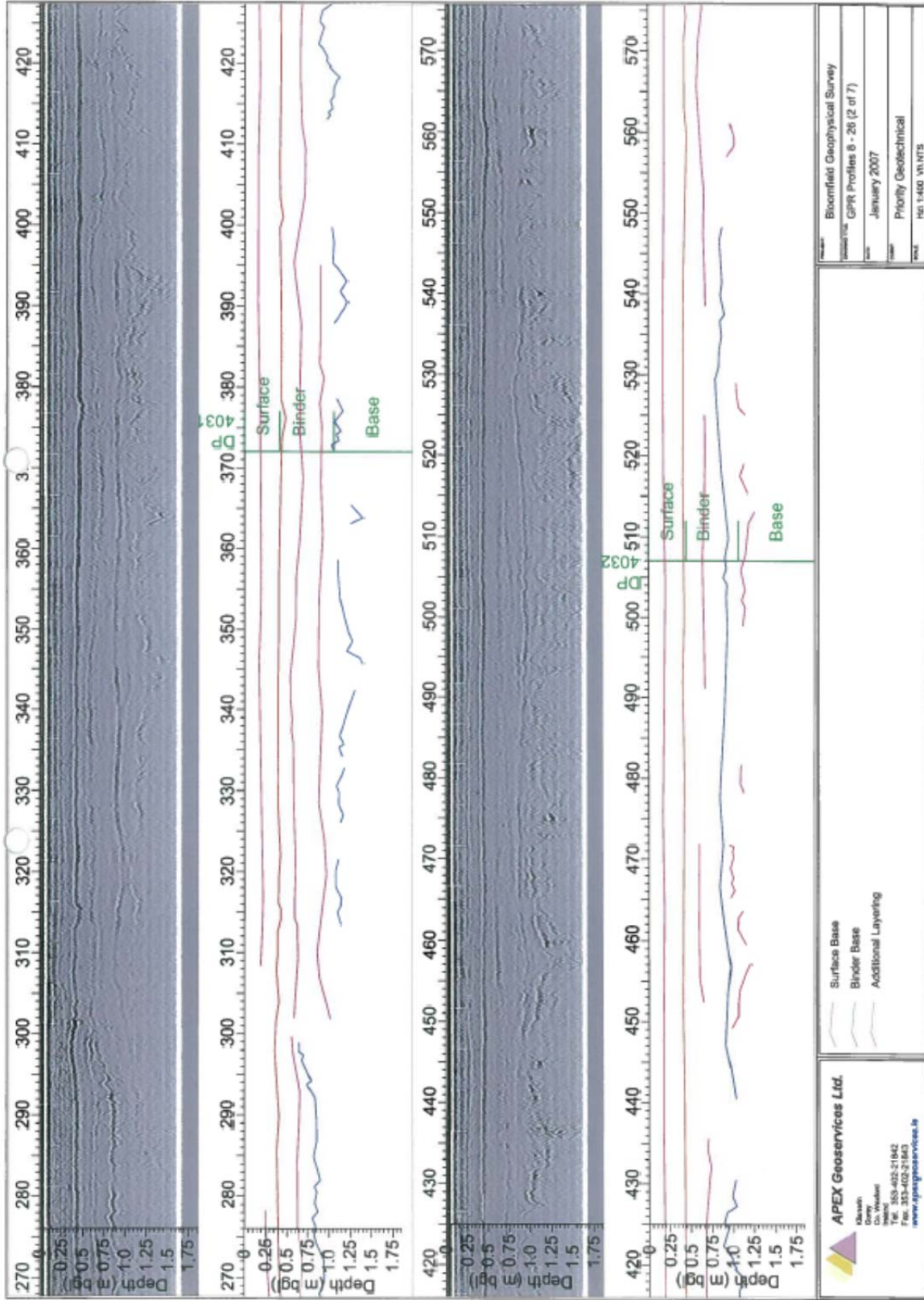
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- Surface Base
- Base of Hardcore
- Additional Layering

PROJECT:	Bloomfield Geophysical Survey
DRAWING TITLE:	GPR Profiles 5 & 6 & 7
DATE:	January 2007
CLIENT:	Priority Geotechnical
SCALE:	Hzl 1:400 Vtl NTS

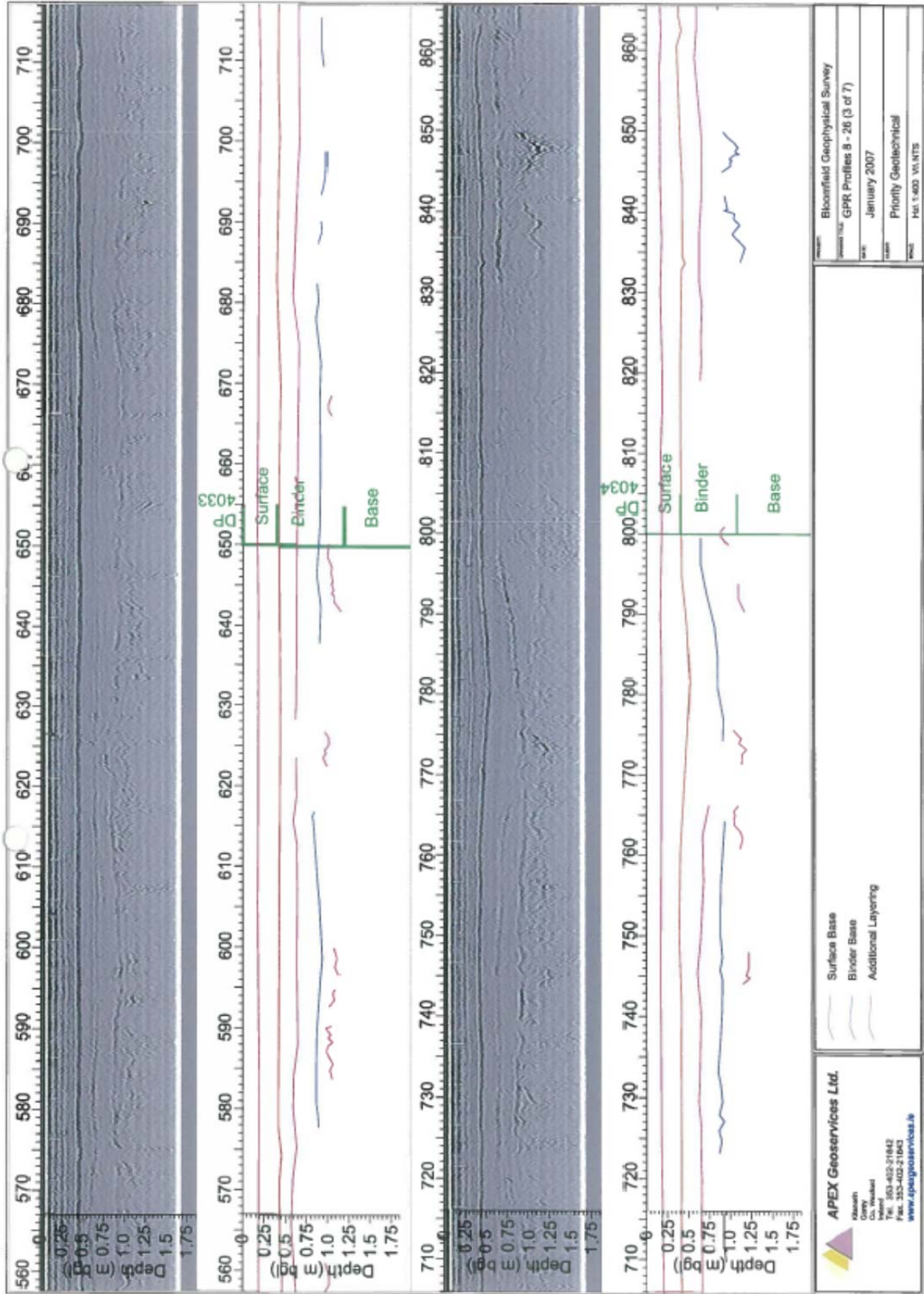


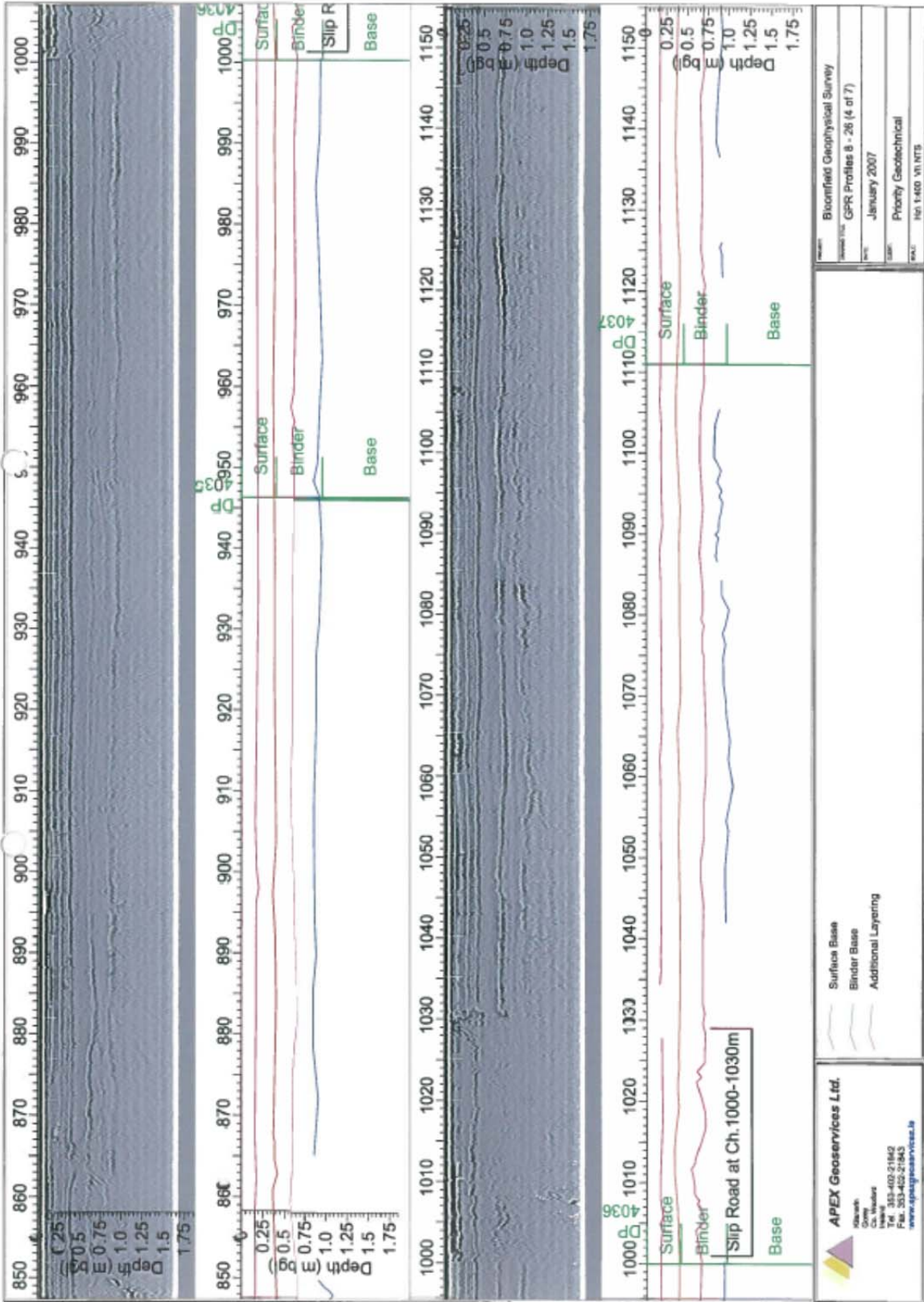


Project	Bloomfield Geophysical Survey
Profile No.	GPR Profiles B - 26 (2 of 7)
Date	January 2007
Client	Priority Geotechnical
Scale	FIG 1:400 VN NTS

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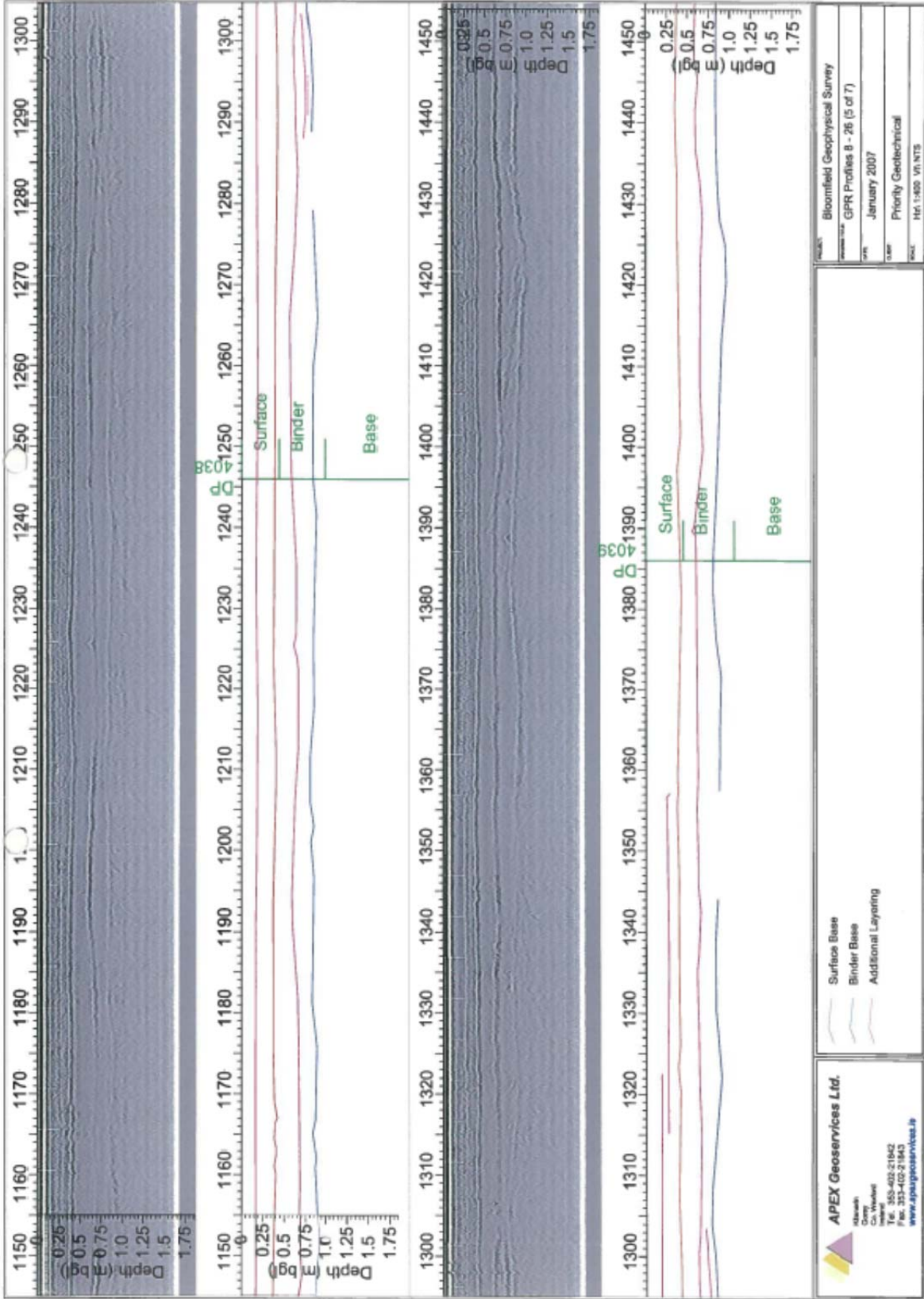




Bloomfield Geophysical Survey
 GPR Profile 8 - 26 (4 of 7)
 January 2007
 Priority Geotechnical
 No 1460 VI RTB

Surface Base
 Binder Base
 Additional Layering

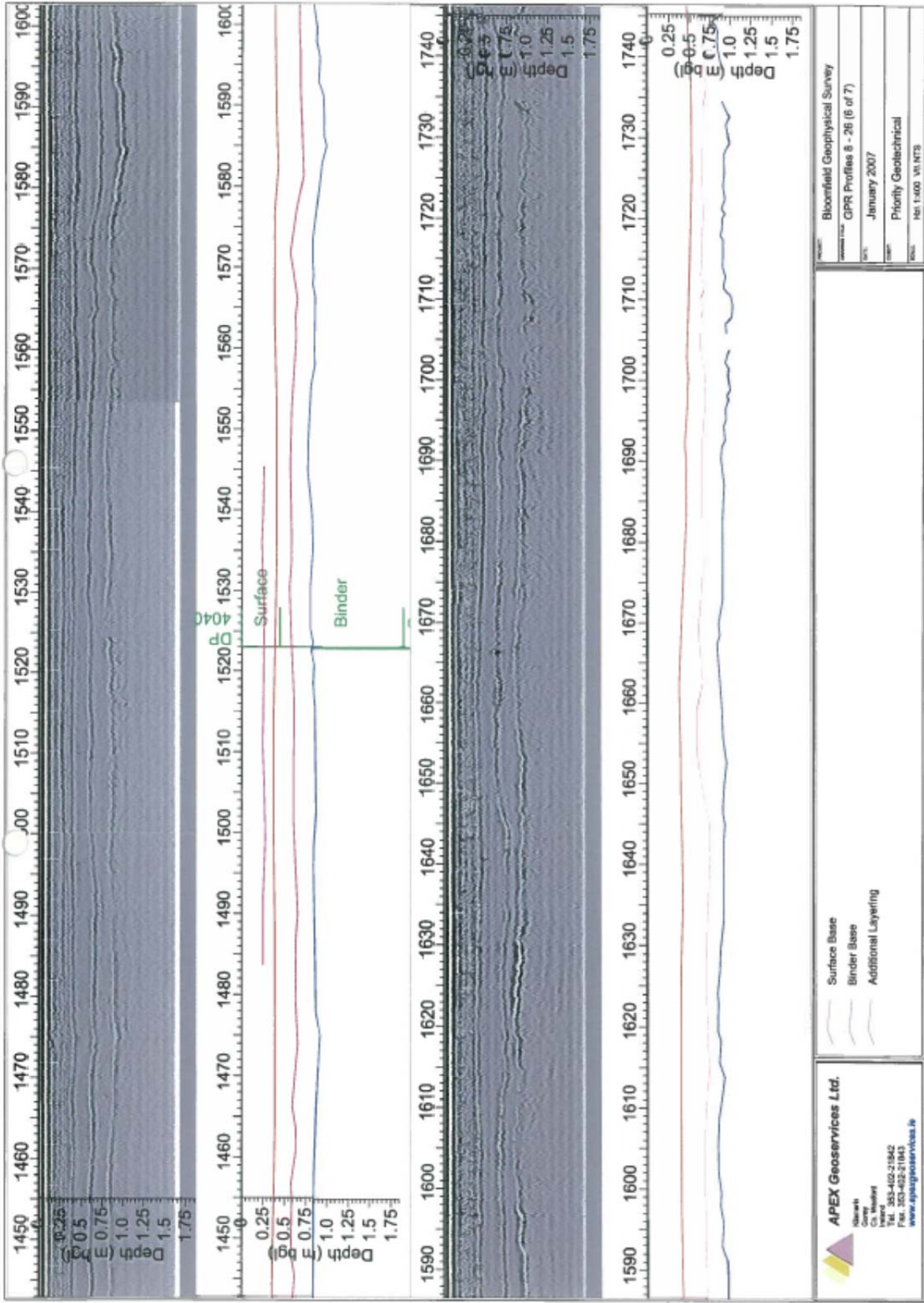
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BLOOMFIELD Geophysical Survey
 GPR Profiles 8 - 26 (5 of 7)
 Date: January 2007
 User: Priority Geotechnical
 Plot: Hdr: 1:400 V: 1 NTS

Surface Base
 Binder Base
 Additional Layering

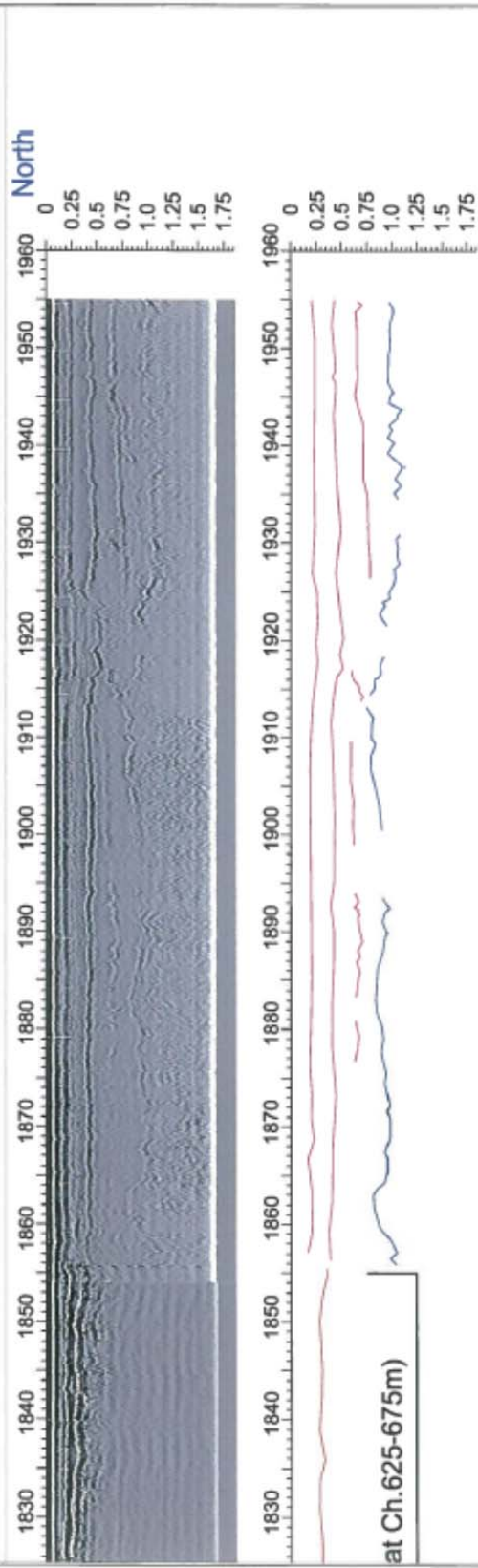
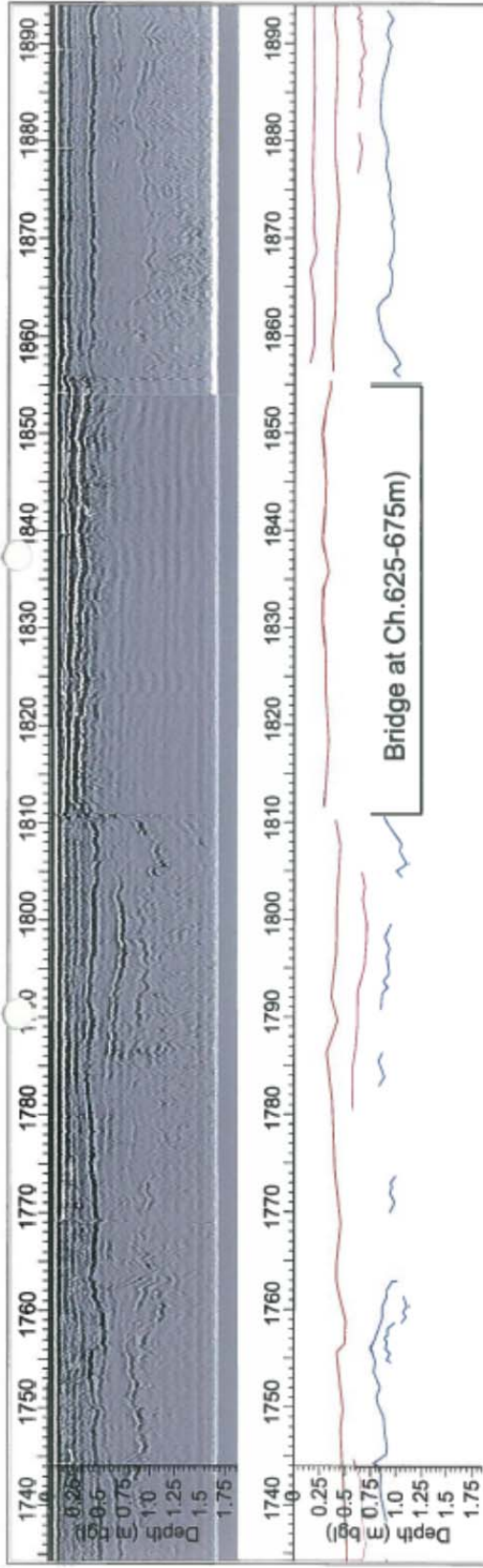
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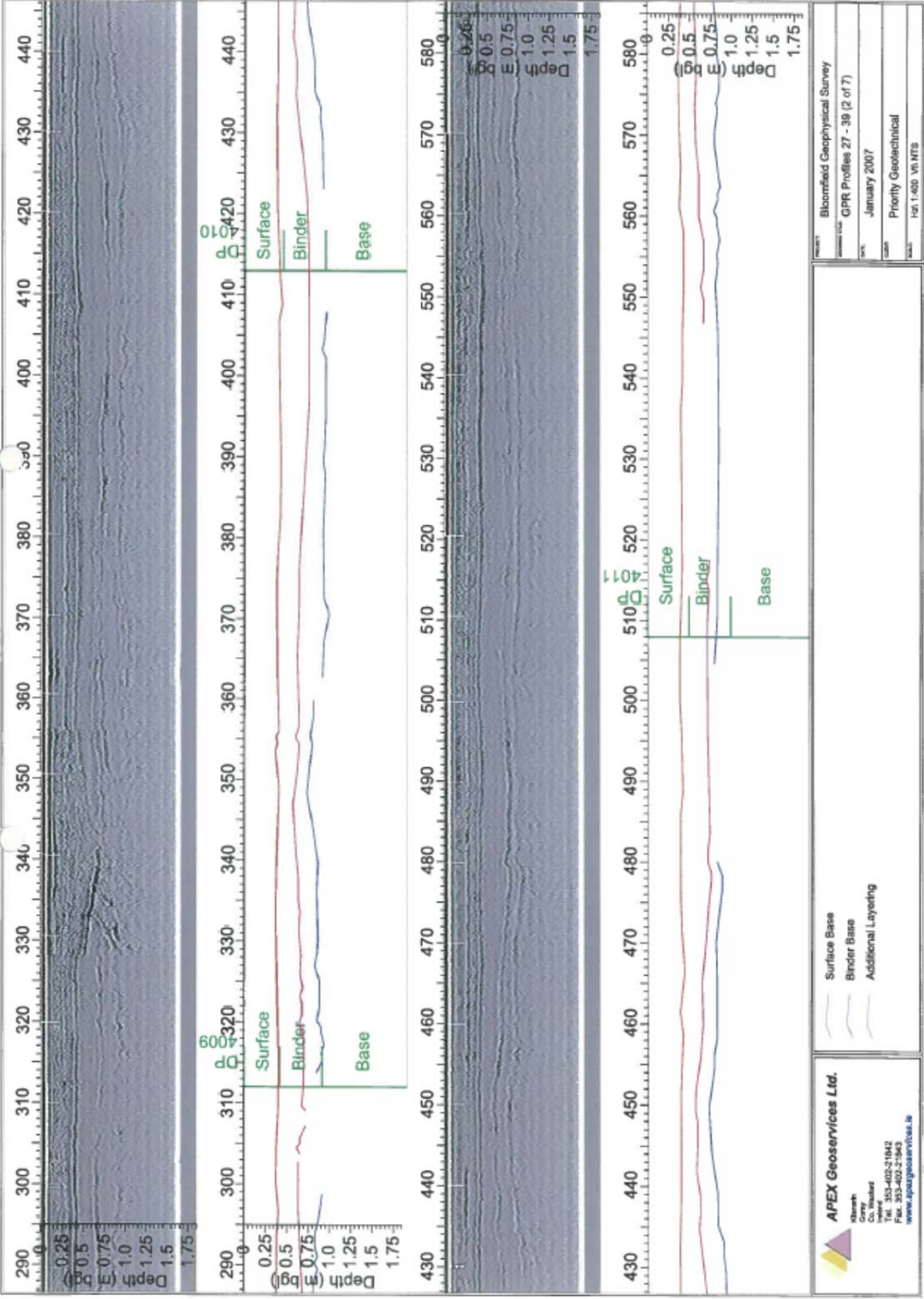
PROJECT	Bloomfield Geophysical Survey
DATE	GPR Profiles 6 - 26 (6 of 7)
DATE	January 2007
DATE	Priority Geotechnical
DATE	HS 1-600 VIRTIS

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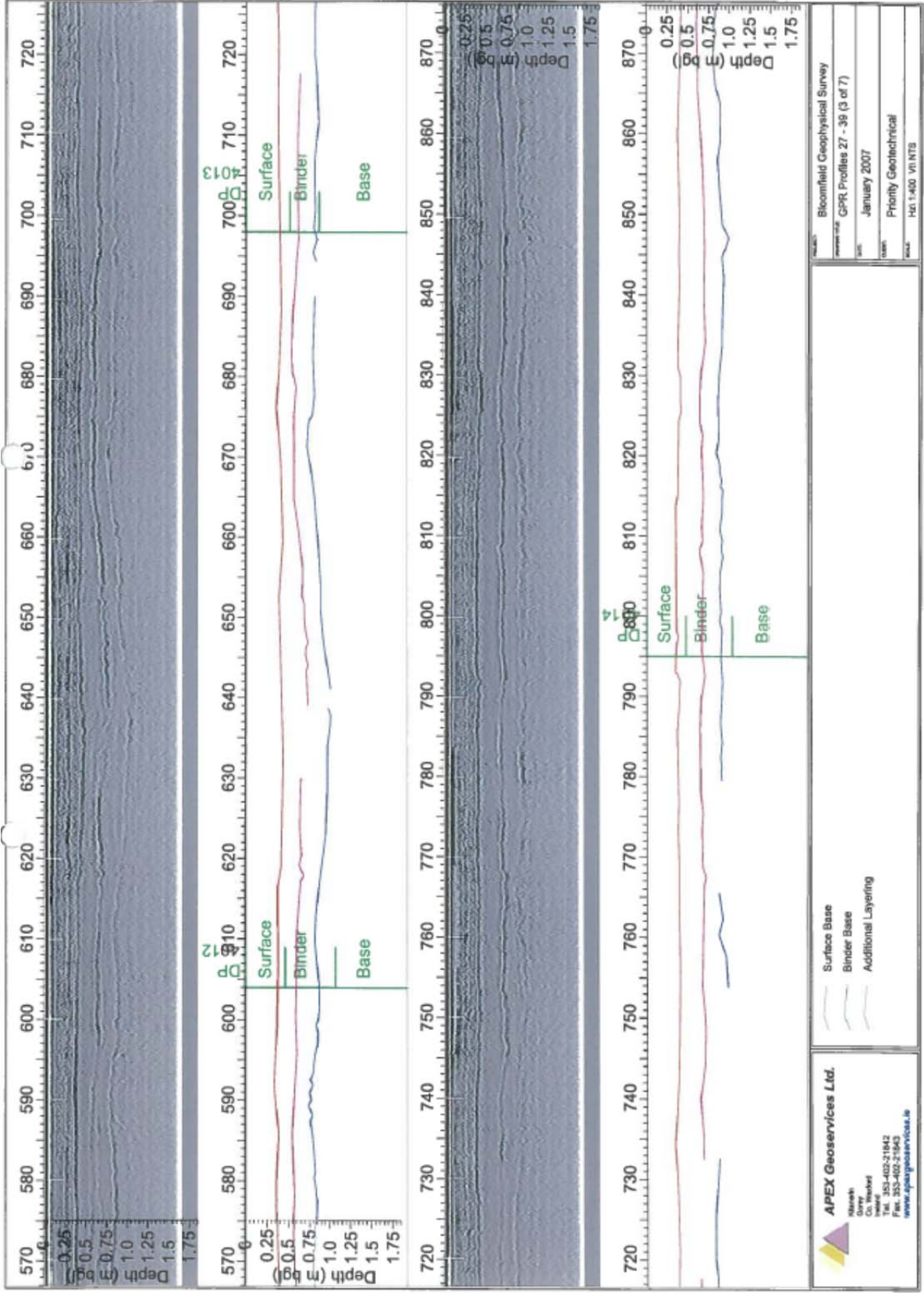
 APEX Geoservices Ltd. Group Company Tel. 353-402-21842 Fax. 353-402-21843 www.apexgeoservices.ie		Surface Base Binder Base Additional Layering
Bloomfield Geophysical Survey GPR Profiles 8 - 26 (7 of 7)		
Date: January 2007		
Client: Priority Geotechnical		
Scale: 1:500 Vh NTS		



Broomfield Geophysical Survey
 GPR Profiles 27 - 39 (2 of 7)
 Date: January 2007
 Client: Priority Geotechnical
 Ref: HG 1-600 VN NTS

Surface Base
 Binder Base
 Additional Layering

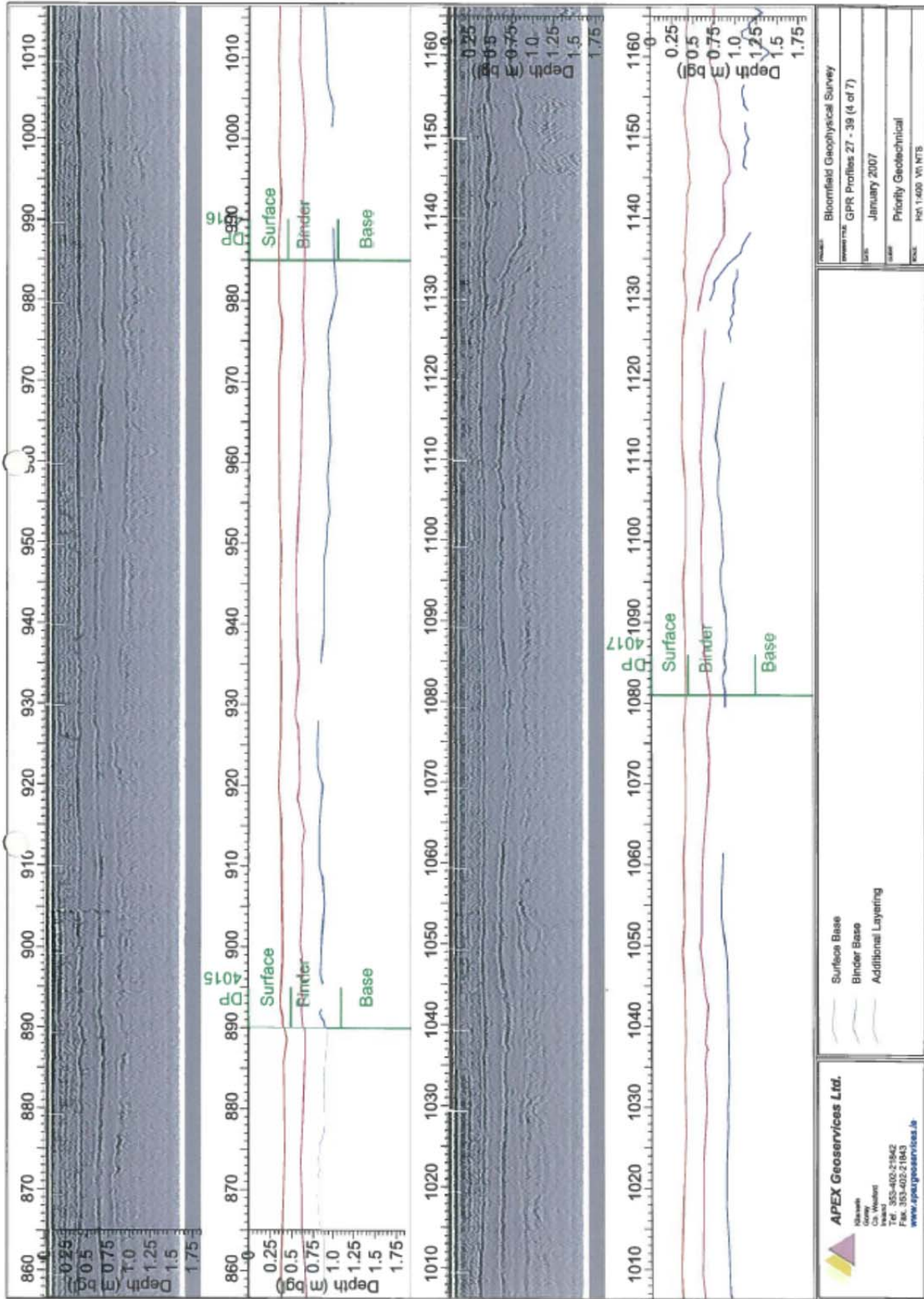
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Bloomfield Geophysical Survey
 GPR Profiles 27 - 38 (3 of 7)
 Date: January 2007
 Client: Priority Geotechnical
 Scale: H&V 1:400 V&H NTS



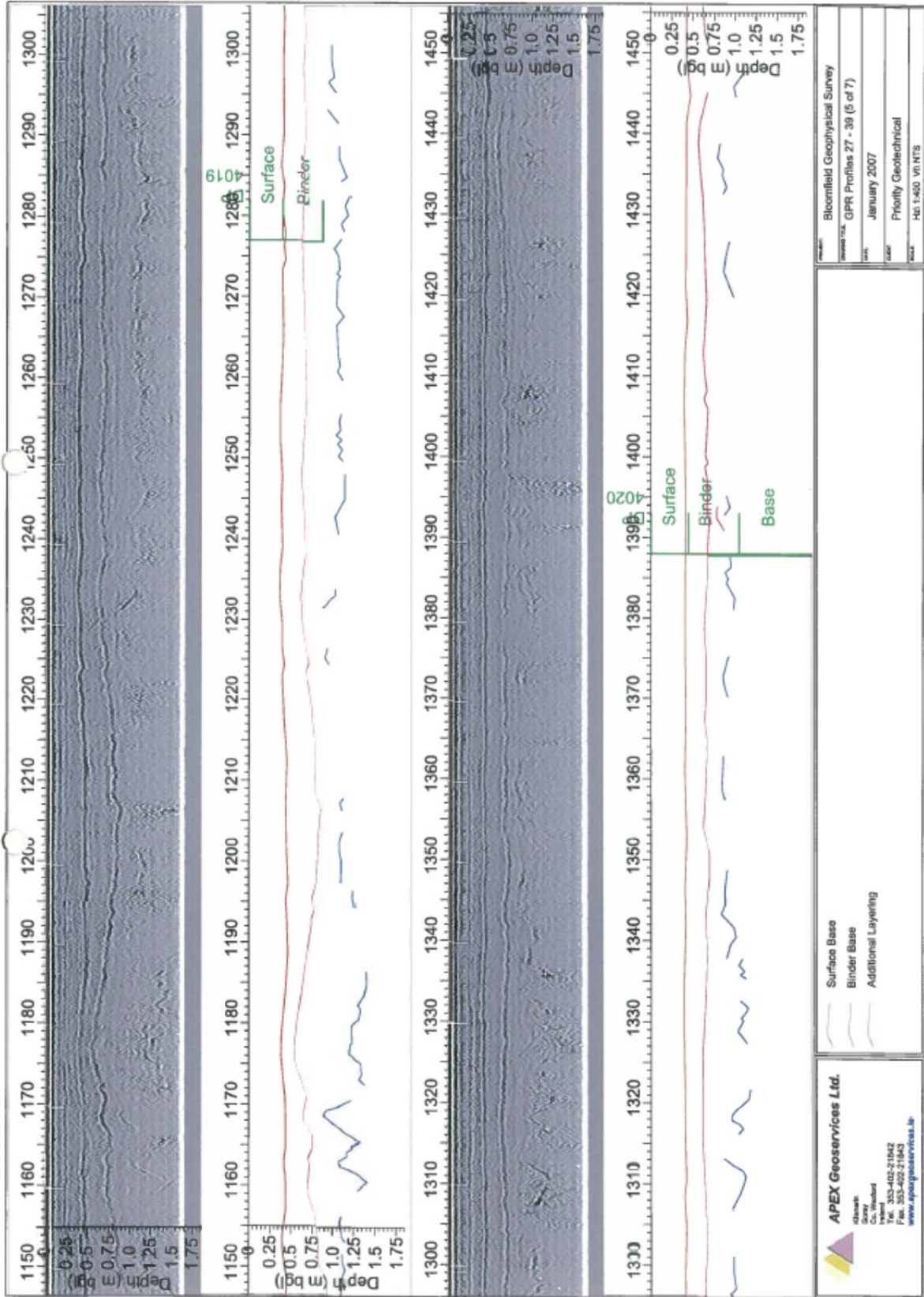
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 Survey
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Project	Bloomfield Geophysical Survey
Survey no.	GPR Profiles 27 - 39 (4 of 7)
Date	January 2007
Client	Priority Geotechnical
Scale	Per 1:400, VN NTS

<p>Surface Base Binder Base Additional Layering</p>

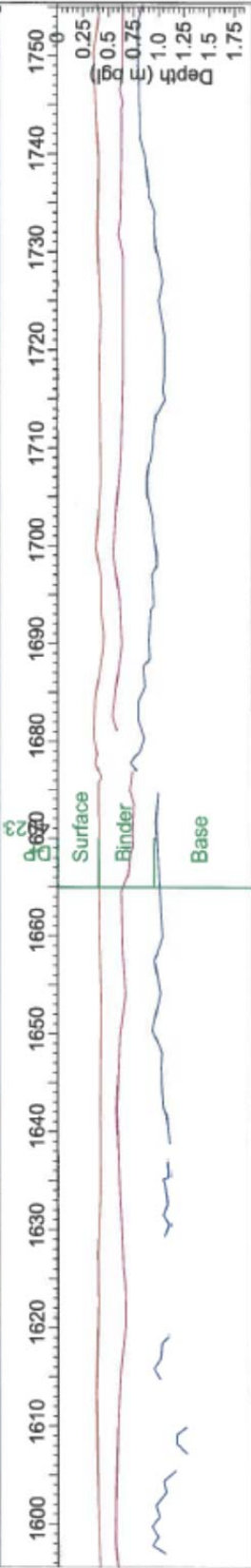
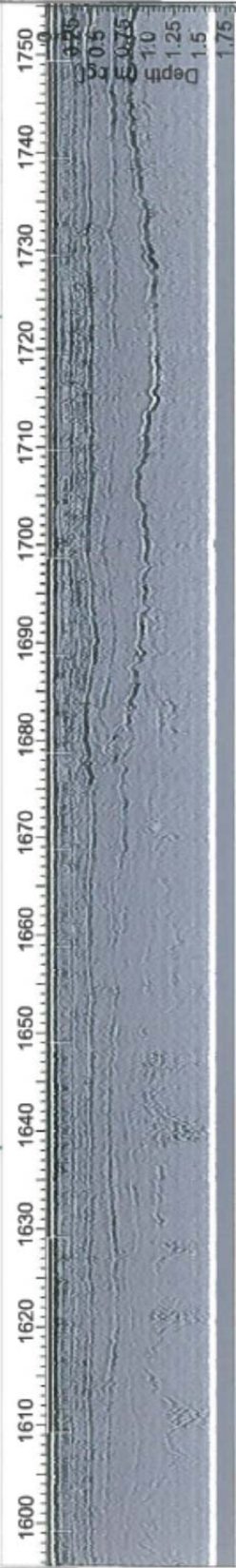
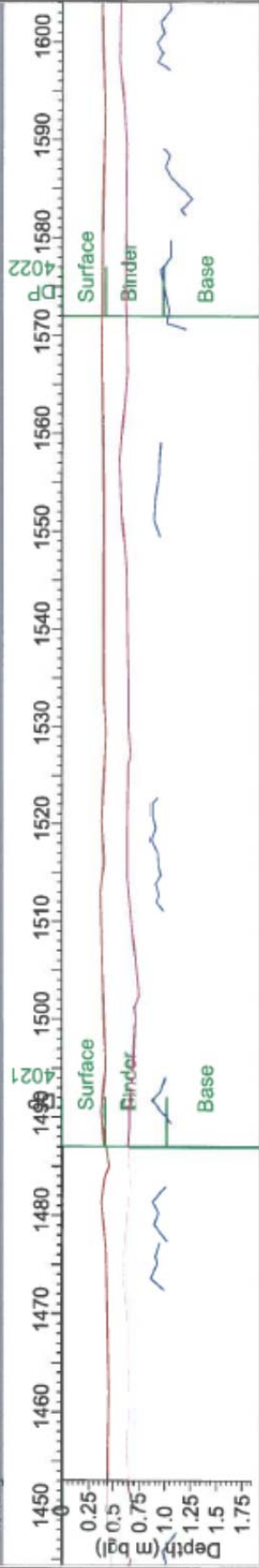
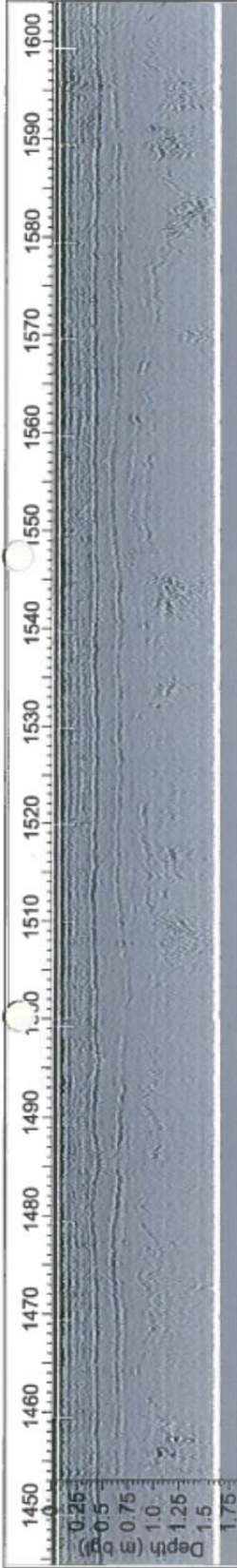
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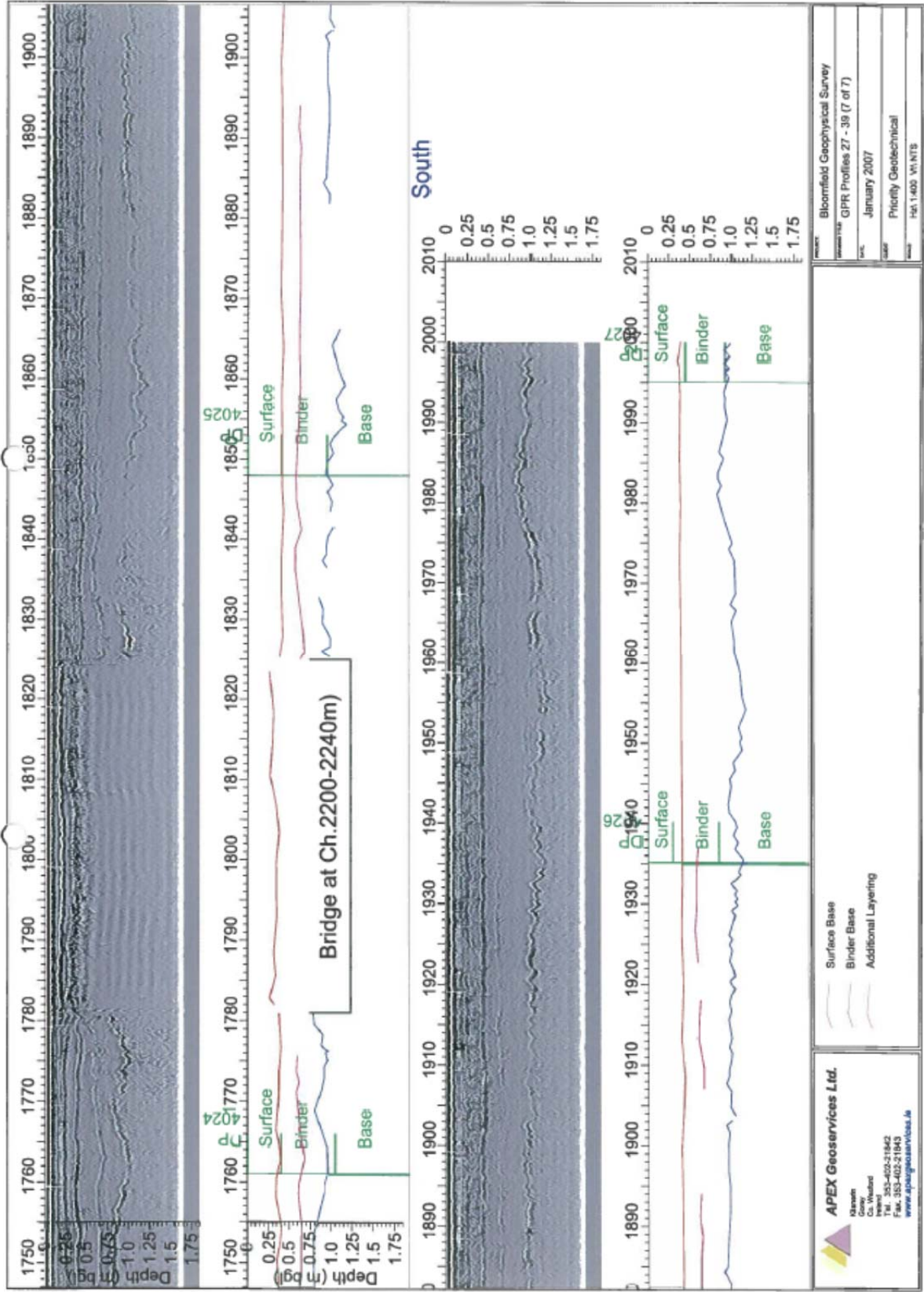
Project: Bloomfield Geophysical Survey
 Contract No.: GPR Profiles 27 - 39 (5 of 7)
 Date: January 2007
 Client: Priority Geotechnical
 File: HG1-460-VI.NTS

Surface Base
 Binder Base
 Additional Layering

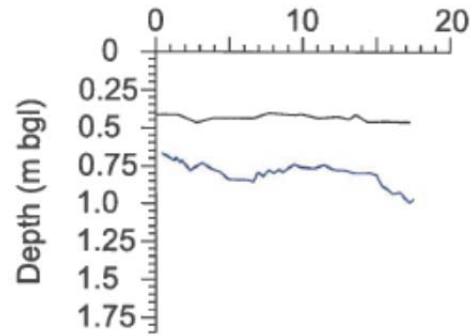
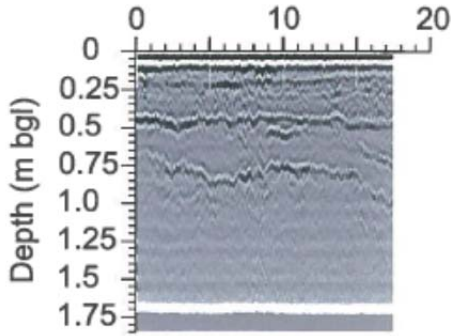
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 Glenageary
 Co. Wicklow
 Ireland
 Tel: 353-402-21842
 Fax: 353-402-21843
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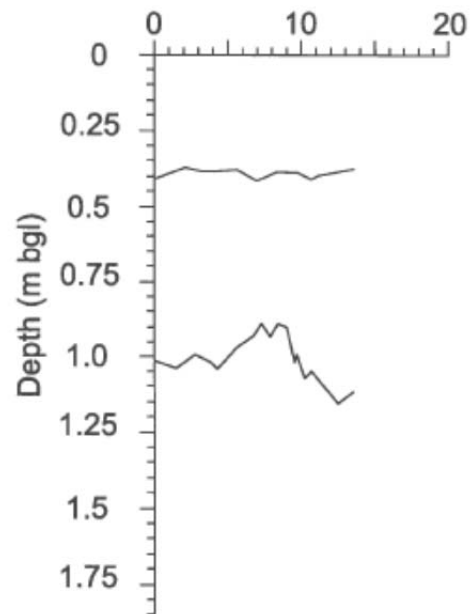
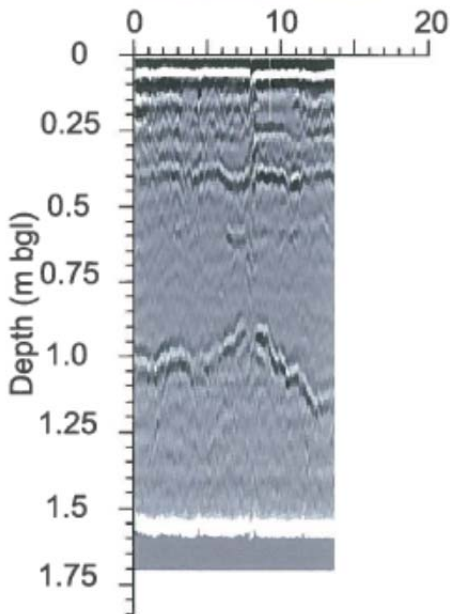
 APEX Geoservices Ltd. Geoservices Data Management Technology Tel: 353-402-21942 Fax: 353-402-21943 www.apexgeoservices.ie	Project: Bloomfield Geophysical Survey Station No: GPR Profiles 27 - 39 (6 of 7) Date: January 2007 Client: Priority Geotechnical Scale: 1:100 (V.N.T.B)
	Surface Base Binder Base Additional Layering
	(Empty space for notes or additional data)
	(Empty space for notes or additional data)



GPR Profile X1



GPR Profile X2



APEX Geoservices Ltd.

Kilmerin
 Gorey
 Co. Wexford
 Ireland
 Tel. 353-402-21842
 Fax. 353-402-21843
www.apexgeoservices.ie

- Surface Base
- Binder Base
- Additional Layering

PROJECT:	Bloomfield Geophysical Survey
DRAWING TITLE:	GPR Profiles X1 & X2
DATE:	January 2007
CLIENT:	Priority Geotechnical
SCALE:	Hz: 1:400 Vt: NTS