Site 18: Rifle Range Rd Deep

Site I.D. No: 7428103

Deep Pukekohe Basalt Aquifer

NZMS 260 Ref: R12: 766 426

Lat / Long: 36° 12' 18.7" S, 174° 54' 23.1" E

Casing depth: 78.00 metres

Bore Depth: 90.00 metres

Casing diameter: 0.050 m

Elevation: 72.577 metres

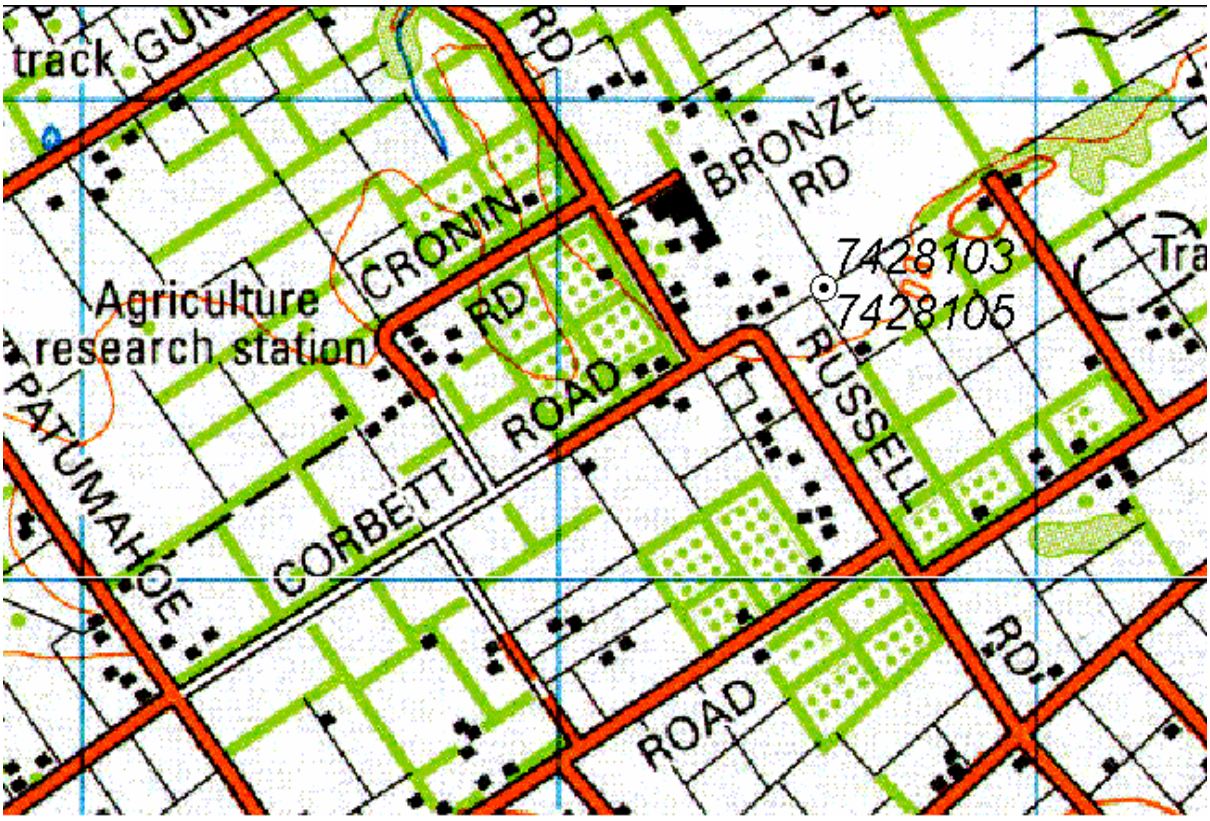
TOC = 0.460 m above ground level

This site has a dedicated pump installed for NGMP monitoring.

Care should be taken in winter months to access this site using a 4WD vehicle. Tephra/ash at the surface produces a very slick surface.

Christmas pine plantings now occupy entire length of right-of-way – room for vehicle access has been left, to left hand side of area. 4WD access only – year round

Average Pumping Time: 20 minutes



Site 19: Douglas Rd

Site I.D. No: 7429017

Kaawa Shellbed Aquifer

NZMS 260 Ref: R12: 765 411

Lat /Long: 37° 13' 31" S, 174° 52' 34" E

Bore Depth: 268.20 metres

Elevation: 109.02 metres

Casing depth: 254.00 metres

Casing diameter: 0.100 m

TOC = 0.xxx m above ground level

This site is currently not in use, due to major pump problems. A new dedicated pump has recently been purchased, and is due to be installed shortly, after a new shed has been installed on site (the previous shed having been destroyed during a major storm in early 2006).

ROAD
EDEN
DOUGLAS
ROAD
ROAD
7429013
ROAD
104
POLLOCK
RD
Market
gardens
129
Tank
ROAD
HILL

Site 20: Bullens Rd

Site I.D. No: 7409011

Sandstone / Limestone Aquifer

NZMS 260 Ref: R11: 863 607

Lat / Long: 37° 02' 24.7" S, 174° 58' 39.7" E

Bore Depth: 75.00 metres

Elevation: 34.66 metres

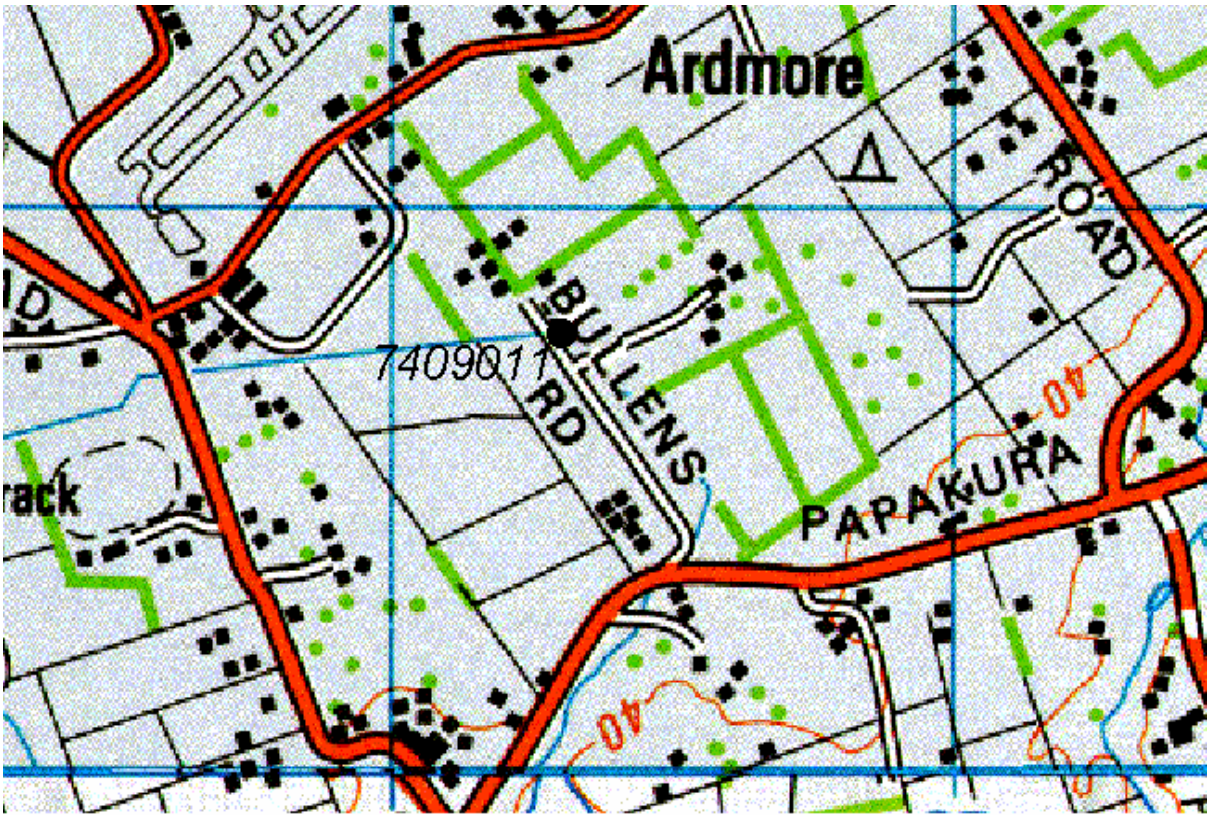
Casing depth: 38.90 metres

Casing diameter: 0.100 m

TOC = 0.xxx m above ground level

Care should be taken accessing this site during winter. Check the grass surface for firmness.

Average Pumping Time: 50 minutes


Ardmore
7409011
BULLENS RD
PAPAKURA
ROAD
40
40

Site 21: Burnsides Rd

Site I.D. No: 7409001

Waitemata / Greywacke Aquifer

NZMS 260 Ref: R11: 881 619

Lat / Long: 37° 01' 44.4" S, 174° 59' 51.4" E

Bore Depth: 169.00 metres

Elevation: 30.519 metres

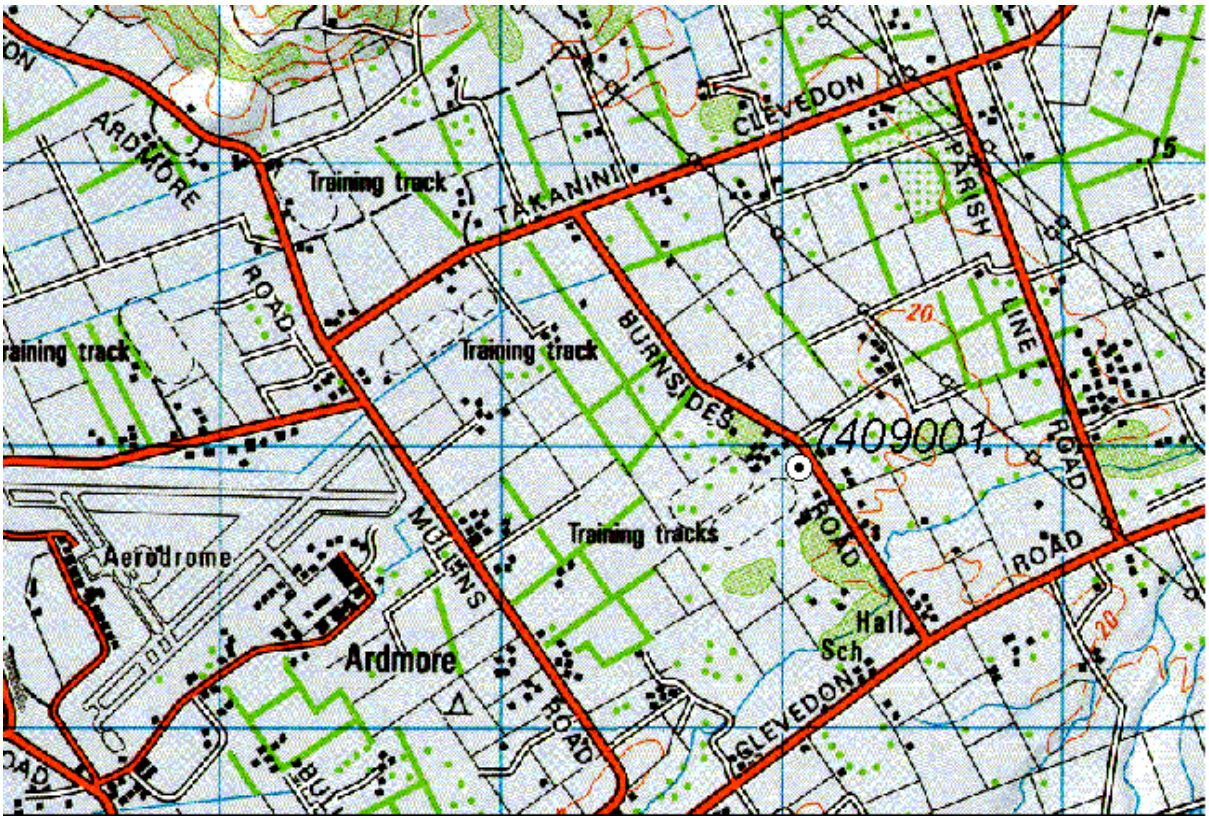
Casing depth: 154.2.00 metres

Casing diameter: 0.100 m

TOC = 1.460 m above ground level

Note: Bore is 200mm diameter to 18m only; 100 mm diameter there on. Calculations to be made on basis of 100 mm diameter throughout entire bore depth.

Average Pumping Time: 1 hour 30 minutes



Site 22: Amelia Earhart Ave

Site I.D. No: 6497017

Mangere Sand Aquifer

NZMS 260 Ref: R11: 691 675

Lat / Long: 36° 58' 56.2" S, 174° 46' 58.1" E

Casing depth: 42.60 metres

Bore Depth: 50.60 metres

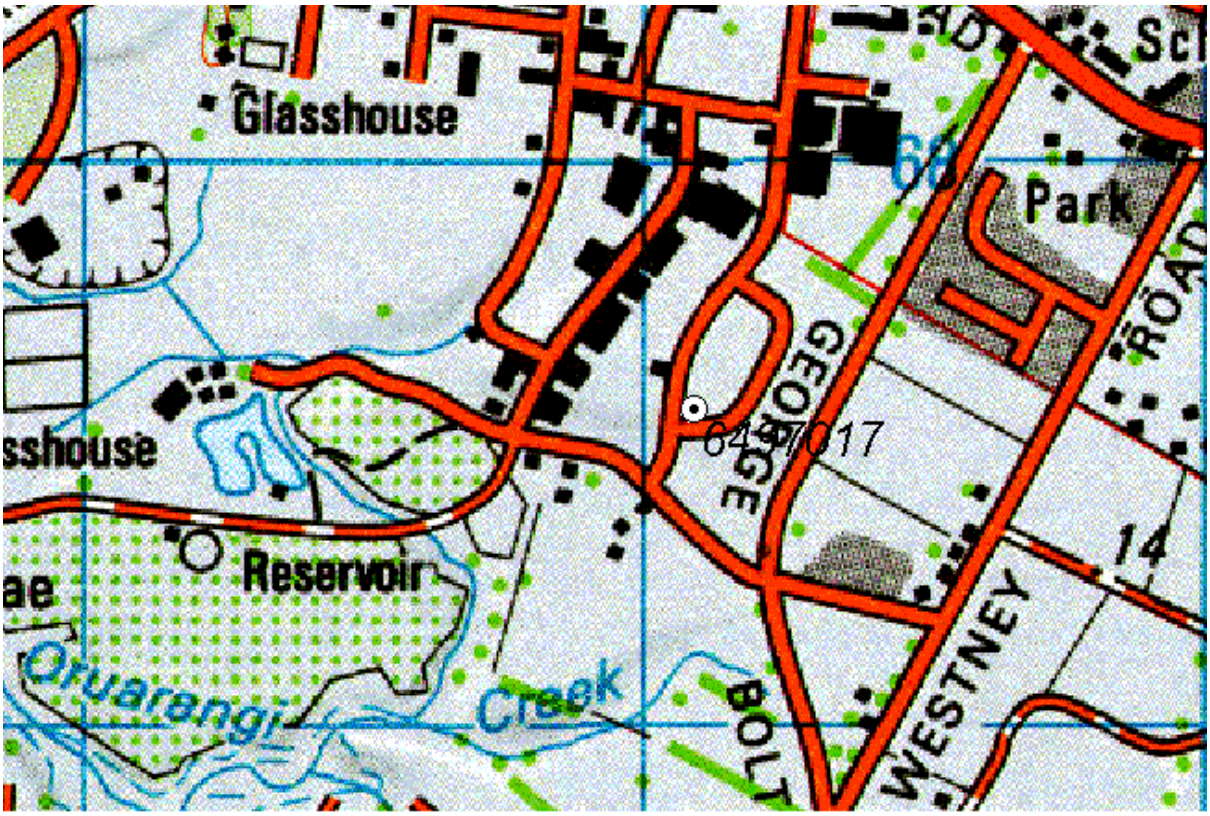
Casing diameter: 0.050 m

Elevation: 11.865 metres

TOC = 0.425 m above ground level

Bore located on public road reserve adjacent to vacant land. Vehicle parking not always available on roadway due to parked trucks – therefore park on vacant land adjacent to bore-head.

Average Pumping Time: 25 minutes



Site 23: Ford Motor Co.

Waitemata Sandstone Aquifer

Lat / Long: 36° 59' 55" S, 174° 52' 16" E

Depth: 200.00 metres

Elevation: 18.662 metres

Site I.D. No: 6498035

NZMS 260 Ref: R11: 768 660

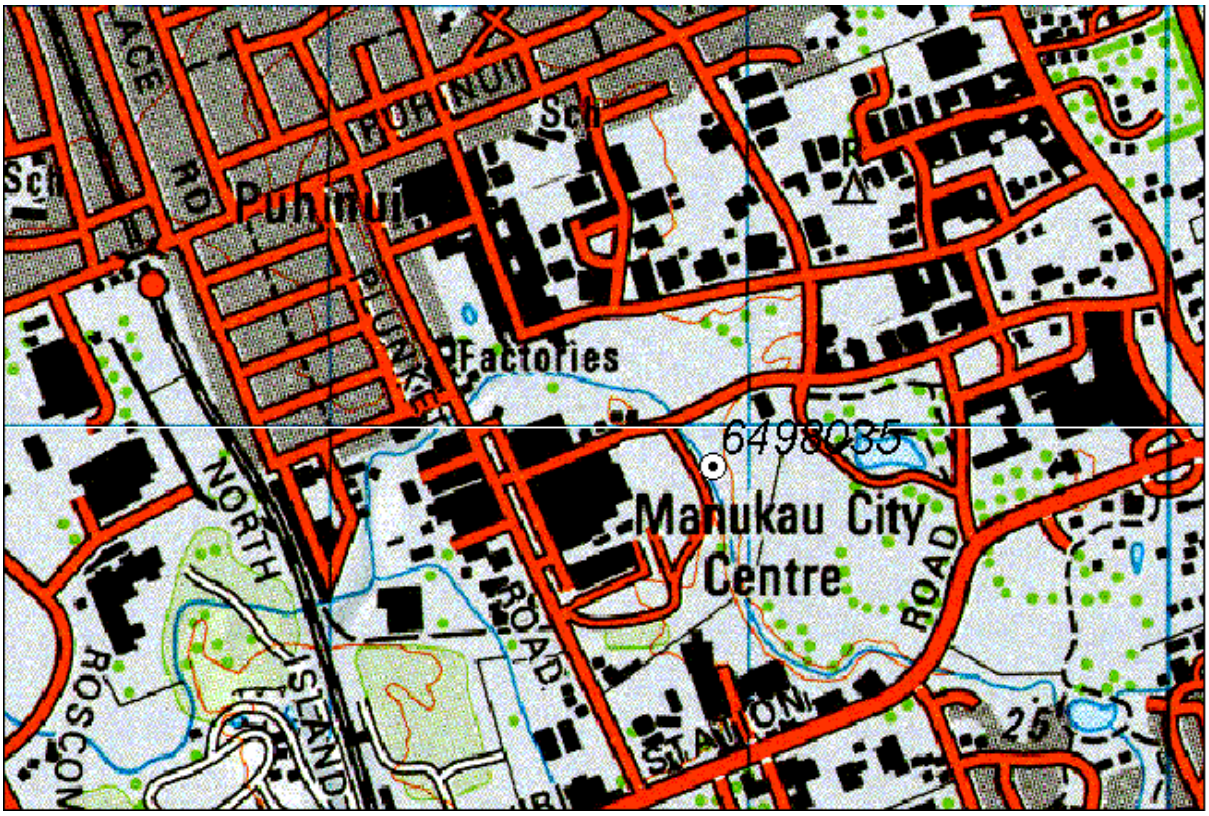
Casing depth: 60.00 metres

Casing diameter: 0.100 m

TOC = 0.xxx m above ground level

This site is artesian and should not require pumping. A tap has been provided at the borehead (August 1999) - turn tap ***ON*** and let bore free-flow for 24 hours prior to sampling.

NOTE: Pressure meter in adjacent shed to be read PRIOR to opening tap – note reading in field log book along with time of reading, and pass data to Hydrology group as soon as possible.



Site 24: Seagrove Observation

Waitemata Sandstone Aquifer

Lat / Long: 37° 07' 56" S, 174° 45' 18" E

Depth: 201.00 metres

Elevation: 28.18 metres

The observation bore is sited approximately 100 metres from an ARC shed. The shed may be used for shelter, writing notes, etc. No mains power available on site.

Average Pumping Time: 1 hour 35 minutes

Note: From August 2003, off-road parking almost impossible due to 'upgrading' of road-side ditch. Therefore, gear to be off-loaded from vehicle at site, then vehicle moved to beside ARC shed, to keep it clear of road.

Site I.D. No: 7417023

NZMS 260 Ref: R12: 663 509

Casing depth: 97.80 metres

Casing diameter: 0.100 m

TOC = 0.485 m above ground level

Appendix 2: Groundwater Sampling Plan

Original Groundwater Sampling Schedule, 1998-2006

Site	Year 1 1998				Year 2 1999				Year 3 2000				Year 4 2001				Year 5 2002			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Quintals Rd																				
2. Waiwera Thermal Park																				
3. Parakai Thermal Pools																				
4. Rimmer Rd																				
5. Chenery Rd																				
6. Waitakere Rd Shallow																				
7. Waitakere Rd Deep [1]																				
8. Ostrich Farm Rd #2																				
9. Ostrich Farm Rd #1 [1]																				
10. Central Park																				
11. Tiwai Rd																				
12. Watson Ave																				
13. Mt Richmond																				
14. Fielding Rd Sand																				
15. Fielding Rd Volcanic																				
16. BP Bombay																				
17. Rifle Range Rd Shallow [1]																				
18. Rifle Range Rd Deep [1]																				
19. Douglas Rd																				
20. Bullens Rd																				
21. Burnsides Rd																				
22. Amelia Earhart Ave																				
23. Ford Motor Co.																				
24. Seagrove Rd [1]																				

Original Groundwater Sampling Schedule, 1998-2006

Site	Year 6 2003				Year 7 2004				Year 8 2005				Year 9 2006				Year 10 2006			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Quintals Rd																				
2. Waiwera Thermal Park																				
3. Parakai Thermal Pools																				
4. Rimmer Rd																				
5. Chenery Rd																				
6. Waitakere Rd Shallow																				
7. Waitakere Rd Deep [1]																				
8. Ostrich Farm Rd #2																				
9. Ostrich Farm Rd #1 [1]																				
10. Central Park																				
11. Tiwai Rd																				
12. Watson Ave																				
13. Mt Richmond																				
14. Fielding Rd Sand																				
15. Fielding Rd Volcanic																				
16. BP Bombay																				
17. Rifle Range Rd Shallow [1]																				
18. Rifle Range Rd Deep [1]																				
19. Douglas Rd																				
20. Bullens Rd																				
21. Burnsides Rd																				
22. Amelia Earhart Ave																				
23. Ford Motor Co.																				
24. Seagrove Rd [1]																				

Samples collected for ARC SoE Ground Water program only
Samples collected for IGNS NGMP program only
Samples collected for ARC SoE Ground Water and IGNS NGMP programs

SoE Groundwater Sampling Plan
2005 - 2009

The revised sampling plan commenced in June 2005 (Year 8 Q3). The program originally commenced in January 1998 (Year 1 Quarter 1). Sampling is undertaken in January, April, July and October of each calendar year.

Site	Year 8 - 2005				Year 9 - 2006				Year 10 - 2007				Year 11 - 2008				Year 12 - 2009				Totals
	Jan Q1	Apr Q2	Jul Q3	Oct Q4	Jan Q1	Apr Q2	Jul Q3	Oct Q4	Jan Q1	Apr Q2	Jul Q3	Oct Q4	Jan Q1	Apr Q2	Jul Q3	Oct Q4	Jan Q1	Apr Q2	Jul Q3	Oct Q4	
1. Quintals Rd																					*11*
2. Waiwera Thermal Park[2]																					*6*
3. Parakai Thermal Pools[2]																					*5*
4. Rimmer Rd																					*10*
5. Chenery Rd[2]																					*5*
6. Waitakere Rd Shallow																					*20*
7. Waitakere Rd Deep [1]				QBA																	*20*
8. Ostrich Farm Rd #2				QBA																	*9*
9. Ostrich Farm Rd #1 [1]				QBA																	*20*
10. Central Park																					*20*
11. Tiwai Rd																					*20*
12. Watson Ave																					*20*
13. Mt Richmond[2]																					*20*
14. Fielding Rd Sand																					*10*
15. Fielding Rd Volcanic																					*20*
16. BP Bombay[2]																					*20*
17. Rifle Range Rd Shallow [1]																					*20*
18. Rifle Range Rd Deep [1]																					*20*

19. Douglas Rd																					*5*
20. Bullens Rd				QBA																	*5*
21. Burnsides Rd																					*18*
22. Amelia Earhart Ave																					*18*
23. Ford Motor Co.				QBA																	*5*
24. Seagrove Rd [1]				QBA																	*20*
ARC Bores sampled (includes 2 x QC)	*14*	*17*	*13*	*22*	*13*	*26*	*13*	*17*	*13*	*26*	*13*	*17*	*13*	*26*	*13*	*17*	*13*	*26*	*13*	*17*	*342*
Analytes:	QA	QA	QA	QB	Q	QBA	Q	QB	Q	QBA	Q	QB	Q	QBA	Q	QB	Q	QBA	Q	QB	

1. Dedicated pump installed
2. Production pump installed

Samples collected for ARC SoE Ground Water program only
Samples collected for IGNS NGMP program only
Samples collected for ARC SoE Ground Water and IGNS NGMP programs

Q	*Quarterly*	*27*	*analytes*
B	*Bi-annual*	*2*	*analytes*
A	*Annual*	*11*	*analytes*

Appendix 3: Water Quality Parameters

SoE Groundwater Parameters and detection limits as of July 05

Quote 16585 Parameter	Required Detection Limit mg/l		RJ Hill Detection Limit mg/l	Comments	Analyte Sampling Schedule
pH	0.1	pH unit	0.1		Quarterly
Turbidity	0.5	NTU	0.05		Quarterly
SS - 0.1	0.1		0.5	0.1 (at least 2L volume filtered needed)	Quarterly
TDS	10		10		Quarterly
Cation/anion balance	1	%			Quarterly
Tot. Alk as CaCO3	1		1		Quarterly
Bicarb. Alk (HCO_3^-) (Unfiltered)	1		1	Calculated	Quarterly
Carb. Alk (CO_3^{2-}) (Unfiltered)	1		1	Calculated	Quarterly
Hydroxide Alk	1		1	Calculated	Quarterly
Tot Hardness as CaCO3	1		1	Calculated	Quarterly
Calcium as CaCO3	0.1		0.05	Calculated	Quarterly
Magnesium as CaCO3	0.1		0.02	Calculated	Quarterly
Nitrate-N (Tot. dissolved)	0.002		0.002		Quarterly
Nitrite-N (Tot. dissolved)	0.002		0.002		Annual
Ammoniacal-N ($NH_3 + NH_4^+$) (Tot. dissolved)	0.01		0.01		Quarterly
Tot. Phosphorous	0.01		0.004		Quarterly
Phosphorous (Tot. dissolved)	0.01		0.004		Quarterly
Silica as SiO2 (Tot. dissolved)	0.1		0.1		Quarterly
Calcium (Tot. dissolved)	0.05		0.05		Quarterly
Magnesium (Tot. dissolved)	0.05		0.02		Quarterly
Sodium (Tot. dissolved)	0.05		0.02		Quarterly
Potassium (Tot. dissolved)	0.04		0.05		Quarterly
Chloride (Tot. dissolved)	0.5		0.5		Quarterly
Sulphate (Tot. dissolved)	0.5		0.5		Quarterly

Quote 16585 Parameter	Required Detection Limit mg/l	RJ Hill Detection Limit mg/l	Comments	Analyte Sampling Schedule
Tot. Mn	0.001	0.0005		Quarterly
Mn (Tot. dissolved)	0.001	0.0005		Quarterly
Tot. Fe	0.02	0.02		Quarterly
Fe (Tot. dissolved)	0.005	0.005	ultra trace DL	Quarterly
Al (Tot. dissolved)	0.01	0.003		Annual
As (Tot. dissolved)	0.0005	0.0005	ultra trace DL	Annual
B (Tot. dissolved)	0.005	0.005		Annual
Cr (Cr(III) + Cr(VI)) (Tot. dissolved)	0.0005	0.0005		Annual
Cu (Tot. dissolved)	0.0005	0.0005		Annual
F (Tot. dissolved)	0.05	0.05		Annual
Li (Tot. dissolved)	0.001	0.0002		Annual
Ni (Tot. dissolved)	0.001	0.0005		Annual
Pb (Tot. dissolved)	0.0001	0.0001		Annual
Zn (Tot. dissolved)	0.002	0.001		Annual
Faecal Coliforms (MPN/100ml)		2		Bi-annual (April/Oct)
E. Coli (MPN/100ml)		1		Bi-annual (April/Oct)