GROUNDWATER RESOURCE INFORMATION PROJECT
EASTERN CAPE PROVINCE

GROUNDWATER INFORMATION SOURCE REFERENCE SHEET

SOURCE REF NR:	AG053	Own Archive	X	Copy attached	X
		Sourced		Copy at source	

A: SOURCE DESCRIPTION

District Municipality:	Amatole		Chris Hani	X	O R Tambo	
	Ukhahlamba		Cacadu		Alfred Nzo	
Local Municipality:	Lukanji					
Institution where Information is held:	AGES EC CC					
Branch of Institution:	EAST LONDON					
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B: TYPE OF INFORMATION

Information format:	Hard copy	X	Data Summary		Electronic Report	
	Specify Other:					
Report / Info Title:	Pump testing evaluation of existing boreholes at Sterkstroom Eastern Cape Province					
Report Nr:	EC/02/02/HG		Date:	May 2002		
Author Details:	J.A MYBURGH					
Author's Qualification:	Hydrogeologist	X	Govt Dept		Project Manager	
	Engineer		Technician		Other	
	Specify Other:					
Captured by:	A VILJOEN	Date:	23/2/2004	Signed:	AViljoen	

C: GEOHYDROLOGICAL CATEGORIZATION

Project Type	Source development	X	Feasibility Study		Sanitation Study:	
	Specify Other:					

Reference Co-ordinate:	Latitude	Longitude
	S 31° 32' 57"	E 26° 32' 58"

	Yes	No	Complete	Incomplete
Lithological & Construction Logs		X		
Hydrocensus Data	X		X	
Pump Testing Data	X		X	
Chemical Water Analysis Data	X		X	
Geohydrological Data	X			X
Spring Data		X		
Remote Sensing Data		X		
Map Data	X			X

Comments:

Reviewed by: J.A. MYBURGH Date: 27/2/04 Signed:

Project report:

EC/02/02/HG

GeoCon

Hydrogeological investigation

Pump Testing Evaluation of existing boreholes at STERKSTROOM – Eastern Cape Province

May 2002

Project team:

J.A.Myburgh,
F.N. De Jager,

SOUTHERN AFRICA GEOCONSULTANTS (PTY) LTD

Project report:

EC/02/02/HG

Hydrogeological investigation

Pump Testing Evaluation of existing boreholes STERKSTROOM – Eastern Cape Province

May 2002

Conducted on behalf of:
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1. INTRODUCTION

1.1 Terms of reference

Southern Africa GeoConsultants (PTY) Ltd – hereafter referred to as GeoCon - was appointed by Kwezi V3 Engineers to carry out determinative pump testing of existing boreholes at the town Sterkstroom in the Inkwanca Municipality of the Chris Hani District of the Eastern Cape Province.

This report gives results and recommendations resulting from the execution of potential determinative pump tests at six existing boreholes all of which is located within the boundaries of the study area.

1.2 Scope of investigation

GeoCon was appointed to render the following hydrogeological consultation services in the project area:

- Liaison with municipal offices and personnel
- Evaluation of four electrical submersible pumps, one electrical driven mono pump and one open borehole
- Site evaluation - groundwater potential assessment
- Coordination and supervision of pump testing program
- Analyses of pump testing data
- Assessment of groundwater quality
- Reporting with utilization recommendations

1.3 Location of study area

The town Sterkstroom is located approximately 50 kilometers to the northwest of Queenstown (Figure 1). Four of boreholes concerned are situated directly to the north of the town, and two are situated to the east of the town next to the Masaki Township.

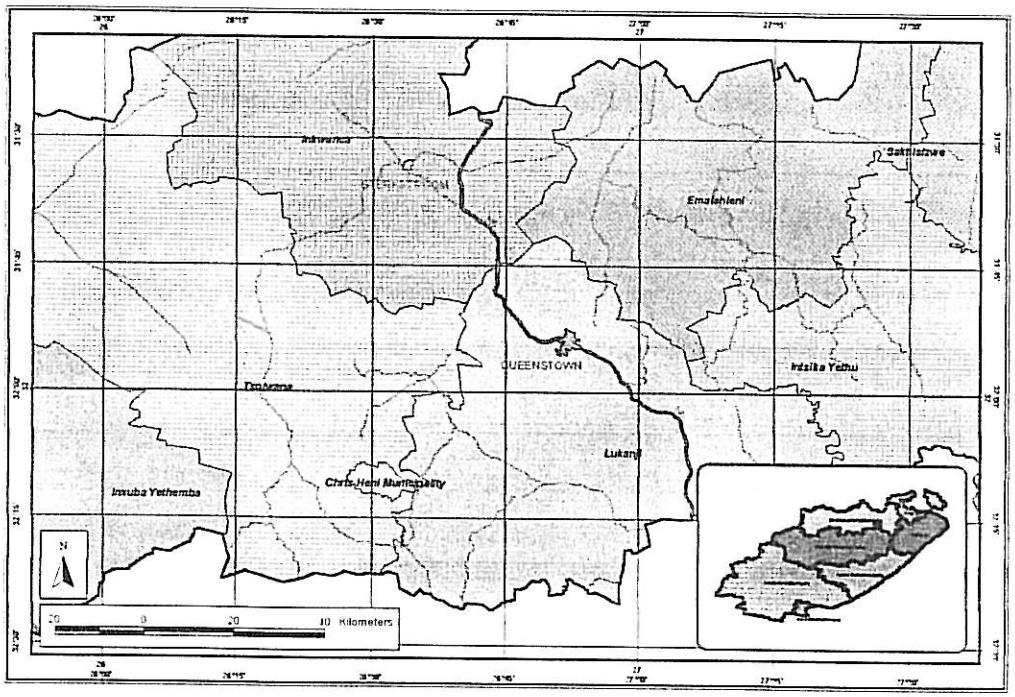


Figure 1: Regional Locality Map

1.4 Information sources

All information pertaining to the boreholes was obtained from on-site observations and reports from local municipality representative - Mr. Boeta Geyer.

- Geological information was obtained from the 1:250 000 scale geological map: 3126 - Queenstown.
- Hydrogeological information was obtained from the 1:500 000 scale hydrogeological map: 3126 Queenstown.
- Topographical information was obtained from the 1:50 000 scale topographical map: 3126DA – Sterkstroom.

2. METHODOLOGY

2.1 Hydrogeological survey

Field inspections were carried out during which the local geological and hydrogeological conditions were evaluated. This information was required for aquifer definition, pump testing data analyses, recharge potential as well as water quality assessments and long-term sustainability determination.

2.2 Evaluation of existing equipment

The flow rate at one existing electrical submercible pump was measured to determine the current abstraction rate at the borehole. All the other boreholes were vandalized and it currently in disrepair. Existing pumps in the other holes were sent to RJN Projects in East London for calibration.

2.3 Pump testing

2.3.1 Pump testing procedure

Pump testing was carried out under the co-ordination and guidance of the hydrogeological consultant. It was the aim of the pump testing exercise to determine the potential at each borehole and tests were adapted according to the yields observed. This resulted in some boreholes being pumped for longer periods than others. The aim at all times was to obtain maximum information regarding the local aquifer within the allowed budget and scope of the appointment.

The appointed pump-testing contractor executed pump testing under the supervision and guidance of the hydrogeological consultant at the existing boreholes. Pump testing was done using a positive displacement mono-type pump being driven by an engine equipped with a gearbox to be able to pump at different rates. Because the boreholes are in use, they were allowed to recover sufficiently before pump testing of the holes commenced.

Initial testing procedures involved calibration testing where no information or inaccurate information regarding the yield of a borehole exists. This was typically followed by a step drawdown test during which the water level response to different abstraction rates was measured. Results from this test were used to determine a safe and adequate rate at which to perform the constant rate drawdown test. The constant rate drawdown test was commenced once the water level has recovered sufficiently.

The water level response to the constant rate drawdown test, as well as the recovery after the test, was used to assess the hydraulic parameters of the aquifer. These results help to determine the safe long-term abstraction rates at each of the tested boreholes.

Monitoring of boreholes nearest to the pumping borehole was carried out where seen as feasible.

2.3.2 Pump testing analysis

Two parameters are used to describe the physical properties of the aquifer, namely transmissivity (T) and storativity (S). The first of these two quantifies the rate at which water moves through the aquifer and the latter quantifies the aquifer's ability to release water. These 2 parameters can be determined by means of aquifer tests such as pumping tests. However in order to obtain accurate S values observation borehole water levels must be recorded.

Three different methods were used to determine the T values of the boreholes under investigation. They are:

- **Cooper-Jacob analysis**
  The Cooper-Jacob method is summarized in Kruseman and De Ridder (1991). This method was actually developed for porous flow aquifers. However if the pumping tests are correctly recorded, the method can be used to obtain information concerning the fractures (early T analyses) and the surrounding rock matrix (late-T analyses).
  The pump testing graphs from the Cooper-Jacob analyses are attached in Appendix B for reference.

- **FC-analysis**
  FC refers to flow characterization of groundwater flow to a borehole. This method of analysis takes into account factors such as the derivatives of drawdown versus time data, boundary information and error propagation. The method has been developed by the Institute for Groundwater Studies (IGS). An in-depth discussion of the method can be found on the IGS website http://www.uovs.ac.za/igs.

- **Recovery method**
  This test provides an indication of the ability of a borehole and groundwater system to recover from the stress of abstraction. This ability can again be analyzed to provide information in regard to the hydraulic properties of the groundwater system and arrive at an optimum yield for the medium to long-term utilization of the borehole. Although referred to as a test, it rather represents a period of monitoring activity following a period of pumping. The rate at which the water level in the tested borehole (or any other borehole affected by the abstraction) recovers towards its starting level (the groundwater rest level before pumping started) is monitored in this period. For more information concerning this method refer to Kruseman and De Ridder (1991).
  The values obtained from these methods were then used to fit the step-drawdown data as a means of calibration.

2.4 Chemical Water Analyses

A water sample was taken at the boreholes at the end of the pumping cycle of the last test carried out. Water was analyzed as far as its physical-, chemical- and microbiological quality is concerned.

Results were evaluated using the document:

Quality of Domestic Water Supplies; Volume 1;Assessment Guide; Second Edition 1998; Water Research Commission No. TT101/98.

The Water Quality Assessment Guide defines the following classes:

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

3. RESULTS

3.1 Hydrogeological Setting

According to the geological map the study area is covered by alluvium and underlain by sandstone and mudstone of the Burgersdorp formation from the Tarkastad subgroup; and by mudstone, shale, gritty sandstone and occasional coal seams of the Molteno formation. These formations belong to the Karoo sequence of rocks (Figure 2). The sedimentary formations dip at an angle of approximately 4° to the north. The Karoo Sequence has been intruded by Dolerite in the form of sheets and dykes during the late Karoo volcanism.

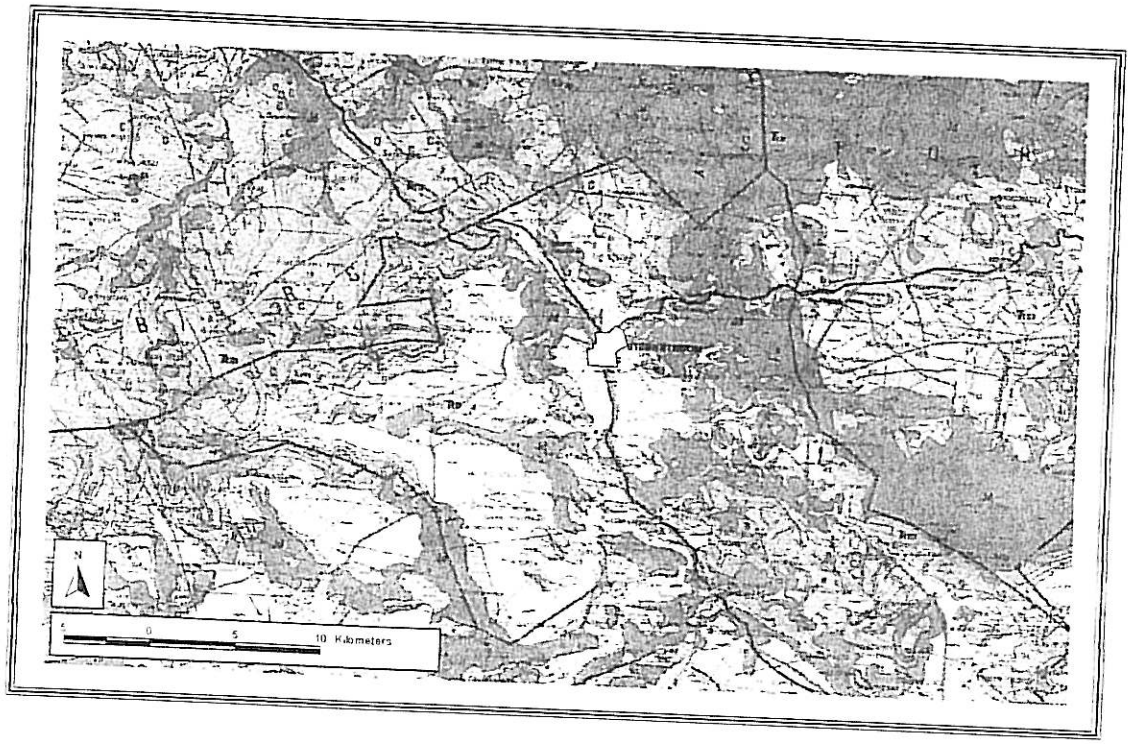


Figure 2: Regional Geology

According to the hydrogeological map of Queenstown the study area's surface geology is mainly alluvium. Groundwater occurrences are expected in fractured zones with yields varying between 0.5 and 2.0 l/s at successful boreholes. According to the hydrogeological map, Sterkstroom is a large-scale groundwater abstraction area with an estimated annual groundwater usage of between 0.1 and 1 million m^3, mainly for domestic purposes.

3.2 Liaison

Two site visits were made on the 10th and 19th of April 2002. Pump testing procedures to be followed were discussed with the representative from the local municipality - Mr B. Geyer. Existing boreholes that had to be tested were indicated and site verification and geological mapping was done. Liaison documentation is attached in Appendix A for reference.

3.3 Borehole census

Not forming part of the scope of this appointment – no formal borehole census was carried out outside of the target area. Other boreholes that were noted in the area and these are indicated in Figure 3.

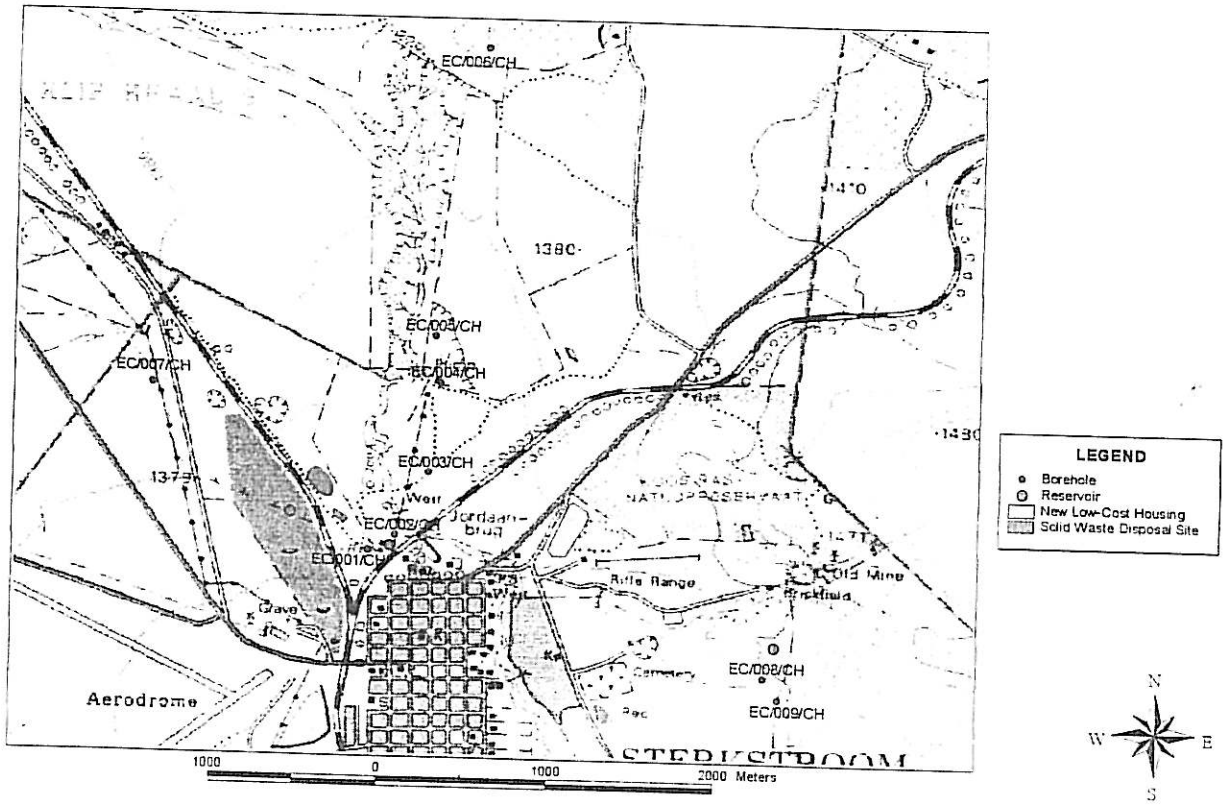


Figure 3: Detailed Site Layout Map (Geology excluded)

It will be strongly recommended that a regional borehole census be carried out to determine regional abstraction trends and volumes that will most definitely effect the municipal abstraction. This borehole census will include all boreholes in the town as well as surrounding farms.

3.4 Existing equipment

Of the six boreholes concerned, four were equipped with electrical submersible pumps; one with an electrical driven mono pump and one borehole was unequipped. Only one borehole was in a working condition during the testing phase of the project. All the other boreholes were vandalized, switchboxes and pump-houses were broken down. Two of the town boreholes, EC/001/CH and EC/003/CH, were rendered useless by bricks having been thrown down the boreholes.

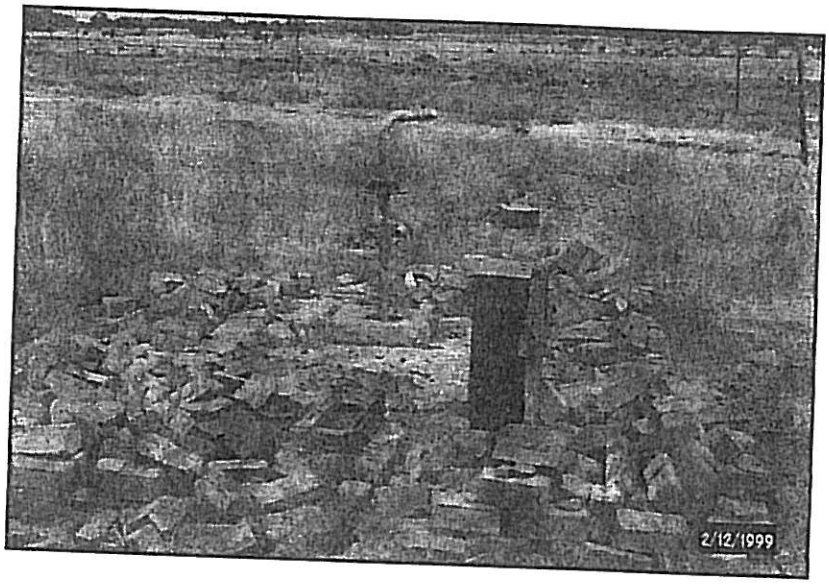


Photo 1: Borehole EC/003/CH – Vandalized

3.5 Pump Testing

A total of six boreholes were scheduled to be pump tested by the pump testing contractor.

- Borehole EC/001/CH (Sterkstroom 1) could not be tested because it was blocked.
- Borehole EC/002/CH (Sterkstroom 2) was tested successfully.
- Borehole EC/003/CH (Sterkstroom 3) could not be tested because it was blocked.
- Borehole EC/004/CH (Sterkstroom 4) was tested successfully.
- Borehole EC/005/CH (Sterkstroom 5) was tested successfully.
- Borehole EC/006/CH (Sterkstroom 6) was tested successfully.
- Borehole EC/007/CH (Chris Hani) will be tested during a next phase.
- Borehole EC/008/CH (Masaki 1) was tested successfully.
- Borehole EC/009/CH (Masaki 2) was tested successfully.

Results from the pump testing phase were analyzed according to the methods described in Paragraph 2.3.2. Results are summarized in the Project Summary Table below:

Pump testing data and Cooper-Jacob graphs are attached in Appendix B for reference.

TER EVALUATION

T DISCHARGE TEST				RECOVERY TEST				WATER CHEMISTRY		MANAGEMENT RECOMMENDATIONS (8/24 hour duty cycle)		
arn wn	% Drawdown (of available dd)	Early Time T (m2/d)	Late Time T (m2/d)	Duration (min)	% Recovery/ pumping time	Residual drawdown (m)	Recover T (m2/d)	Drinking water class	Abstraction rate (L/s)	Daily volume (m3/d)	Pump Inst. Depth (mbgl)	Comments
	15.21	146	19	2880	95	0.29	28.44	Class 2	2.80	80.64	50.00	From fitting step drawdown data T = 120 m2/d, S = 7e-4. The maximum radius of influence after 6 mnths = 9191m and the average radius of influence after 6 mnths = 3568 m
	7.77	132	38.5	1560	94	0.18	179.6	Class 4	3.50	100.80	40.00	From fitting step drawdown data T = 70 m2/d, S = 9.1e-4. The maximum radius of influence after 6 mnths = 10340m and the average radius of influence after 6 mnths = 5324.5 m
	70.05	2.8	0.65	1200	94	2.52	4	Class 4	0.12	3.57	65.00	From fitting step drawdown data T = 7 m2/d, S = 2.3e-4. The maximum radius of influence after 6 mnths = 1423m and the average radius of influence after 6 mnths = 697 m. This hole can alternatively be used as monitoring point if not equipped.
	44.96	10	6.9	1440	93	1.42	3.7	Class 1	0.75	21.60	52.00	From fitting step drawdown data T = 18 m2/d, S = 1e-4. The maximum radius of influence after 6 mnths = 2985m and the average radius of influence after 6 mnths = 1731.2 m
	47.84	12	4.9	1440	51	5.99	22.5	Class 2	0.50	14.40	65.00	From fitting step drawdown data T = 7 m2/d, S = 1e-4. The maximum radius of influence after 6 mnths = 2012.5m and the average radius of influence after 6 mnths = 4221.4 m
	72.89	12	1.3	2160	62	7.32	14.3	Class 3	0.30	8.64	50.00	From fitting step drawdown data T = 25 m2/d, S = 1.7e-4. The maximum radius of influence after 6 mnths = 3600m and the average radius of influence after 6 mnths = 1026 m

4. SUMMARY & RECOMMENDATIONS

- GeoCon was appointed by Kwezi V3 Engineers to carry out a hydrogeological investigation at the town Sterkstroom in the Chris Hani District Municipality. The project resulted in the testing of a total of six town boreholes.
- The area is covered by alluvium and underlain by sandstone and mudstone of the Burgersdorp formation from the Tarkastad subgroup; and by mudstone, shale, gritty sandstone and occasional coal seams of the Molteno formation. Dolerite intruded into the sedimentary package in the form of dykes, sills and sheets.
- A total of six town boreholes were scheduled for pump testing. Two of the town boreholes, EC/001/CH and EC/003/CH were completely destroyed by community members, and it was decided to test two other boreholes in the Masaki Township instead.
- Of the six boreholes that were tested, four were equipped with electrical submersible pumps; one with an electrical driven mono pump and one borehole was unequipped. Only one borehole was in a working condition during the testing phase of the project. All the other boreholes were vandalized.
- Analysis of the pump testing data indicated that the boreholes are utilizing the same aquifer and that there is a definite interaction between boreholes. Recommendations were made taking this into account.
- Recommended abstraction rates for the boreholes are indicated in the Project Summary Table. Duty cycles are recommended not to exceed 8 hours of pumping per day, resulting in a total available daily volume of 230 m^3.
- The drinking water quality of the boreholes was found to be marginal to poor. Class 3 and 4 values can be ascribed to the high feacal- and total coliform counts. Total Hardness causes some water from some boreholes to be marginal. It is recommended that the water be chlorinated to minimize the possible health risk posed by drinking of the water.

- The implementation of a water level monitoring and groundwater management program is of critical importance to ensure that groundwater remains a long-term sustainable water source for the municipality. The implementation of such a management plan will have to entail a full hydrocensus, to be carried out within a 5 km radius of the town center to identify all boreholes in the area. There is a good possibility that other boreholes in the area are being over exploited and mismanaged. The long-term response of the aquifer to the recommended abstraction rates can thus be evaluated and changes to duty cycles can be made if required.
- It is recommended that the new low-cost housing development make use of the town's sewerage system to minimize possible groundwater pollution as a result from on-site sanitation.
- It is recommended that an engineering geological and hydrogeological investigation be conducted at the town's solid waste disposal site due to the proximity of the site to the town boreholes, and the possible pollution hazards posed by this.

APPENDIX A

LIAISON DOCUMENTATION

S. A. GeoConsultants (Pty) Ltd
P / Bag X9063, Postnet 203
East London
Tel: 043 - 726 2070

LIAISON - LOCAL AUTHORITIES

Date:	10 April 2002
District:	CHRIS HANI
Community:	
Project:	STERKSTROOM GROUNDWATER INVESTIGATION

Objectives - GeoCon:	
Hydrocensus	Visit 6 Town boreholes to be pup tested.
	Pump testing supervision - site inspection
Objectives - Community:	

Authorities:

Name:	Position:	Signature:	Date:	Remarks:
F. DE JAGER	GeoCon		10/4/2002	
H P Geyer	Sterkstroom		10/4/2002	
C Stidwell	Testing Contr.		10/04/2002	
F DE JAGER	GeoCon		19/4/2002	
H. Visser	N. B Pumps		19/04/2002.	Seal Boreholes, plant marker poles.
H P Geyer	Sterkstroom		19/04/2002	

APPENDIX B

PUMP TESTING DATA

CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/002/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :		SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :		CLIENT:	Chris Hani District

BOREHOLE DEPTH (mbdl):	54.25	CASING DEPTH (mbdl):	10.28	PUMP TYPE USED:	P100
DEPTH OF PUMP (mbdl):	50.20	CASING HEIGHT (magl):	0.25	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):	165.00	CASING ID (mm):		CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	9.90	DATUM LEVEL (magl):	0.59	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 10/04/2002 TIME: 16h50

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.03		1	
2	0.04		2	
3	0.07		3	
5	0.11	0.31	5	
7	0.12		7	
10	0.13	0.31	10	
15	0.16		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 10/04/2002 TIME: 17h05

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.21		1	
2	0.27	0.83	2	
3	0.28		3	
5	0.30	0.83	5	
7	0.30		7	
10	0.32	0.82	10	
15	0.34		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 10/04/2002 TIME: 17h20

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.41		1	
2	0.43		2	
3	0.44	1.14	3	
5	0.49		5	
7	0.66	1.77	7	
10	0.70		10	
15	0.75		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 10/04/2002 TIME: 17h35

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	1.02		1	
2	1.07		2	
3	1.11	2.61	3	
5	1.28		5	
7	1.30	2.62	7	
10	1.35		10	
15	1.40		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE: BP9L

PUMP MANUFACTURER:

PUMP SERIAL No:

PUMP PULLEY DIAMETER (mm): 250m

PUMP INTAKE DEPTH (m): 28m

PUMP RPM: 1445

PUMP CONDITION: Good

DISCHARGE RATE 5

DATE: 10/04/2002 TIME: 17h50

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	2.02		1	
2	2.09	4.11	2	
3	2.19		3	
5	2.24	4.12	5	
7	2.34		7	
10	2.40	4.12	10	
15	2.45		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER: Electricity

ENGINE MANUACTURER: Geo Machines

ENGINE MODEL: Indukie Motors Induction

ENGINE SERIAL No: LD 5788 / 21

ENGINE PULLEY DIAMETER (mm): 164 mm

POWER RATING (kW): 7.5 kw

ENGINE CONDITION: Motor Bad

DISCHARGE RATE 6

DATE: 10/04/2002 TIME: 18h05

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	2.88		1	1.35
2	4.06	6.42	2	1.05
3	4.63		3	0.85
5	5.15	7.76	5	0.67
7	5.40		7	0.55
10	5.44	7.77	10	0.41
15	5.60		15	0.37
			20	0.30
			30	0.24
			40	0.20
			50	0.16
			60	0.12
			70	0.07
			80	0.03
			90	
			100	
			110	
			120	
			150	
			180	
			210	
			240	
			300	
			420	
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER: Galvinised steel

CLASS OF RISER: 6

DIAMETER OF RISER (mm): 50mm

CONDITION OF RISER: Good

SHAFT DIAMETER (mm): 16mm

ELEMENT DIAMETER (mm): 85mm

ELEMENT STROKE (mm): 250mm

COMMENTS:

P100 was too small for the water. Therefor we had to change borth the pipes and the element

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ? YES

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	EC/002/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO.:	0	SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO.:	0	CLIENT:	Chris Hani District

BOREHOLE DEPTH (mbdl):	54.25	CASING DEPTH (mbdl):	10.28	PUMP TYPE USED:	P100
DEPTH OF PUMP (mbdl):	50.20	CASING HEIGHT (magl):	0.25	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):	165.000	CASING ID (mm):	0.000	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	9.90	DATUM LEVEL (magl):	0.59		

DISCHARGE RATE 1

DATE: 11/04/2002
TIME: 11H30

Time (min)	Drawdown (m)	Yield (l/s)
1	0.51	
2	0.74	
3	0.81	3.000
5	1.18	
7	1.40	4.030
10	1.51	
15	1.57	4.030
20	1.62	
30	1.67	4.040
40	1.70	
50	1.72	4.030
60	1.75	
70	1.77	4.030
80	1.80	
90	1.82	4.030
100	1.84	
110		
120		

Average yield: 3.88428571 (l/s)

Recovery 1

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 2

DATE: 11/04/2002
TIME: 13H10

Time (min)	Drawdown (m)	Yield (l/s)
1	3.73	
2	4.35	9.210
3	4.43	8.210
5	4.51	8.030
7	4.60	
10	4.68	8.020
15	4.70	
20	4.78	8.020
30	4.87	
40	4.95	8.030
50	5.07	
60	5.13	8.020
70	5.18	
80	5.23	8.020
90	5.27	
100	5.32	
110		
120		

Average yield: 8.195

Recovery 2

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	7.29	
2	9.14	15.550
3	9.72	
4	9.85	15.890
7	9.90	16.040
10	9.96	
15	10.49	16.040
20	11.32	
30	29.26	16.030
40	38.55	
50	P. I. S	13.330
60	P. I. S	12.440
70	P. I. S	12.230
80		
90		
100		
110		
120		

Average yield: 14.69375

Recovery 3

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Average yield: #DIV/0!

Recovery 4

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Recovery 5

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
660		

Average yield:

Recovery

Time (min)	Recovery (m)
1	8.62
2	7.60
3	6.14
5	5.43
7	3.48
10	2.73
15	1.96
20	1.52
30	1.02
40	0.79
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	

COMMENTS:

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/002/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development		
DEPTH OF PUMP (mbdl):	50.20	PUMP TYPE USED:	P100	OPERATOR:	Christopher
INLET DIAMETER (mm):	165	EXISTING EQUIPMENT:	BP9L	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	11/04/2002	TEST COMPLETED	DATE:	15/04/2002	TOTAL TIME - PUMPED (min):	2880	TOTAL TEST TIME (min):	2880
	TIME:	16h30		TIME:	06h30	TOTAL TIME RECOVERY(min):	2280	AVERAGE YIELD (l/s):	5.79

DISCHARGE BOREHOLE

CASING HEIGHT (magl):	0.25
CASING DEPTH (mbdl):	10.28
CASING ID (mm):	0.00
BOREHOLE DEPTH (mbdl):	54.25
WATER LEVEL (mbdl):	9.90
DATUM LEVEL (magl):	0.59

Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)
1	1.43		4.10
2	1.58	3.23	3.73
3	1.85	4.47	3.62
5	2.02		3.43
7	2.66	5.59	3.27
10	3.13		3.04
15	3.43	6.05	2.70
20	3.53		2.55
30	3.61	6.05	2.21
40	3.66		2.00
60	3.70	6.05	1.75
90	3.79		1.50
120	3.86	6.04	1.36
150	3.91		1.24
180	3.94	6.04	1.18
210	3.96		1.11
240	3.98	6.04	1.05
300	4.04		1.00
360	4.07	6.04	0.94
420	4.09		0.89
480	4.13	6.05	0.84
540	4.17		0.80
600	4.21	6.06	0.74
660	4.26		0.70
720	4.30	6.05	0.66
780	4.34		0.63
840	4.37	6.05	0.59
900	4.41		0.57
960	4.45	6.04	0.55
1020	4.50		0.54
1080	4.55	6.05	0.53
1140	4.61		0.52
1200	4.67	6.06	0.50
1260	4.72		0.48
1320	4.78	6.05	0.45
1380	4.83		0.44
1440	4.89	6.05	0.43

OBSERVATION BOREHOLE 1

No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time (min)	Drawdown (m)	Recovery (m)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
60		
90		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
720		
840		
960		
1080		
1200		
1320		
1440		
1800		
2280		
2880		

OBSERVATION BOREHOLE 2

No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time (min)	Drawdown (m)	Recovery (m)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
60		
90		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
720		
840		
960		
1080		
1200		
1320		
1440		
1800		
2280		
2880		

OBSERVATION BOREHOLE 3

No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time (min)	Drawdown (m)	Recovery (m)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
60		
90		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
720		
840		
960		
1080		
1200		
1320		
1440		
1800		
2280		
2880		

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time	Drawdown	Yield	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery
(min)	(m)	(l/s)	(m)	(min)	(m)	(m)	(min)	(m)	(m)	(min)	(m)	(m)
1500	4.95	6.05	0.42	1500			1500			1500		
1560	5.01		0.41	1560			1560			1560		
1620	5.05	6.05	0.40	1620			1620			1620		
1680	5.11		0.39	1680			1680			1680		
1740	5.17	6.05	0.38	1740			1740			1740		
1800	5.22		0.37	1800			1800			1800		
1860	5.28	6.05	0.36	1860			1860			1860		
1920	5.33		0.35	1920			1920			1920		
1980	5.40	6.05	0.34	1980			1980			1980		
2040	5.44		0.33	2040			2040			2040		
2100	5.49	6.05	0.32	2100			2100			2100		
2160	5.54		0.31	2160			2160			2160		
2220	5.59	6.04	0.30	2220			2220			2220		
2280	5.64		0.29	2280			2280			2280		
2340	5.69	6.05		2340			2340			2340		
2400	5.74			2400			2400			2400		
2460	5.79	6.05		2460			2460			2460		
2520	5.84			2520			2520			2520		
2580	5.89	6.04		2580			2580			2580		
2640	5.98			2640			2640			2640		
2700	6.00	6.05		2700			2700			2700		
2760	6.04			2760			2760			2760		
2820	6.08	6.05		2820			2820			2820		
2880	6.13			2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No.
VERTICALITY TEST:		No.
CASING DETECTION:		No.
STEEL BOREHOLE COVER:		No.
BOREHOLE MARKING:		No.
SITE CLEANING / FINISHING:		No.
REPORTING & DATA RECORDING:		No.
SLUG TEST:		No.
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION	STEP	1	2	3	4	5	6	TOTAL: (min)	(hrs)	RECOVERY: (m)	(min)
CALIBRATION TEST:											
TEST DURATION (Minutes)		15	15	15	15	15	15	90	1.50	0.03	80
TEST YIELD (l/s)		0.31	0.83	1.46	2.62	4.12	7.32	MAXIMUM (l/s)	7.3		
DRAWDOWN (m)		0.16	0.34	0.75	1.40	2.45	5.60	MAXIMUM (m)	5.6		
MULTI-RATE / STEP DRAWDOWN:											
TEST DURATION (Minutes)		100	100	70				270	4.50	0.79	40
TEST YIELD (l/s)		3.88	8.20	14.69				MAXIMUM (l/s)	14.7		
DRAWDOWN (m)		1.3	5.32	38.55				MAXIMUM (m)	38.6		

RECOVERY TEST			
TIME TOTAL (hrs):			40.00
Cal	Steps	CD	Total
80	40	2280	2400
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTIL-ISED		%
40.3	6.13		15.21

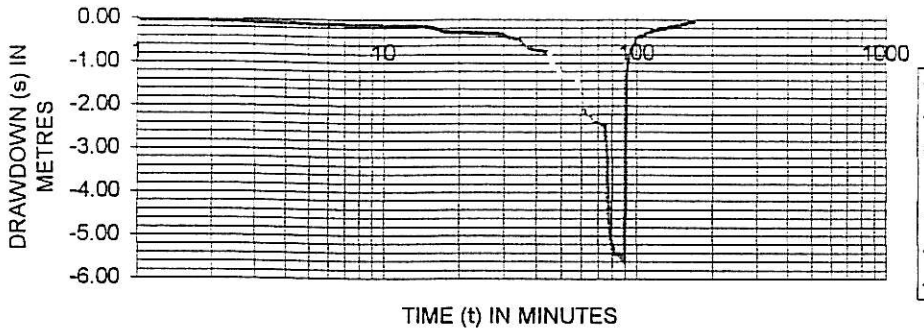
CONSTANT DISCHARGE TEST	TEST DURATION (min)	(hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	%	(min)	(hrs)
	2880	48.00	5.79	6.13	0.29	95.27	2280	38.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	Time	TOTAL: (min)	(hrs)
							0	0.00

BOREHOLE NUMBER: EC/002/CH

CALIBRATION TEST AND RECOVERY

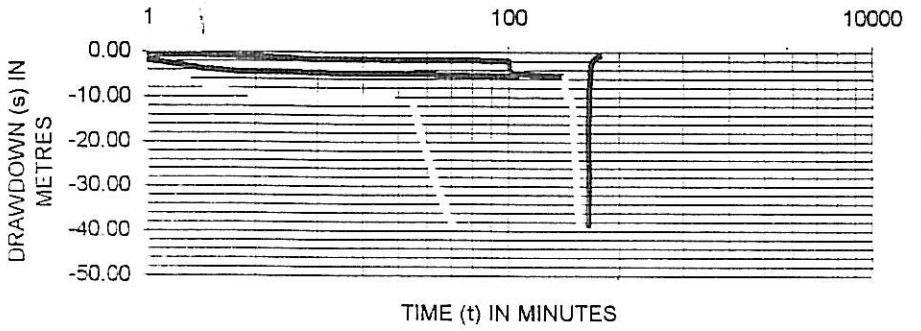
Discharge 1:	0.31	Discharge 2:	0.83	Discharge 3:	1.46	Discharge 4:	2.62	Discharge 5:	4.12	Discharge 6:	7.3167



Drawdown 1:	0.16
Drawdown 2:	0.34
Drawdown 3:	0.75
Drawdown 4:	1.40
Drawdown 5:	2.45
Drawdown 6:	5.60
Duration 1:	15
Duration 2:	15
Duration 3:	15
Duration 4:	15
Duration 5:	15
Duration 6:	15
Recovery (m):	0.03
Recovery (min):	80

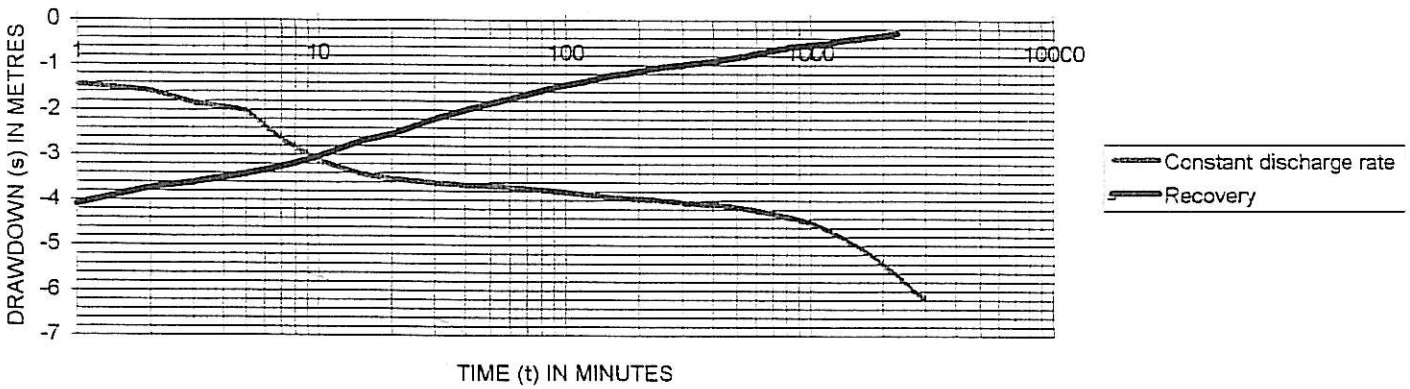
STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	3.88429	Discharge 2:	8.195	Discharge 3:	14.6938	Discharge 4:		Discharge 5:		Discharge 6:	



Drawdown 1:	1.84
Drawdown 2:	5.32
Drawdown 3:	38.55
Drawdown 4:	0.00
Drawdown 5:	0.00
Drawdown 6:	
Duration 1:	100
Duration 2:	100
Duration 3:	70
Duration 4:	
Duration 5:	
Duration 6:	
Recovery (m):	0.79
Recovery (min):	40

CONSTANT DISCHARGE TEST AND RECOVERY



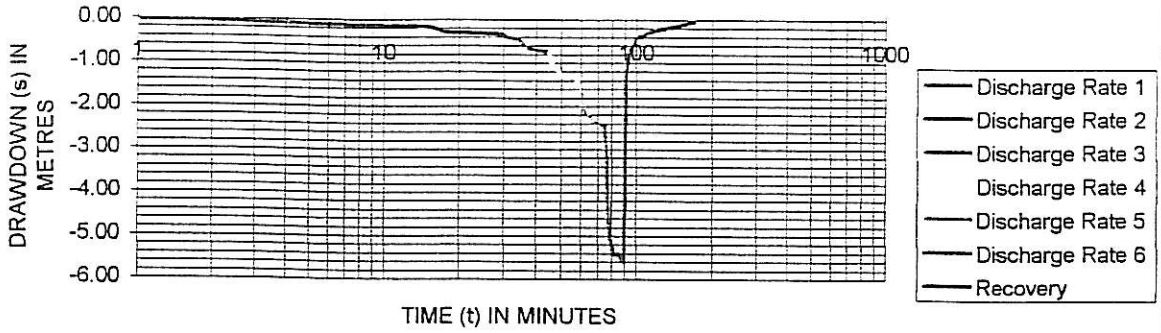
TEST INFORMATION

Date tested	11/04/2002	Water level (mbgl)	9.90	Depth of pump (mbgl)		50.2
CD duration	2880	CD discharge rate	5.79	CD drawdown		6.13
Available drawdown (m)	40.3	% Recovery after CD	95	% after	2280	min

BOREHOLE NUMBER: EC/002/CH

CALIBRATION TEST AND RECOVERY

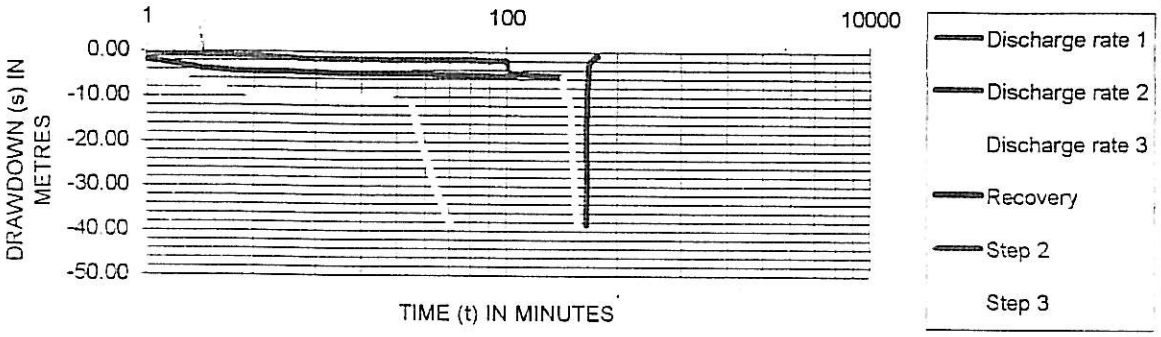
Discharge 1:	0.31	Discharge 2:	0.83	Discharge 3:	1.46	Discharge 4:	2.62	Discharge 5:	4.12	Discharge 6:	7.3167



Drawdown 1:	0.16
Drawdown 2:	0.34
Drawdown 3:	0.75
Drawdown 4:	1.40
Drawdown 5:	2.45
Drawdown 6:	5.60
Duration 1:	15
Duration 2:	15
Duration 3:	15
Duration 4:	15
Duration 5:	15
Duration 6:	15
Recovery (m):	0.03
Recovery (min):	80

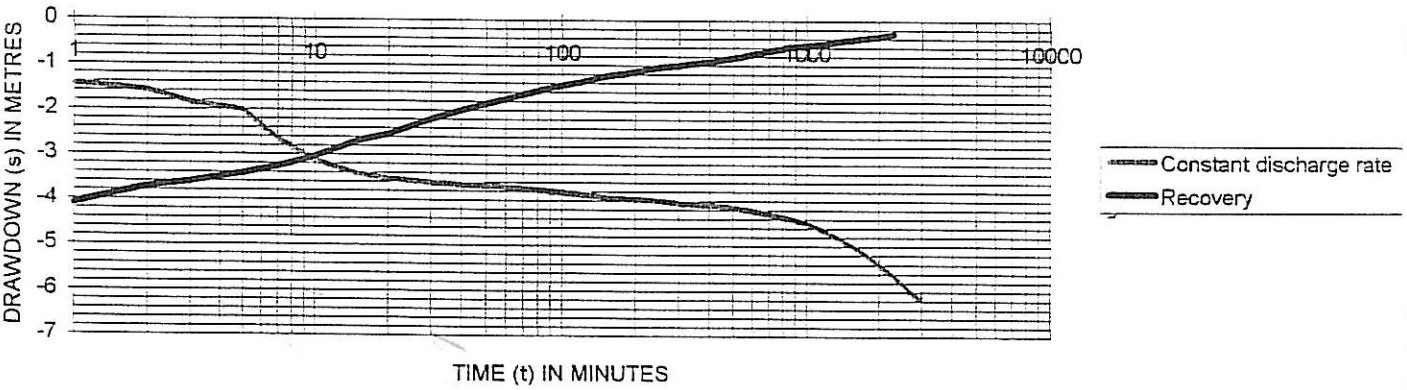
STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	3.88429	Discharge 2:	8.195	Discharge 3:	14.6938	Discharge 4:		Discharge 5:		Discharge 6:	



Drawdown 1:	1.84
Drawdown 2:	5.32
Drawdown 3:	38.55
Drawdown 4:	0.00
Drawdown 5:	0.00
Drawdown 6:	
Duration 1:	100
Duration 2:	100
Duration 3:	70
Duration 4:	
Duration 5:	
Duration 6:	
Recovery (m):	0.79
Recovery (min):	40

CONSTANT DISCHARGE TEST AND RECOVERY

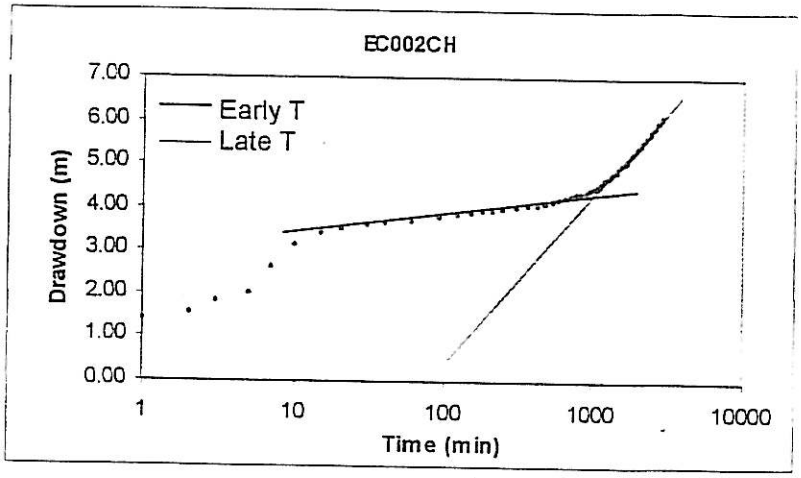


TEST INFORMATION

Date tested	11/04/2002	Water level (mbgl)	9.90	Depth of pump (mbgl)			50.2
CD duration	2880	CD discharge rate	5.79	CD drawdown			6.13
Available drawdown (m)	40.3	% Recovery after CD	95	%	after	2280	min

COOPER-JACOB ANALASYS GRAPH

EC/002/CH



CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/004/CH			PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				CLIENT:	Chris Hani District
BOREHOLE DEPTH (mbdl):	42.52	CASING DEPTH (mbdl):	13.66	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	41.65	CASING HEIGHT (magl):	0.00	OPERATOR:	Pieters Mbedzi
PUMP INLET DIAMETER (mm):		CASING ID (mm):	165.00	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	6.24	DATUM LEVEL (magl):	0.52	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 11/04/2002 TIME: 17h00

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.16		1	
2	0.17		2	
3	0.17	0.87	3	
5	0.19		5	
7	0.20		7	
10	0.21		10	
15	0.24		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 11/04/2002 TIME: 17h15

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	1.78	4.02	1	
2	1.92		2	
3	2.01		3	
5	2.10	4.04	5	
7	2.32		7	
10	2.52		10	
15	2.80		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 11/04/2002 TIME: 17h30

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	5.48		1	
2	8.51	6.5	2	
3	11.16	6.54	3	
5	23.30		5	
7	31.24	6.53	7	
10	34.64		10	
15	36.33		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 11/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	
2			2	
3			3	
5			5	
7			7	
10			10	
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE:

PUMP MANUFACTURER:

PUMP SERIAL No:

PUMP PULLEY DIAMETER (mm):

PUMP INTAKE DEPTH (m):

PUMP RPM:

PUMP CONDITION:

DISCHARGE RATE 5

DATE: 11/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	
2			2	
3			3	
5			5	
7			7	
10			10	
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER:

ENGINE MANUACTURER:

ENGINE MODEL:

ENGINE SERIAL No:

ENGINE PULLEY DIAMETER (mm):

POWER RATING (kW):

ENGINE CONDITION:

DISCHARGE RATE 6

DATE: TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	12.27
2			2	2.03
3			3	0.67
5			5	0.50
7			7	0.40
10			10	0.37
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	
			180	
			210	
			240	
			300	
			420	
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER:

CLASS OF RISER:

DIAMETER OF RISER (mm):

CONDITION OF RISER:

SHAFT DIAMETER (mm):

ELEMENT DIAMETER (mm):

ELEMENT STROKE (mm):

COMMENTS:

P. I. S 4.68

4.4

4.38

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ?

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/004/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	CLIENT:	Chris Hani District

BOREHOLE DEPTH (mbdl):	42.52	CASING DEPTH (mbdl):	13.66	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	41.65	CASING HEIGHT (magl):	0.00	OPERATOR:	Pieters Mbedzi
PUMP INLET DIAMETER (mm):	0.000	CASING ID (mm):	165.000	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	6.24	DATUM LEVEL (magl):	0.52		

DISCHARGE RATE 1

DATE: 11/04/2002
TIME: 18h00

Time (min)	Drawdown (m)	Yield (l/s)
1	0.47	
2	0.48	
3	0.48	0.810
5	0.48	
7	0.46	
10	0.46	0.810
15	0.46	
20	0.46	
30	0.45	
40	0.45	0.820
50	0.45	
60	0.45	
70	0.45	
80	0.45	0.820
90	0.45	
100	0.45	
110		
120		

Average yield: 0.815

Time (min)	Recovery 1 (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
(l/s)	

DISCHARGE RATE 2

DATE: 11/04/2002
TIME: 19h40

Time (min)	Drawdown (m)	Yield (l/s)
1	0.79	
2	0.81	
3	0.83	1.770
5	0.83	
7	0.84	
10	0.87	1.650
15	0.89	
20	0.91	
30	0.94	1.650
40	0.95	
50	0.98	1.660
60	0.98	
70	0.99	1.650
80	0.99	
90	1.01	
100	1.01	
110		
120		

Average yield: 1.676

Time (min)	Recovery 2 (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 11/04/2002
TIME: 21h20

Time (min)	Drawdown (m)	Yield (l/s)
1	1.12	
2	1.12	1.900
3	1.25	
4	1.27	2.500
7	1.30	
10	2.35	3.240
15	2.48	
20	2.62	
30	2.72	
40	2.77	3.240
50	2.81	
60	2.86	
70	2.88	3.240
80	2.92	
90	2.94	
100	2.96	
110		
120		

Average yield: 2.824

Time (min)	Recovery 3 (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 11/04/2002
TIME: 23h00

Time (min)	Drawdown (m)	Yield (l/s)
1	3.16	
2	3.20	
3	3.93	4.50
5	7.18	
7	8.79	
10	10.06	5.06
15	13.20	
20	15.74	
30	21.50	5.06
40	26.30	
50	29.26	
60	30.75	5.06
70	31.47	
80	31.80	5.04
90	32.65	
100	33.46	
110		
120		

Average yield: 4.944

Time (min)	Recovery 4 (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Time (min)	Recovery 5 (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 11/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		

Average yield:

Time (min)	Recovery (m)
1	6.83
2	1.25
3	0.78
5	0.65
7	0.60
10	0.55
15	0.50
20	0.46
30	0.44
40	0.40
50	0.37
60	0.35
70	0.32
80	0.30
90	0.27
100	0.25
110	0.23
120	0.21
150	0.18
180	0.16
210	0.12
240	0.1
300	
360	
420	
480	
540	
600	
660	
720	

COMMENTS:

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/004/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development		
DEPTH OF PUMP (mbdl):	41.65	PUMP TYPE USED:	BP22	OPERATOR:	Pieters Mbedzi
INLET DIAMETER (mm):	0	EXISTING EQUIPMENT:	0	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	12/04/2002	TEST COMPLETED	DATE:		TOTAL TIME - PUMPED (min):	2880
	TIME:	08h00		TIME:		TOTAL TIME RECOVERY (min):	1560

TOTAL TEST TIME (min):	2880
AVERAGE YIELD (l/s):	2.84

DISCHARGE BOREHOLE	
CASING HEIGHT (magl):	0.00
CASING DEPTH (mbdl):	13.66
CASING ID (mm):	165.00
BOREHOLE DEPTH (mbdl):	42.52
WATER LEVEL (mbdl):	6.24
DATUM LEVEL (magl):	0.52

OBSERVATION BOREHOLE 1	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL :	
DISTANCE (m):	

OBSERVATION BOREHOLE 2	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL :	
DISTANCE (m):	

OBSERVATION BOREHOLE 3	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL :	
DISTANCE (m):	

Time	Drawdown	Yield	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery
(min)	(m)	(l/s)	(m)	(min)	(m)	(m)	(min)	(m)	(m)	(min)	(m)	(m)
1	0.45		1.05	1			1			1		
2	0.48		0.94	2			2			2		
3	0.50	1.50	0.88	3			3			3		
5	0.68		0.83	5			5			5		
7	1.16	1.99	0.80	7			7			7		
10	1.34		0.76	10			10			10		
15	1.68	2.94	0.72	15			15			15		
20	1.75		0.69	20			20			20		
30	1.88	3.01	0.66	30			30			30		
40	1.98	2.94	0.63	40			40			40		
60	1.93	2.92	0.60	60			60			60		
90	1.98		0.56	90			90			90		
120	2.02	2.93	0.52	120			120			120		
150	2.05		0.50	150			150			150		
180	2.08		0.47	180			180			180		
210	2.10	2.93	0.45	210			210			210		
240	2.11		0.44	240			240			240		
300	2.14		0.41	300			300			300		
360	2.16		0.37	360			360			360		
420	2.19	2.93	0.36	420			420			420		
480	2.21		0.34	480			480			480		
540	2.22	2.90	0.33	540			540			540		
600	2.25	2.94	0.31	600			600			600		
660	2.27	2.94	0.30	720			720			720		
720	2.29	2.93	0.28	840			840			840		
780	2.32	2.94	0.27	960			960			960		
840	2.34	2.95	0.27	1080			1080			1080		
900	2.35	2.92	0.26	1200			1200			1200		
960	2.35	2.93	0.25	1320			1320			1320		
1020	2.36	2.93	0.25	1440			1440			1440		
1080	2.37	2.94	0.24	1800			1800			1800		
1140	2.39	2.94	0.23	2280			2280			2280		
1200	2.41	2.94	0.22	2880			2880			2880		
1260	2.42	2.93	0.21									
1320	2.44	2.94	0.20									
1380	2.45	2.94	0.20									
1440	2.45	2.94	0.18									

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)
1500	2.47		0.18	1500			1500			1500		
1560	2.48	2.94	0.16	1560			1560			1560		
1620	2.50			1620			1620			1620		
1680	2.50	2.93		1680			1680			1680		
1740	2.50	2.94		1740			1740			1740		
1800	2.53	2.95		1800			1800			1800		
1860	2.56	2.95		1860			1860			1860		
1920	2.57	2.94		1920			1920			1920		
1980	2.59	2.93		1980			1980			1980		
2040	2.59	2.94		2040			2040			2040		
2100	2.60	2.94		2100			2100			2100		
2160	2.60	2.94		2160			2160			2160		
2220	2.62	2.93		2220			2220			2220		
2280	2.63	2.94		2280			2280			2280		
2340	2.64	2.93		2340			2340			2340		
2400	2.66	2.95		2400			2400			2400		
2460	2.67	2.95		2460			2460			2460		
2520	2.68	2.93		2520			2520			2520		
2580	2.70	2.94		2580			2580			2580		
2640	2.72	2.93		2640			2640			2640		
2700	2.74	2.95		2700			2700			2700		
2760	2.74	2.94		2760			2760			2760		
2820	2.75	2.94		2820			2820			2820		
2880	2.75			2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No.
VERTICALITY TEST:		No.
CASING DETECTION:		No.
STEEL BOREHOLE COVER:		No.
BOREHOLE MARKING:		No.
SITE CLEANING / FINISHING:		No.
REPORTING & DATA RECORDING:		No.
SLUG TEST:		No.
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION STEP	1	2	3	4	5	6	TOTAL: (min)	TOTAL: (hrs)	RECOVERY: (m)	RECOVERY: (min)
CALIBRATION TEST:										
TEST DURATION (Minutes)	15	15	15				45	0.75	0.37	10
TEST YIELD (l/s)	0.87	4.03	5.52				MAXIMUM (l/s)	6.5		
DRAWDOWN (m)	0.24	2.80	36.33				MAXIMUM (m)	36.3		
MULTI-RATE / STEP DRAWDOWN:										
TEST DURATION (Minutes)	100	100	100	100			400	6.67	0.10	240
TEST YIELD (l/s)	0.82	1.68	2.82	4.94			MAXIMUM (l/s)	4.9		
DRAWDOWN (m)	0.5	1.01	2.96	33.46			MAXIMUM (m)	33.5		

RECOVERY TEST			
TIME TOTAL (hrs):			30.17
Cal	Steps	CD	Total
10	240	1560	1810
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTILISED		%
35.4	2.75		7.77

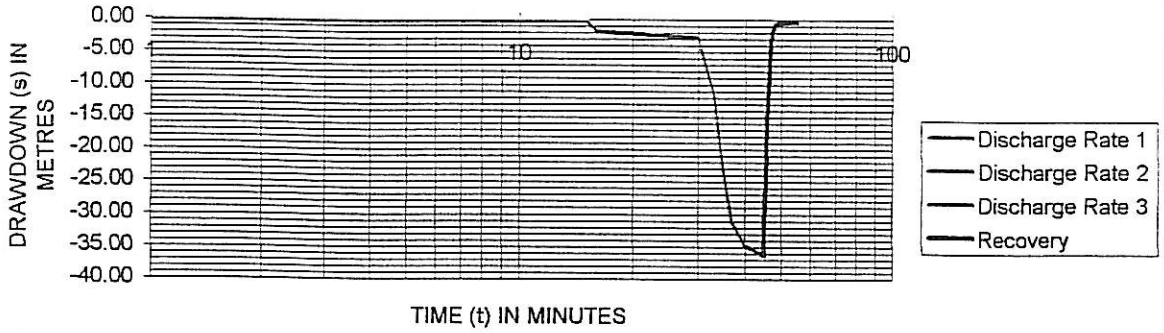
CONSTANT DISCHARGE TEST	TEST DURATION (min)	TEST DURATION (hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	%	(min)	(hrs)
	2880	48.00	2.84	2.75	2.16	94.18	1560	26.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	>2880 (min) Time	TOTAL: (min)	TOTAL: (hrs)
							0	0.00

BOREHOLE NUMBER: EC/004/CH

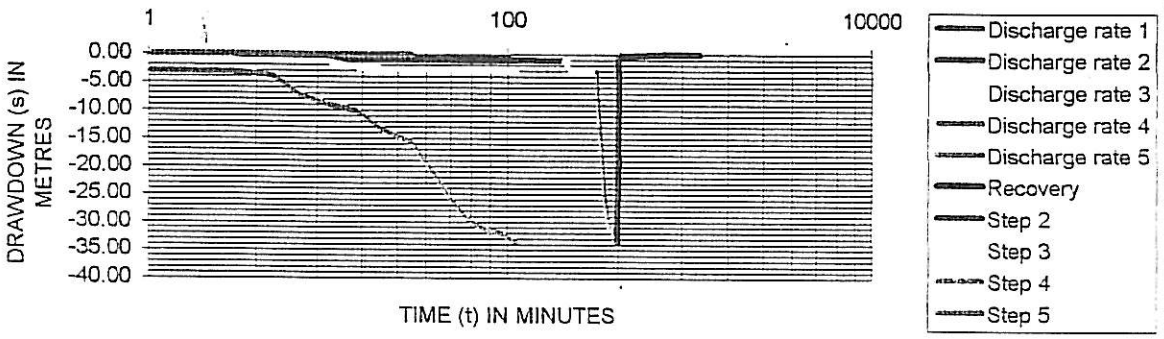
CALIBRATION TEST AND RECOVERY

ischarge 1:	0.87	Discharge 2:	4.03	Discharge 3:	6.52	Discharge 4:		Discharge 5:		Discharge 6:	
										Drawdown 1:	0.24
										Drawdown 2:	2.80
										Drawdown 3:	36.33
										Drawdown 4:	0.00
										Drawdown 5:	0.00
										Drawdown 6:	0.00
										Duration 1:	15
										Duration 2:	15
										Duration 3:	15
										Duration 4:	
										Duration 5:	
										Duration 6:	
										Recovery (m):	0.37
										Recovery (min):	10

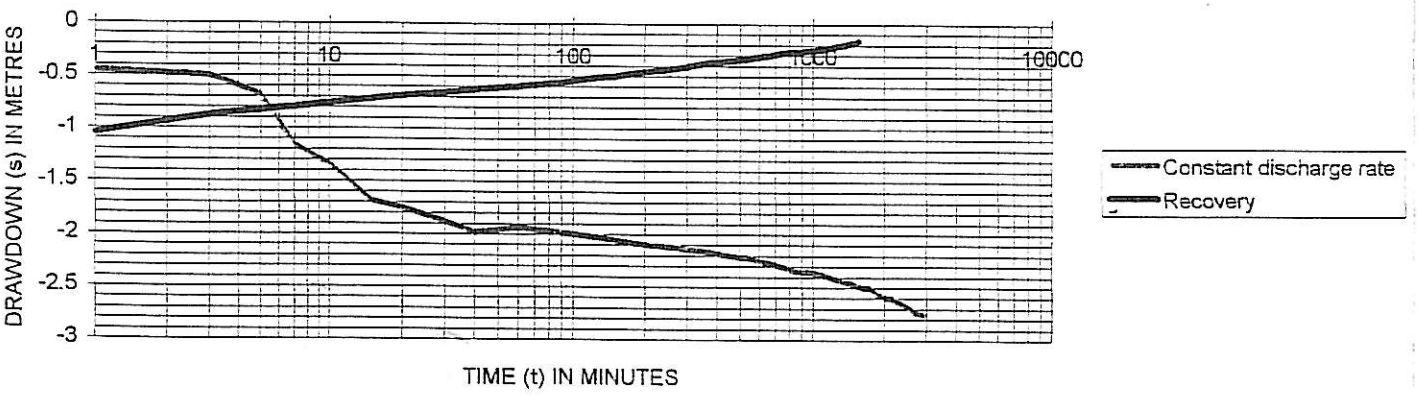


STEPPED DISCHARGE TEST AND RECOVERY

ischarge 1:	0.815	Discharge 2:	1.676	Discharge 3:	2.824	Discharge 4:	4.944	Discharge 5:		Discharge 6:	
										Drawdown 1:	0.48
										Drawdown 2:	1.01
										Drawdown 3:	2.96
										Drawdown 4:	33.46
										Drawdown 5:	0.00
										Drawdown 6:	
										Duration 1:	100
										Duration 2:	100
										Duration 3:	100
										Duration 4:	100
										Duration 5:	0
										Duration 6:	
										Recovery (m):	0.10
										Recovery (min):	240



CONSTANT DISCHARGE TEST AND RECOVERY

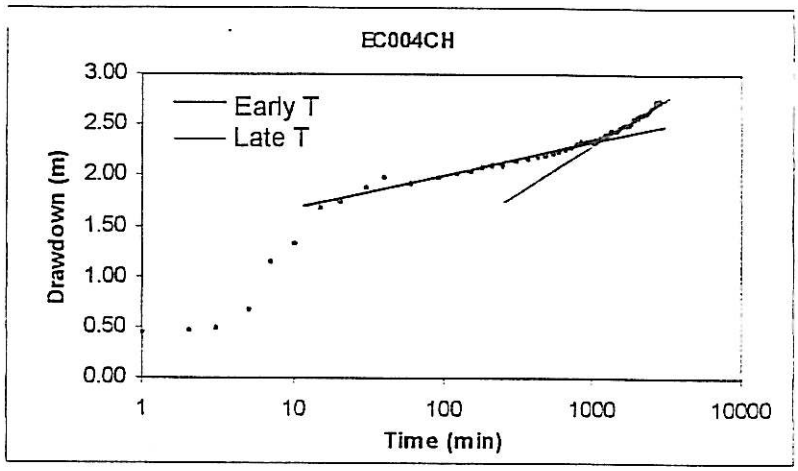


TEST INFORMATION

ate tested	12/04/2002	Water level (mbgl)	6.24	Depth of pump (mbgl)		41.65
D duration	2880	CD discharge rate	2.84	CD drawdown		2.75
vailable drawdown (m)	35.41	% Recovery after CD	94	% after	1560	min

COOPER-JACOB ANALASYS GRAPH

EC/004/CH



CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/005/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :		SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :		CLIENT:	Chris Hani District Municipality

BOREHOLE DEPTH (mbdl):	75.40	CASING DEPTH (mbdl):	15.45	PUMP TYPE USED:	BP 22
DEPTH OF PUMP (mbdl):	61.65	CASING HEIGHT (magl):	0.20	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):		CASING ID (mm):	165.00	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	5.26	DATUM LEVEL (magl):	0.21	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 14/04/2002 TIME: 12:00 AM

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.75		1	
2	1.14		2	
3	1.41	0.46	3	
5	1.73		5	
7	1.95	0.47	7	
10	2.19		10	
15	2.48		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 14/04/2002 TIME: 15h15

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	2.64		1	
2	2.75	0.68	2	
3	2.88		3	
5	3.32	0.81	5	
7	3.81		7	
10	4.22	0.82	10	
15	4.69		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 14/04/2002 TIME: 15h30

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	5.12		1	
2	5.47	1.23	2	
3	6.01		3	
5	6.64	1.22	5	
7	7.19		7	
10	7.75	1.23	10	
15	8.51		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 14/04/2002 TIME: 15h45

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	9.43		1	
2	10.43	2.28	2	
3	11.35		3	
5	12.68	2.3	5	
7	13.78		7	
10	14.72	2.3	10	
15	18.13		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE: Franklin Electronic

PUMP MANUFACTURER:

PUMP SERIAL No: 36982 / 904 460 v 536

PUMP PULLEY DIAMETER (mm):

PUMP INTAKE DEPTH (m): 36

PUMP RPM:

PUMP CONDITION: Broken

DISCHARGE RATE 5

DATE: 14/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	20.45		1	
2	23.73	3.05	2	
3	27.65	3.23	3	
5	38.92		5	
7	56.80	6.82.59	7	
10	P. I. S	215	10	
15	P. I. S		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER: Electricity

ENGINE MANUACTURER:

ENGINE MODEL:

ENGINE SERIAL No:

ENGINE PULLEY DIAMETER (mm):

POWER RATING (kW): 3.25 kw

ENGINE CONDITION:

DISCHARGE RATE 6

DATE: TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	45.54
2			2	37.80
3			3	30.37
5			5	17.49
7			7	13.11
10			10	10.88
15			15	7.79
			20	6.13
			30	4.28
			40	3.03
			50	2.55
			60	2.29
			70	2.08
			80	1.84
			90	1.72
			100	1.63
			110	1.51
			120	1.40
			150	1.32
			180	1.25
			210	1.18
			240	1.13
			300	0.81
			420	0.52
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER: Galvinised steel

CLASS OF RISER: 6

DIAMETER OF RISER (mm): 50mm

CONDITION OF RISER: Good

SHAFT DIAMETER (mm):

ELEMENT DIAMETER (mm): 90mm

ELEMENT STROKE (mm):

COMMENTS:

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ?

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/005/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	CLIENT:	Chris Hani District Municipality

BOREHOLE DEPTH (mbgl):	75.40	CASING DEPTH (mbdl):	15.45	PUMP TYPE USED:	BP 22
DEPTH OF PUMP (mbdl):	61.65	CASING HEIGHT (magl):	0.20	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):	0.000	CASING ID (mm):	165.000	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	5.26	DATUM LEVEL (magl):	0.21		

DISCHARGE RATE 1

DATE: 15/04/2002
TIME: 08h00

Time (min)	Drawdown (m)	Yield (l/s)
1	1.44	
2	1.98	0.630
3	2.33	
5	2.91	0.500
7	3.33	0.460
10	3.20	
15	3.05	0.450
20	3.09	
30	3.30	0.450
40	3.45	
50	3.61	0.460
60	3.74	
70	3.83	0.450
80	3.93	
90	4.03	0.450
100	4.12	
110		
120		

Average yield: 0.48125

Recovery 1

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
(l/s)	

DISCHARGE RATE 2

DATE: 15/04/2002
TIME: 09h40

Time (min)	Drawdown (m)	Yield (l/s)
1	4.43	
2	4.64	0.780
3	4.83	
5	5.21	0.820
7	5.47	
10	5.85	0.820
15	6.29	
20	6.52	0.810
30	6.89	
40	7.21	0.820
50	7.45	
60	7.67	0.820
70	7.86	
80	8.03	0.820
90	8.20	
100	8.31	
110		
120		

Average yield: 0.81285714

Recovery 2

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	9.23	
2	10.41	1.840
3	10.93	1.750
4	11.47	
7	12.14	1.650
10	12.64	
15	13.33	1.640
20	13.89	
30	14.62	1.640
40	15.94	
50	17.82	1.640
60	19.04	
70	21.47	1.650
80	22.03	
90	23.41	1.650
100	24.31	
110		
120		

Average yield: 1.6825

Recovery 3

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 15/04/2002
TIME: 13h00

Time (min)	Drawdown (m)	Yield (l/s)
1	25.89	
2	27.73	2.43
3	30.69	
5	35.82	2.57
7	40.02	
10	45.53	2.56
15	52.89	
20	56.80	2.56
30	P. I. S	2.17
40	P. I. S	1.89
50	P. I. S	1.77
60		
70		
80		
90		
100		
110		
120		

Average yield: 2.27857143

Recovery 4

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Recovery 5

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		

Average yield:

Recovery

Time (min)	Recovery (m)
1	46.38
2	39.53
3	33.18
5	23.47
7	19.30
10	15.24
15	11.00
20	10.45
30	8.71
40	7.58
50	6.75
60	6.13
70	5.63
80	5.20
90	4.88
100	4.50
110	4.19
120	3.95
150	3.42
180	3.05
210	2.89
240	2.68
300	2.49
360	
420	
480	
540	
600	
660	
720	

COMMENTS:

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/005/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District Municipality
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development		
DEPTH OF PUMP (mbdl):	61.65	PUMP TYPE USED:	BP 22	OPERATOR:	Christopher
INLET DIAMETER (mm):	0	EXISTING EQUIPMENT:	Franklin Electronic	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	15/04/2002	TEST COMPLETED	DATE:	17/04/2002	TOTAL TIME - PUMPED (min):	1440	TOTAL TEST TIME (min):	1440
	TIME:	15H20		TIME:	11H20	TOTAL TIME RECOVERY(min):	1200	AVERAGE YIELD (l/s):	1.27

DISCHARGE BOREHOLE	
CASING HEIGHT (magl):	0.20
CASING DEPTH (mbdl):	15.45
CASING ID (mm):	165.00
BOREHOLE DEPTH (mbdl):	75.40
WATER LEVEL (mbdl)	5.26
DATUM LEVEL (magl):	0.21

OBSERVATION BOREHOLE 1	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

OBSERVATION BOREHOLE 2	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

OBSERVATION BOREHOLE 3	
No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time	Drawdown	Yield	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery
(min)	(m)	(l/s)	(m)	(min)	(m)	(m)	(min)	(m)	(m)	(min)	(m)	(m)
1	3.89		33.86	1			1			1		
2	5.13	0.64	29.06	2			2			2		
3	5.41	0.92	25.23	3			3			3		
5	5.92	1.03	20.00	5			5			5		
7	6.40	1.34	16.63	7			7			7		
10	9.31		14.29	10			10			10		
15	10.91	1.34	13.69	15			15			15		
20	11.49		13.25	20			20			20		
30	12.62	1.33	12.55	30			30			30		
40	13.22		11.92	40			40			40		
60	14.26	1.34	10.70	60			60			60		
90	16.31		9.90	90			90			90		
120	18.35	1.34	9.27	120			120			120		
150	19.52		8.60	150			150			150		
180	20.40	1.34	7.95	180			180			180		
210	20.90		7.48	210			210			210		
240	21.85	1.34	7.17	240			240			240		
300	23.06		6.39	300			300			300		
360	24.49	1.35	5.88	360			360			360		
420	25.73		5.23	420			420			420		
480	26.57	1.34	4.93	480			480			480		
540	27.41		4.74	540			540			540		
600	28.65	1.33	4.53	600			600			600		
660	29.24		4.29	720			720			720		
720	30.83	1.33	4.02	840			840			840		
780	31.66		3.78	960			960			960		
840	32.95	1.34	3.51	1080			1080			1080		
900	33.76		3.40	1200			1200			1200		
960	34.35	1.34	3.19	1320			1320			1320		
1020	34.95		3.03	1440			1440			1440		
1080	35.54	1.34	2.89	1800			1800			1800		
1140	36.06		2.68	2280			2280			2280		
1200	36.49	1.34	2.52	2880			2880			2880		
1260	37.09											
1320	38.01	1.34										
1380	38.00	1.34										
1440	39.50											

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time	Drawdown	Yield	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery
(min)	(m)	(l/s)	(m)	(min)	(m)	(m)	(min)	(m)	(m)	(min)	(m)	(m)
1500				1500			1500			1500		
1560				1560			1560			1560		
1620				1620			1620			1620		
1680				1680			1680			1680		
1740				1740			1740			1740		
1800				1800			1800			1800		
1860				1860			1860			1860		
1920				1920			1920			1920		
1980				1980			1980			1980		
2040				2040			2040			2040		
2100				2100			2100			2100		
2160				2160			2160			2160		
2220				2220			2220			2220		
2280				2280			2280			2280		
2340				2340			2340			2340		
2400				2400			2400			2400		
2460				2460			2460			2460		
2520				2520			2520			2520		
2580				2580			2580			2580		
2640				2640			2640			2640		
2700				2700			2700			2700		
2760				2760			2760			2760		
2820				2820			2820			2820		
2880				2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No.
VERTICALITY TEST:		No.
CASING DETECTION:		No.
STEEL BOREHOLE COVER:		No.
BOREHOLE MARKING:		No.
SITE CLEANING / FINISHING:		No.
REPORTING & DATA RECORDING:		No.
SLUG TEST:		No.
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION	STEP	1	2	3	4	5	6	TOTAL: (min)	TOTAL: (hrs)	RECOVERY: (m)	RECOVERY: (min)
CALIBRATION TEST:											
TEST DURATION (Minutes)		15	15	15	15	15		75	1.25	0.52	420
TEST YIELD (l/s)		0.47	0.77	1.23	2.29	73.76		MAXIMUM (l/s)	73.8		
DRAWDOWN (m)		2.48	4.69	8.51	18.13	56.80		MAXIMUM (m)	56.8		
MULTI-RATE / STEP DRAWDOWN:											
TEST DURATION (Minutes)		100	100	100	20			320	5.33	2.49	300
TEST YIELD (l/s)		0.48	0.81	1.68	2.28			MAXIMUM (l/s)	2.3		
DRAWDOWN (m)		4.1	8.31	24.31	56.80			MAXIMUM (m)	56.8		

RECOVERY TEST			
TIME TOTAL (hrs):			32.00
Cal	Steps	CD	Total
420	300	1200	1920
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTIL-ISED	%	
56.4	39.50	70.05	

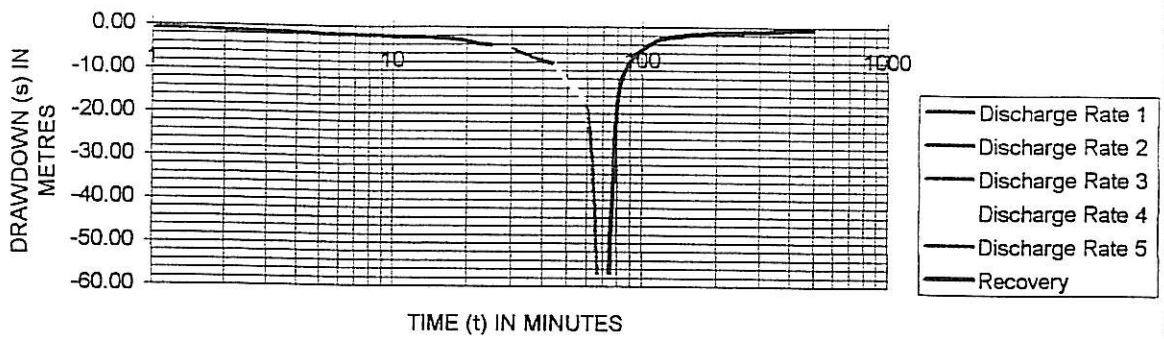
CONSTANT DISCHARGE TEST	TEST DURATION (min)	TEST DURATION (hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	RECOVERY: %	RECOVERY: (min)	RECOVERY: (hrs)
	1440	24.00	1.27	39.50	2.52	93.62	1200	20.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	>2880 (min) Time	TOTAL: (min)	TOTAL: (hrs)
							0	0.00

BOREHOLE NUMBER: EC/005/CH

CALIBRATION TEST AND RECOVERY

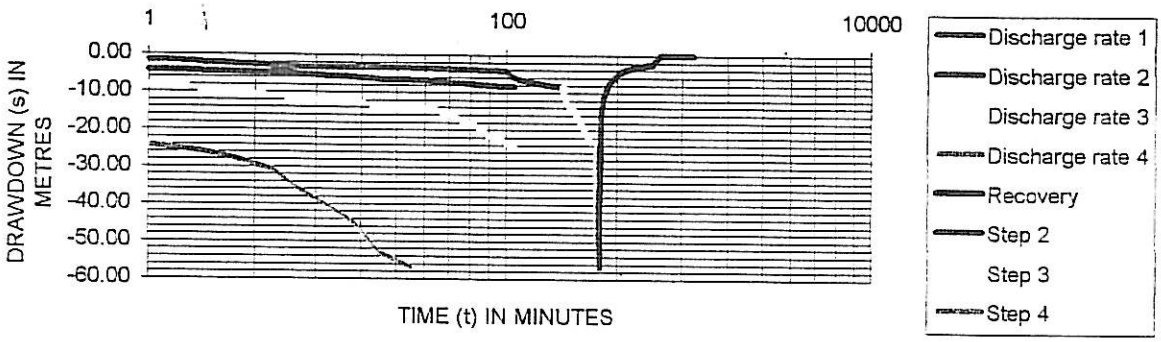
Discharge 1:	0.47	Discharge 2:	0.77	Discharge 3:	1.23	Discharge 4:	2.29	Discharge 5:	73.76	Discharge 6:	



Drawdown 1:	2.48
Drawdown 2:	4.69
Drawdown 3:	8.51
Drawdown 4:	18.13
Drawdown 5:	56.80
Drawdown 6:	0.00
Duration 1:	15
Duration 2:	15
Duration 3:	15
Duration 4:	15
Duration 5:	15
Duration 6:	
Recovery (m):	0.52
Recovery (min):	420

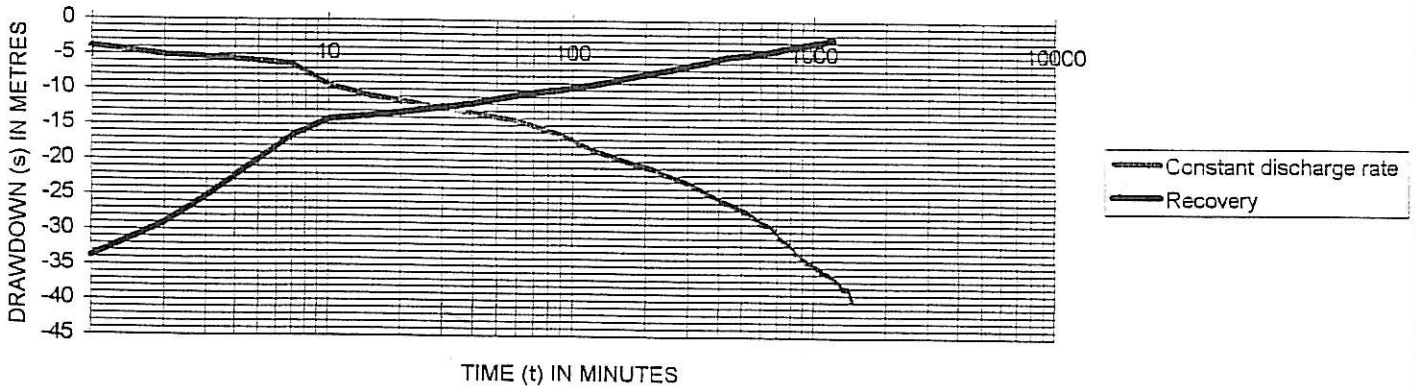
STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	0.48125	Discharge 2:	0.81286	Discharge 3:	1.6825	Discharge 4:	2.27857	Discharge 5:		Discharge 6:	



Drawdown 1:	4.12
Drawdown 2:	8.31
Drawdown 3:	24.31
Drawdown 4:	56.80
Drawdown 5:	0.00
Drawdown 6:	
Duration 1:	100
Duration 2:	100
Duration 3:	100
Duration 4:	20
Duration 5:	
Duration 6:	
Recovery (m):	2.49
Recovery (min):	300

CONSTANT DISCHARGE TEST AND RECOVERY

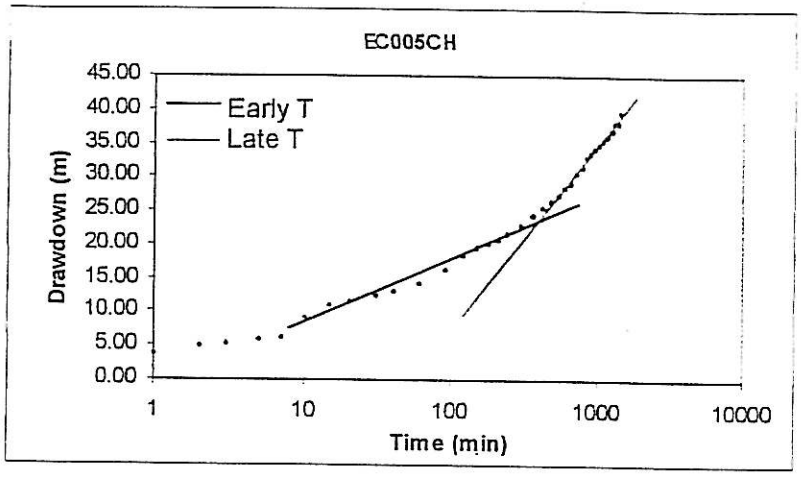


TEST INFORMATION

ate tested	15/04/2002	Water level (mbgl)	5.26	Depth of pump (mbgl)		61.65
D duration	1440	CD discharge rate	1.27	CD drawdown		39.5
Available drawdown (m)	56.39	% Recovery after CD	94	% after	1200	min

COOPER-JACOB ANALASYS GRAPH

EC/005/CH



CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/006/CH			PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				CLIENT:	Chris Hani District Municipality
BOREHOLE DEPTH (mbdl):	57.98	CASING DEPTH (mbdl):	4.44	PUMP TYPE USED:	P100
DEPTH OF PUMP (mbdl):	50.20	CASING HEIGHT (magl):	0.21	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):		CASING ID (mm):	165.00	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	3.54	DATUM LEVEL (magl):	0.48	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 17/04/2002 TIME: 06h45

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.42		1	
2	0.61		2	
3	0.66		3	
5	0.78		5	
7	0.89	0.37	7	
10	1.60		10	
15	1.28	0.37	15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 17/04/2002 TIME: 07h00

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	1.80		1	
2	1.67	0.71	2	
3	1.82		3	
5	2.03	0.82	5	
7	2.18		7	
10	2.37	0.83	10	
15	2.64		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 17/04/2002 TIME: 07h15

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	3.41		1	
2	3.84	1.88	2	
3	4.02		3	
5	4.37	1.9	5	
7	4.65		7	
10	5.00	1.92	10	
15	5.44		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 17/04/2002 TIME: 07h30

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	6.96		1	
2	8.06	3.6	2	
3	8.41		3	
5	9.13	3.61	5	
7	9.62		7	
10	10.18	3.6	10	
15	10.93		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE:

PUMP MANUFACTURER:

PUMP SERIAL No:

PUMP PULLEY DIAMETER (mm):

PUMP INTAKE DEPTH (m):

PUMP RPM:

PUMP CONDITION:

DISCHARGE RATE 5

DATE: 17/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	11.81		1	
2	12.59	4.48	2	
3	13.26	5.46	3	
5	14.43		5	
7	15.59	5.5	7	
10	16.50		10	
15	17.63		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER:

ENGINE MANUACTURER:

ENGINE MODEL:

ENGINE SERIAL No:

ENGINE PULLEY DIAMETER (mm):

POWER RATING (kW):

ENGINE CONDITION:

DISCHARGE RATE 6

DATE: TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	18.24		1	18.65
2	20.48	11.13	2	14.94
3	24.67		3	13.30
5	28.75	11.15	5	11.43
7	31.22		7	10.09
10	35.80	11.2	10	8.70
15	41.34		15	7.17
			20	6.08
			30	4.80
			40	4.09
			50	3.56
			60	3.14
			70	2.98
			80	2.83
			90	2.72
			100	2.64
			110	2.55
			120	2.47
			150	2.36
			180	2.29
			210	2.19
			240	2.08
			300	2.00
			360	1 28
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER:

CLASS OF RISER:

DIAMETER OF RISER.(mm):

CONDITION OF RISER:

SHAFT DIAMETER (mm):

ELEMENT DIAMETER (mm):

ELEMENT STROKE (mm):

COMMENTS:

New borehole

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ? Yes

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO.:	EC/006/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO.:	0	SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO.:	0	CLIENT:	Chris Hani District Municipality

BOREHOLE DEPTH (mbdl):	57.98	CASING DEPTH (mbdl):	4.44	PUMP TYPE USED:	P100
DEPTH OF PUMP (mbdl):	50.20	CASING HEIGHT (magl):	0.21	OPERATOR:	Christopher
PUMP INLET DIAMETER (mm):	0.000	CASING ID (mm):	165.000	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	3.54	DATUM LEVEL (magl):	0.48		

DISCHARGE RATE 1

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	3.53	
2	4.08	1.800
3	4.32	
5	4.99	2.290
7	5.86	
10	6.66	2.530
15	7.19	
20	7.75	2.530
30	8.42	
40	8.92	2.530
50	9.31	
60	9.66	2.540
70	9.89	
80	10.12	2.530
90	10.34	
100	10.53	
110		
120		

Average yield: 2.39285714 (l/s)

Recovery 1

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 2

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	12.73	
2	13.52	4.290
3	14.03	4.770
5	15.62	5.000
7	17.20	
10	17.57	5.040
15	18.13	
20	18.81	5.040
30	19.84	
40	20.77	5.400
50	21.61	
60	22.29	5.040
70	22.79	
80	23.09	5.030
90	23.59	
100	24.02	
110		
120		

Average yield: 4.95125

Recovery 2

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	27.73	
2	29.97	8.630
3	31.70	9.450
4	36.44	
7	42.90	10.120
10	47.78	
15	P. I. S.	7.890
20		7.750
30		7.560
40		
50		
60		
70		
80		
90		
100		
110		
120		

Average yield: 8.56666667

Recovery 3

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Average yield: #DIV/0!

Recovery 4

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Recovery 5

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 17/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		

Average yield:

Recovery

Time (min)	Recovery (m)
1	26.54
2	19.82
3	18.62
5	16.80
7	15.40
10	13.75
15	11.82
20	10.30
30	9.00
40	7.62
50	7.06
60	6.64
70	6.17
80	5.84
90	5.45
100	5.16
110	4.96
120	4.78
150	4.3
180	3.83
210	3.29
240	2.93
300	
360	
420	
480	
540	
600	
660	
720	

COMMENTS:

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/006/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District Municipality
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development		
DEPTH OF PUMP (mbdl):	50.20	PUMP TYPE USED:	P100	OPERATOR:	Christopher
INLET DIAMETER (mm):	0	EXISTING EQUIPMENT:	0	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	17/04/2002	TEST COMPLETED	DATE:	19/04/2002	TOTAL TIME - PUMPED (min):	1440	TOTAL TEST TIME (min):	1440
	TIME:	17H30		TIME:	17H30	TOTAL TIME RECOVERY(min):	1440	AVERAGE YIELD (l/s):	3.24

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
CASING HEIGHT (magl):			0.21	No. :			No. :			No. :		
CASING DEPTH (mbdl):			4.44	DATUM LEVEL (magl):			DATUM LEVEL (magl):			DATUM LEVEL (magl):		
CASING ID (mm):			165.00	CASING DEPTH (mbdl):			CASING DEPTH (mbdl):			CASING DEPTH (mbdl):		
BOREHOLE DEPTH (mbdl):			57.98	BOREHOLE DEPTH :			BOREHOLE DEPTH :			BOREHOLE DEPTH :		
WATER LEVEL (mbdl):			3.54	WATER LEVEL:			WATER LEVEL:			WATER LEVEL:		
DATUM LEVEL (magl):			0.48	DISTANCE (m):			DISTANCE (m):			DISTANCE (m):		
Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)
1	3.49		17.09	1			1			1		
2	3.93	2.83	16.07	2			2			2		
3	4.92	3.01	15.32	3			3			3		
5	7.42	3.27	14.37	5			5			5		
7	8.65		13.90	7			7			7		
10	9.77	3.26	13.26	10			10			10		
15	10.92		12.39	15			15			15		
20	11.61	3.26	11.74	20			20			20		
30	12.63		10.75	30			30			30		
40	13.24	3.26	10.23	40			40			40		
60	14.03		9.10	60			60			60		
90	14.81	3.27	8.05	90			90			90		
120	15.35		7.29	120			120			120		
150	15.77	3.26	6.69	150			150			150		
180	16.11		6.19	180			180			180		
210	16.58	3.26	5.74	210			210			210		
240	16.93		5.37	240			240			240		
300	17.34	3.27	4.82	300			300			300		
360	17.87		4.57	360			360			360		
420	17.99	3.27	4.18	420			420			420		
480	18.19		3.98	480			480			480		
540	18.40	3.26	3.63	540			540			540		
600	18.55		3.39	600			600			600		
660	18.72	3.26	3.06	720			720			720		
720	18.89		2.79	840			840			840		
780	19.03	3.26	2.43	960			960			960		
840	19.24		2.19	1080			1080			1080		
900	19.38	3.26	2.06	1200			1200			1200		
960	19.57		1.98	1320			1320			1320		
1020	19.84	3.26	1.87	1440			1440			1440		
1080	20.03		1.73	1800			1800			1800		
1140	20.18	3.25	1.64	2280			2280			2280		
1200	20.34		1.58	2880			2880			2880		
1260	20.51	3.60	1.53									
1320	20.68		1.49									
1380	20.84	3.26	1.45									
1440	20.98		1.42									

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)
1500				1500			1500			1500		
1560				1560			1560			1560		
1620				1620			1620			1620		
1680				1680			1680			1680		
1740				1740			1740			1740		
1800				1800			1800			1800		
1860				1860			1860			1860		
1920				1920			1920			1920		
1980				1980			1980			1980		
2040				2040			2040			2040		
2100				2100			2100			2100		
2160				2160			2160			2160		
2220				2220			2220			2220		
2280				2280			2280			2280		
2340				2340			2340			2340		
2400				2400			2400			2400		
2460				2460			2460			2460		
2520				2520			2520			2520		
2580				2580			2580			2580		
2640				2640			2640			2640		
2700				2700			2700			2700		
2760				2760			2760			2760		
2820				2820			2820			2820		
2880				2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No.
VERTICALITY TEST:		No.
CASING DETECTION:		No.
STEEL BOREHOLE COVER:		No.
BOREHOLE MARKING:		No.
SITE CLEANING / FINISHING:		No.
REPORTING & DATA RECORDING:		No.
SLUG TEST:		No.
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION STEP	1	2	3	4	5	6	TOTAL: (min)	(hrs)	RECOVERY: (m)	(min)
CALIBRATION TEST:										
TEST DURATION (Minutes)	15	15	15	15	15	15	90	1.50	1.28	360
TEST YIELD (l/s)	0.37	0.79	1.90	3.60	5.15	11.16	MAXIMUM (l/s)	11.2		
DRAWDOWN (m)	1.60	2.64	5.44	10.93	17.63	41.34	MAXIMUM (m)	41.3		
MULTI-RATE / STEP DRAWDOWN:										
TEST DURATION (Minutes)	100	100	10				210	3.50	2.93	240
TEST YIELD (l/s)	2.39	4.95	8.57				MAXIMUM (l/s)	8.6		
DRAWDOWN (m)	10.5	24.02	47.78				MAXIMUM (m)	47.8		

RECOVERY TEST			
TIME TOTAL (hrs):			34.00
Cal	Steps	CD	Total
360	240	1440	2040
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTILISED		%
46.7	20.98		44.96

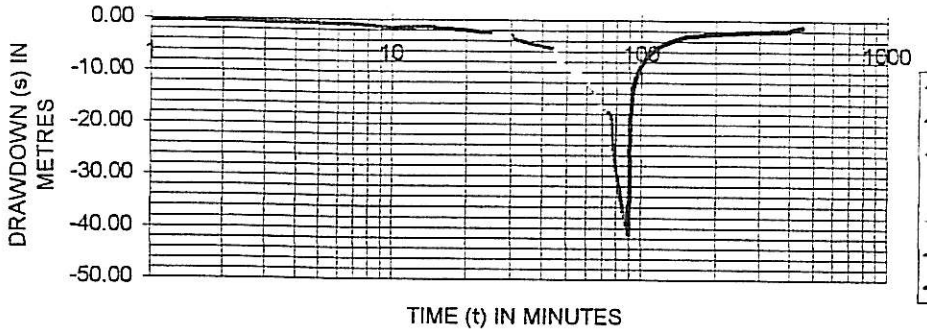
CONSTANT DISCHARGE TEST	TEST DURATION (min)	(hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	%	(min)	(hrs)
	1440	24.00	3.24	20.98	1.42	93.23	1440	24.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	Time	TOTAL: (min)	(hrs)
							0	0.00

BOREHOLE NUMBER: EC/006/CH

CALIBRATION TEST AND RECOVERY

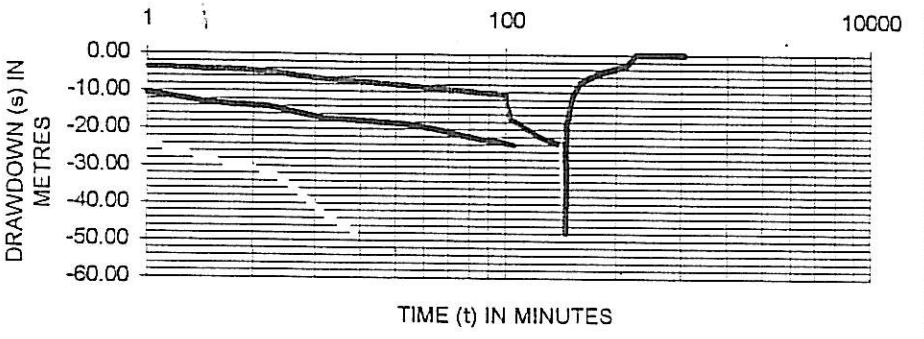
Discharge 1:	0.37	Discharge 2:	0.79	Discharge 3:	1.90	Discharge 4:	3.60	Discharge 5:	5.15	Discharge 6:	11.16



Drawdown 1:	1.60
Drawdown 2:	2.64
Drawdown 3:	5.44
Drawdown 4:	10.93
Drawdown 5:	17.63
Drawdown 6:	41.34
Duration 1:	15
Duration 2:	15
Duration 3:	15
Duration 4:	15
Duration 5:	15
Duration 6:	15
Recovery (m):	1.28
Recovery (min):	360

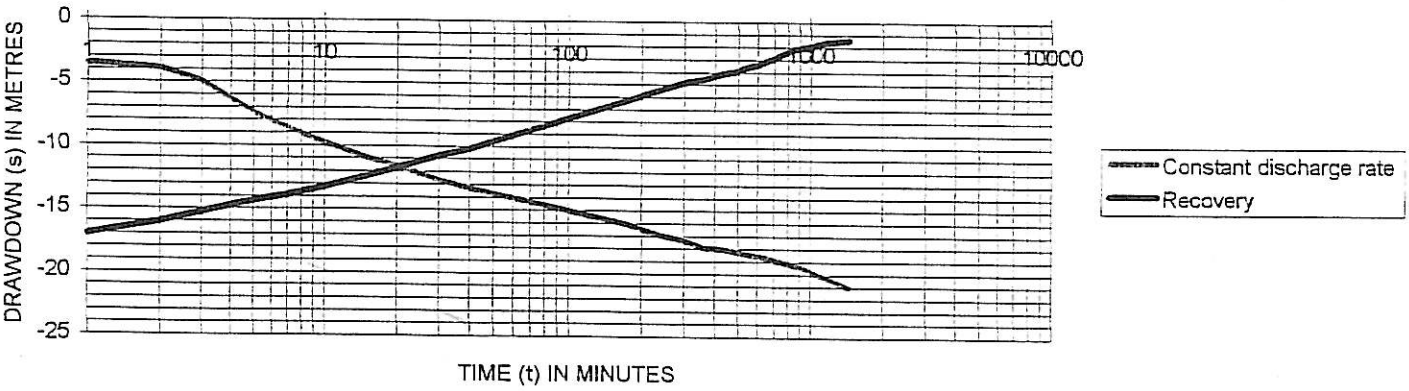
STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	2.39286	Discharge 2:	4.95125	Discharge 3:	8.56667	Discharge 4:		Discharge 5:		Discharge 6:	



Drawdown 1:	10.53
Drawdown 2:	24.02
Drawdown 3:	47.78
Drawdown 4:	0.00
Drawdown 5:	0.00
Drawdown 6:	
Duration 1:	100
Duration 2:	100
Duration 3:	100
Duration 4:	
Duration 5:	
Duration 6:	
Recovery (m):	2.93
Recovery (min):	240

CONSTANT DISCHARGE TEST AND RECOVERY

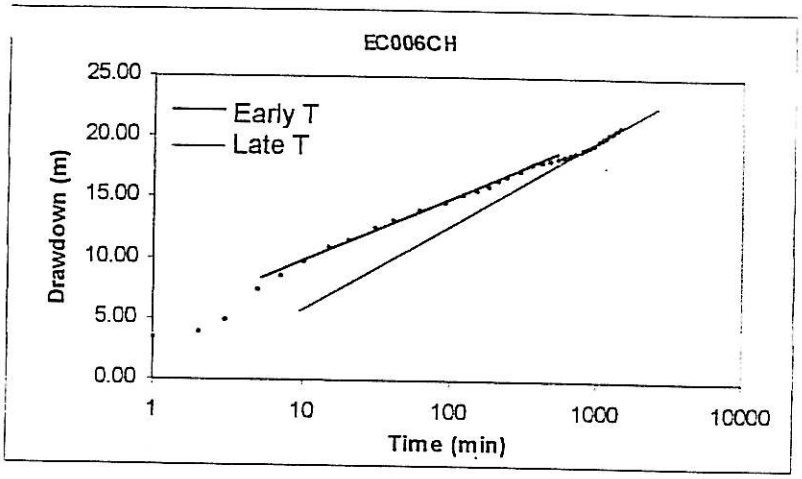


TEST INFORMATION

Date tested	17/04/2002	Water level (mbgl)	3.54	Depth of pump (mbgl)		50.2
CD duration	1440	CD discharge rate	3.24	CD drawdown		20.98
Available drawdown (m)	46.66	% Recovery after CD	93	% after	1440	min

COOPER-JACOB ANALASYS GRAPH

EC/006/CH



CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/008/CH			PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				CLIENT:	Chris Hani District Municipality
BOREHOLE DEPTH (mbdl):	71.23	CASING DEPTH (mbdl):	6.21	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	48.00	CASING HEIGHT (magl):	0.60	OPERATOR:	Isaac
PUMP INLET DIAMETER (mm):		CASING ID (mm):	1.65	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	22.58	DATUM LEVEL (magl):	0.26	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 19/04/2002 TIME: 12h40

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	1.13		1	
2	1.65		2	
3	1.94		3	
5	2.21		5	
7	2.41	0.36	7	
10	2.56		10	
15	2.81		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 19/04/2002 TIME: 12h55

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	2.99		1	
2	3.40		2	
3	3.51	0.6	3	
5	4.08		5	
7	4.42		7	
10	4.63	0.61	10	
15	4.83		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 19/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	5.29		1	
2	5.74	1.02	2	
3	6.30	1.66	3	
5	7.54		5	
7	8.95		7	
10	9.56	1.65	10	
15	10.35		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 19/04/2002 TIME: 13h25

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	11.50		1	
2	12.82		2	
3	14.80	3.98	3	
5	19.95		5	
7	22.91	3.99	7	
10	25.42		10	
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE: Frankin Electric

PUMP MANUFACTURER: Jacuzzi

PUMP SERIAL No: 360415 - V44 NFoH256H22

PUMP PULLEY DIAMETER (mm): 0.41

PUMP INTAKE DEPTH (m): 43.41

PUMP RPM:

PUMP CONDITION:

DISCHARGE RATE 5

DATE: 19/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	
2			2	
3			3	
5			5	
7			7	
10			10	
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER: Electric

ENGINE MANUACTURER:

ENGINE MODEL:

ENGINE SERIAL No:

ENGINE PULLEY DIAMETER (mm):

POWER RATING (kW): 2.25 kw 380v

ENGINE CONDITION:

DISCHARGE RATE 6

DATE: TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	17.03
2			2	11.69
3			3	9.10
5			5	6.36
7			7	4.97
10			10	3.82
15			15	2.60
			20	2.15
			30	1.48
			40	1.15
			50	0.95
			60	0.84
			70	
			80	
			90	
			100	
			110	
			120	
			150	
			180	
			210	
			240	
			300	
			420	
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER:

CLASS OF RISER:

DIAMETER OF RISER (mm):

CONDITION OF RISER:

SHAFT DIAMETER (mm):

ELEMENT DIAMETER (mm):

ELEMENT STROKE (mm):

COMMENTS:

P. I. S = 2.56
2.42
2.37

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ?

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/008/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	CLIENT:	Chris Hani District Municipality

BOREHOLE DEPTH (mbdl):	71.23	CASING DEPTH (mbdl):	6.21	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	48.00	CASING HEIGHT (magl):	0.60	OPERATOR:	Isaac
PUMP INLET DIAMETER (mm):	0.000	CASING ID (mm):	1.650	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	22.58	DATUM LEVEL (magl):	0.26		

DISCHARGE RATE 1

DATE: 19/04/2002
TIME: 14H10

Time (min)	Drawdown (m)	Yield (l/s)
1	1.34	
2	2.19	
3	3.31	
5	3.98	0.700
7	4.22	0.660
10	4.13	
15	4.05	0.540
20	4.21	
30	4.44	
40	4.80	0.550
50	4.86	
60	4.95	0.520
70	5.09	
80	5.19	0.530
90	5.26	
100	5.32	
110		
120		

Average yield: 0.58333333 (l/s)

Recovery 1

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 2

DATE: 19/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	8.37	
2	8.64	
3	8.80	1.040
5	9.13	
7	9.29	
10	9.49	1.050
15	9.95	
20	10.22	1.030
30	10.62	
40	10.80	1.040
50	10.95	1.020
60	11.06	
70	11.21	1.040
80	11.37	
90	11.43	1.030
100	11.50	
110		
120		

Average yield: 1.03571429

Recovery 2

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 19/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1	13.34	
2	14.82	1.970
3	16.35	2.030
4	18.05	
7	19.19	2.060
10	19.85	
15	20.46	
20	20.64	2.040
30	21.34	
40	21.75	2.050
50	22.07	
60	22.64	2.040
70	23.09	
80	23.70	2.030
90	24.10	
100	24.80	
110		
120		

Average yield: 2.03142857

Recovery 3

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 19/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Average yield: #DIV/0!

Recovery 4

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 19/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Recovery 5

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 19/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		

Average yield:

Recovery

Time (min)	Recovery (m)
1	18.28
2	14.76
3	12.00
5	9.42
7	8.04
10	6.72
15	5.60
20	4.84
30	4.36
40	3.78
50	3.57
60	3.04
70	2.72
80	2.64
90	2.56
100	2.49
110	2.42
120	2.35
150	2.28
180	2.21
210	2.14
240	2.07
300	
360	
420	
480	
540	
600	
660	
720	

COMMENTS:

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/008/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District Municipality
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom Groundwater Development		
DEPTH OF PUMP (mbdl):	48.00	PUMP TYPE USED:	BP22	OPERATOR:	Isaac
INLET DIAMETER (mm):	0	EXISTING EQUIPMENT:	Frankin Electric	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	19/04/2002	TEST COMPLETED	DATE:	22/04/2002	TOTAL TIME - PUMPED (min):	1440	TOTAL TEST TIME (min):	1440
	TIME:	06H10		TIME:	06H10	TOTAL TIME-RECOVERY(min):	1440	AVERAGE YIELD (l/s):	0.71

DISCHARGE BOREHOLE		OBSERVATION BOREHOLE 1		OBSERVATION BOREHOLE 2		OBSERVATION BOREHOLE 3	
CASING HEIGHT (magl):	0.60	No. :		No. :		No. :	
CASING DEPTH (mbdl):	6.21	DATUM LEVEL (magl):		DATUM LEVEL (magl):		DATUM LEVEL (magl):	
CASING ID (mm):	1.65	CASING DEPTH (mbdl):		CASING DEPTH (mbdl):		CASING DEPTH (mbdl):	
BOREHOLE DEPTH (mbdl):	71.23	BOREHOLE DEPTH :		BOREHOLE DEPTH :		BOREHOLE DEPTH :	
WATER LEVEL (mbdl):	22.58	WATER LEVEL:		WATER LEVEL:		WATER LEVEL:	
DATUM LEVEL (magl):	0.26	DISTANCE (m):		DISTANCE (m):		DISTANCE (m):	

Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)
1	4.18		10.48	1			1			1		
2	5.23		9.06	2			2			2		
3	6.15		8.31	3			3			3		
5	7.95	0.65	7.62	5			5			5		
7	8.77		7.60	7			7			7		
10	9.38	0.70	7.58	10			10			10		
15	10.15		7.58	15			15			15		
20	10.20		7.58	20			20			20		
30	10.48	0.71	7.57	30			30			30		
40	10.52	0.70	7.56	40			40			40		
60	10.68		7.54	60			60			60		
90	10.75		7.49	90			90			90		
120	10.80	0.70	7.45	120			120			120		
150	10.85		7.38	150			150			150		
180	10.89	0.71	7.32	180			180			180		
210	10.93		7.26	210			210			210		
240	10.96	0.72	7.18	240			240			240		
300	10.99	0.70	7.04	300			300			300		
360	11.09	0.71	6.97	360			360			360		
420	11.18	0.72	6.84	420			420			420		
480	11.27	0.70	6.79	480			480			480		
540	11.35	0.71	6.75	540			540			540		
600	11.40	0.72	6.70	600			600			600		
660	11.45	0.70	6.66	720			720			720		
720	11.50	0.72	6.62	840			840			840		
780	11.55	0.70	6.60	960			960			960		
840	11.60	0.71	6.56	1080			1080			1080		
900	11.66	0.70	6.53	1200			1200			1200		
960	11.71	0.71	6.48	1320			1320			1320		
1020	11.77	0.70	6.42	1440			1440			1440		
1080	11.84	0.72	6.37	1800			1800			1800		
1140	11.89	0.71	6.31	2280			2280			2280		
1200	11.94	0.73	6.26	2880			2880			2880		
1260	11.98	0.72	6.20									
1320	12.04	0.70	6.14									
1380	12.10	0.71	6.09									
1440	12.16	0.70	5.99									

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)	Time (min)	Drawdown (m)	Recovery (m)
1500				1500			1500			1500		
1560				1560			1560			1560		
1620				1620			1620			1620		
1680				1680			1680			1680		
1740				1740			1740			1740		
1800				1800			1800			1800		
1860				1860			1860			1860		
1920				1920			1920			1920		
1980				1980			1980			1980		
2040				2040			2040			2040		
2100				2100			2100			2100		
2160				2160			2160			2160		
2220				2220			2220			2220		
2280				2280			2280			2280		
2340				2340			2340			2340		
2400				2400			2400			2400		
2460				2460			2460			2460		
2520				2520			2520			2520		
2580				2580			2580			2580		
2640				2640			2640			2640		
2700				2700			2700			2700		
2760				2760			2760			2760		
2820				2820			2820			2820		
2880				2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No
VERTICALITY TEST:		No
CASING DETECTION:		No
STEEL BOREHOLE COVER:		No
BOREHOLE MARKING:		No
SITE CLEANING / FINISHING:		No
REPORTING & DATA RECORDING:		No
SLUG TEST:		No
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION STEP	1	2	3	4	5	6	TOTAL: (min)	(hrs)	RECOVERY: (m)	(min)
CALIBRATION TEST:										
TEST DURATION (Minutes)	15	15	15	10			55	0.92	0.84	60
TEST YIELD (l/s)	0.36	0.61	1.44	3.99			MAXIMUM (l/s)	4.0		
DRAWDOWN (m)	2.81	4.83	10.35	25.42			MAXIMUM (m)	25.4		
MULTI-RATE / STEP DRAWDOWN:										
TEST DURATION (Minutes)	100	100	100				300	5.00	2.07	420
TEST YIELD (l/s)	0.58	1.04	2.03				MAXIMUM (l/s)	2.0		
DRAWDOWN (m)	5.3	11.50	24.80				MAXIMUM (m)	24.8		

RECOVERY TEST			
TIME TOTAL (hrs):			32.00
Cal	Steps	CD	Total
60	420	1440	1920
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTIL-ISED		%
25.4	12.16		47.84

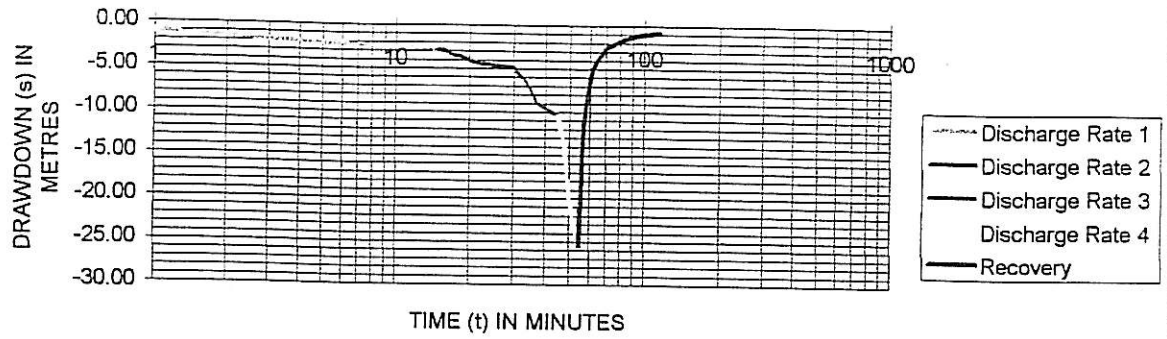
CONSTANT DISCHARGE TEST	TEST DURATION (min)	(hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	%	(min)	(hrs)
	1440	24.00	0.71	12.16	5.99	50.74	1440	24.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	Time	TOTAL: (min)	(hrs)
							0	0.00

BOREHOLE NUMBER: EC/008/CH

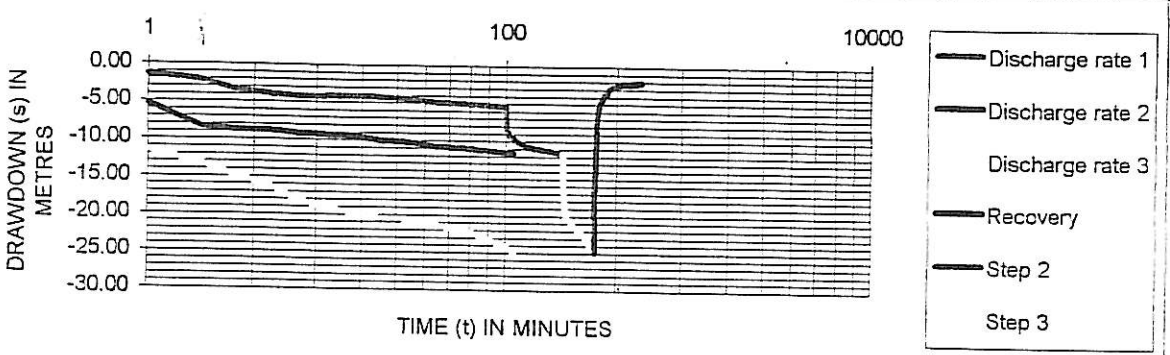
CALIBRATION TEST AND RECOVERY

Discharge 1:	0.36	Discharge 2:	0.61	Discharge 3:	1.44	Discharge 4:	3.99	Discharge 5:		Discharge 6:	
										Drawdown 1:	2.81
										Drawdown 2:	4.83
										Drawdown 3:	10.35
										Drawdown 4:	25.42
										Drawdown 5:	0.00
										Drawdown 6:	0.00
										Duration 1:	15
										Duration 2:	15
										Duration 3:	15
										Duration 4:	10
										Duration 5:	
										Duration 6:	
										Recovery (m):	0.84
										Recovery (min):	60

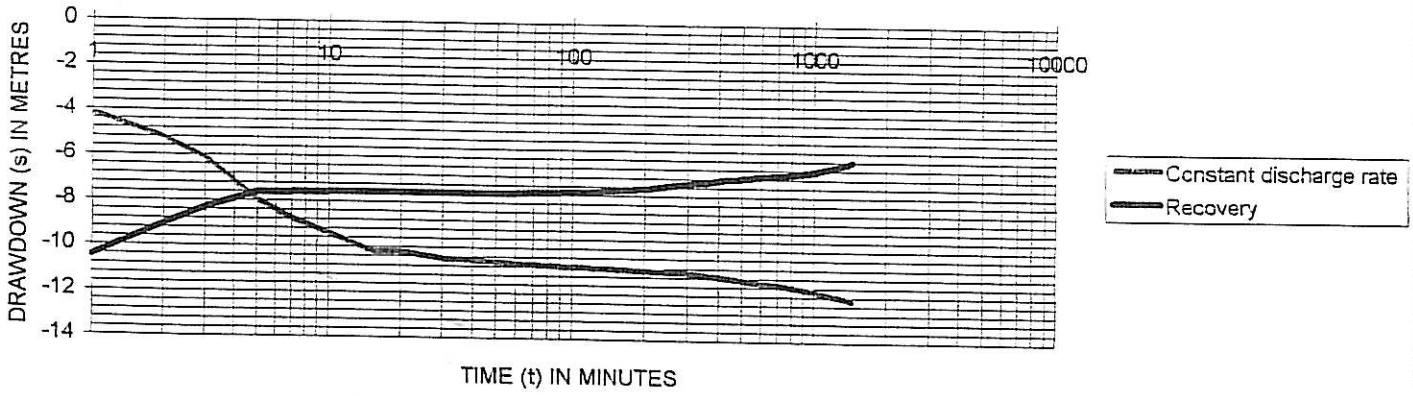


STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	0.58333	Discharge 2:	1.03571	Discharge 3:	2.03143	Discharge 4:		Discharge 5:		Discharge 6:	
										Drawdown 1:	5.32
										Drawdown 2:	11.50
										Drawdown 3:	24.80
										Drawdown 4:	0.00
										Drawdown 5:	0.00
										Drawdown 6:	
										Duration 1:	100
										Duration 2:	100
										Duration 3:	100
										Duration 4:	
										Duration 5:	
										Duration 6:	
										Recovery (m):	2.07
										Recovery (min):	420



CONSTANT DISCHARGE TEST AND RECOVERY

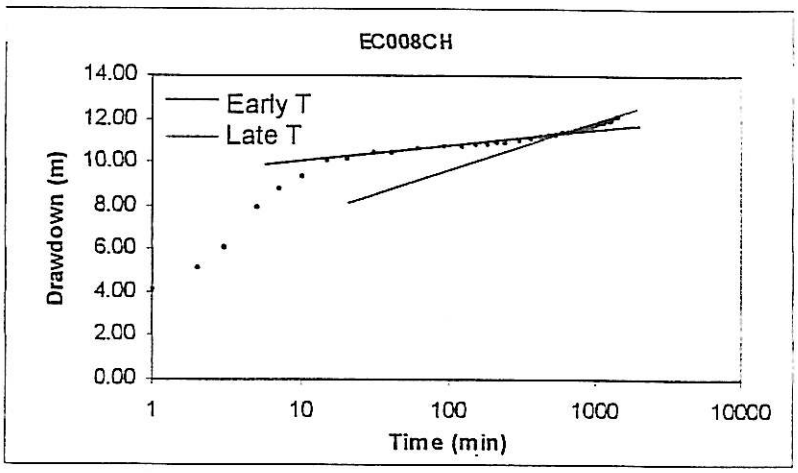


TEST INFORMATION

ate tested	19/04/2002	Water level (mbgl)	22.58	Depth of pump (mbgl)		48
D duration	1440	CD discharge rate	0.71	CD drawdown		12.16
vailable drawdown (m)	25.42	% Recovery after CD	51	% after	1440	min

COOPER-JACOB ANALASYS GRAPH

EC/008/CH



CALIBRATION TEST AND RECOVERY

BOREHOLE NO. :	EC/009/CH			PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :				SITE NAME:	Sterkstroom
ALTERNATIVE NO. :				CLIENT:	Chris Hani District Municipality
BOREHOLE DEPTH (mbdl):	53.49	CASING DEPTH (mbdl):	3.80	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	52.00	CASING HEIGHT (magl):	0.27	OPERATOR:	Isaac
PUMP INLET DIAMETER (mm):	800.00	CASING ID (mm):	165.00	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	25.40	DATUM LEVEL (magl):	0.46	SUPERVISOR:	

DISCHARGE RATE 1

DATE: 15/04/2002 TIME: 19h15

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	0.64		1	
2	0.64		2	
3	0.65	0.76	3	
5	0.75		5	
7	0.84	0.77	7	
10	0.98		10	
15	1.03		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF RESERVOIR:

RESERVOIR SIZE:

RESERVOIR CONITION:

STAND HEIGHT (m):

DISCHARGE RATE 2

DATE: 15/04/2002 TIME: 19h30

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	1.84		1	
2	1.98		2	
3	2.21	2.47	3	
5	2.55		5	
7	2.92	2.46	7	
10	3.18		10	
15	3.55		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF ENCLOSURE:

MATERIAL OF ENCLOSURE:

CONDITION OF ENCLOSURE:

WATER METER MANUFACTURER:

WATER METER READING:

DISCHARGE RATE 3

DATE: 15/04/2002 TIME: 19h45

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	6.80		1	
2	7.75		2	
3	9.57	7.12	3	
5	10.34		5	
7	11.62	7.14	7	
10	12.70		10	
15	13.94		15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PRESSURE GAUGE MANUFACTURER:

GAUGE READING (KpA):

MONITORING FACILITY:

MAINTAINED:

DISCHARGE RATE 4

DATE: 15/04/2002 TIME: 19h50

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1	17.48		1	
2	19.07		2	
3	20.50	15.04	3	
5	23.94		5	
7	26.12		7	
10	P. I. S.	13.04	10	
15	P. I. S.	12.89	15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

PUMP TYPE: Franklin Electric

PUMP MANUFACTURER: Jacuzzi

PUMP SERIAL No: 33632993 2124-09-0/91

PUMP PULLEY DIAMETER (mm): 80

PUMP INTAKE DEPTH (m): 52.81m

PUMP RPM: 0.2875

PUMP CONDITION:

DISCHARGE RATE 5

DATE: 15/04/2002 TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	
2			2	
3			3	
5			5	
7			7	
10			10	
15			15	
			20	
			30	
			40	
			50	
			60	
			70	
			80	
			90	
			100	
			110	
			120	
			150	

EXISTING EQUIPMENT DETAIL:

TYPE OF POWER: Electric

ENGINE MANUACTURER:

ENGINE MODEL:

ENGINE SERIAL No:

ENGINE PULLEY DIAMETER (mm):

POWER RATING (kW): 7.5 kw

ENGINE CONDITION:

DISCHARGE RATE 6

DATE: TIME:

Time (min)	Drawdown (m)	Yield (l/s)	Time (min)	Recovery (m)
1			1	16.32
2			2	15.82
3			3	13.48
5			5	12.18
7			7	11.07
10			10	10.10
15			15	9.42
			20	8.54
			30	7.10
			40	6.26
			50	5.38
			60	4.94
			70	4.43
			80	4.03
			90	3.73
			100	3.38
			110	3.22
			120	3.05
			150	2.69
			180	
			210	
			240	
			300	
			420	
			480	
			540	
			600	
			660	

EXISTING EQUIPMENT DETAIL:

TYPE OF RISER:

CLASS OF RISER:

DIAMETER OF RISER (mm):

CONDITION OF RISER:

SHAFT DIAMETER (mm):

ELEMENT DIAMETER (mm):

ELEMENT STROKE (mm):

COMMENTS:

DID THE BOREHOLE PRODUCE ANY SILT / SAND / GRAVEL ?

STEPPED DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/009/CH	PROJECT:	Sterkstroom Groundwater Development
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom
ALTERNATIVE NO. :	0	CLIENT:	Chris Hani District Municipality

BOREHOLE DEPTH (mbdl):	53.49	CASING DEPTH (mbdl):	3.80	PUMP TYPE USED:	BP22
DEPTH OF PUMP (mbdl):	52.00	CASING HEIGHT (magl):	0.27	OPERATOR:	Isaac
PUMP INLET DIAMETER (mm):	800.000	CASING ID (mm):	165.000	CONTRACTOR:	AB Pumps
STATIC WATER LEVEL (mbdl):	25.40	DATUM LEVEL (magl):	0.46		

DISCHARGE RATE 1

DATE: 15/04/2002
TIME: 23H00

Time (min)	Drawdown (m)	Yield (l/s)
1	3.30	
2	3.51	
3	3.55	1.790
5	4.19	
7	4.50	202.000
10	4.66	
15	4.91	
20	5.10	2.030
30	5.59	
40	5.93	2.020
50	6.19	
60	6.42	2.010
70	6.69	
80	6.84	
90	6.95	2.050
100	7.10	
110		
120		

Average yield: 35.3166667 (l/s)

Recovery 1

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 2

DATE: 15/04/2002
TIME: 00H40

Time (min)	Drawdown (m)	Yield (l/s)
1	8.42	
2	8.35	4.440
3	8.95	4.230
5	8.84	3.860
7	9.06	
10	9.52	4.030
15	9.84	
20	10.21	4.060
30	10.64	
40	11.10	4.050
50	11.74	4.020
60	12.28	
70	12.64	4.030
80	13.00	
90	13.54	4.020
100	14.01	
110		
120		

Average yield: 4.08222222

Recovery 2

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 3

DATE: 15/04/2002
TIME: 02H20

Time (min)	Drawdown (m)	Yield (l/s)
1	14.94	
2	16.23	
3	17.29	
5	18.43	8.040
7	19.31	
10	20.24	8.020
15	21.38	
20	22.29	
30	23.78	8.030
40	25.12	
50	26.12	
60	P. I. S	5.940
70	P. I. S	5.720
80	P. I. S	5.560
90		
100		
110		
120		

Average yield: 6.885

Recovery 3

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 4

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Average yield: #DIV/0!

Recovery 4

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	

DISCHARGE RATE 5

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		

Recovery 5

Time (min)	Recovery (m)
1	
2	
3	
5	
7	
10	
15	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
150	
180	
210	
240	
300	
360	
420	
480	
540	
600	
660	
720	
780	

DISCHARGE RATE 6

DATE: 15/04/2002
TIME:

Time (min)	Drawdown (m)	Yield (l/s)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
50		
60		
70		
80		
90		
100		
110		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
660		
720		

Average yield:

Recovery

Time (min)	Recovery (m)
1	19.66
2	19.02
3	18.76
5	17.96
7	17.43
10	16.68
15	15.93
20	15.18
30	14.42
40	13.66
50	12.90
60	12.24
70	11.50
80	11.04
90	10.89
100	10.23
110	9.57
120	8.91
150	7.58
180	7.14
210	6.84
240	6.24
300	5.97
360	5.34
420	4.09
480	
540	
600	
660	
720	

COMMENTS:

Step 3 pumped sand

CONSTANT DISCHARGE TEST AND RECOVERY

BOREHOLE NO. :	EC/009/CH	PROJECT:	Sterkstroom Groundwater Development	CLIENT:	Chris Hani District Municipality
ALTERNATIVE NO. :	0	SITE NAME:	Sterkstroom		
DEPTH OF PUMP (mbdl):	52.00	PUMP TYPE USED:	BP22	OPERATOR:	Isaac
INLET DIAMETER (mm):	800	EXISTING EQUIPMENT:	Franklin Electric	CONTRACTOR:	AB Pumps

TEST STARTED	DATE:	16/04/2002	TEST COMPLETED	DATE:	19/04/2002	TOTAL TIME - PUMPED (min):	2160	TOTAL TEST TIME (min):	2160
	TIME:	12h30		TIME:	12h30	TOTAL TIME RECOVERY (min):	2160	AVERAGE YIELD (l/s):	1.81

DISCHARGE BOREHOLE

CASING HEIGHT (magl):	0.27
CASING DEPTH (mbdl):	3.80
CASING ID (mm):	165.00
BOREHOLE DEPTH (mbdl):	53.49
WATER LEVEL (mbdl):	25.40
DATUM LEVEL (magl):	0.46

Time (min)	Drawdown (m)	Yield (l/s)	Recovery (m)
1	4.55		15.16
2	4.61		12.42
3	4.62	0.94	12.40
5	4.63		12.34
7	4.66		12.21
10	4.70	1.85	12.08
15	4.92		11.83
20	5.42	1.86	11.63
30	7.04		11.39
40	7.46		11.10
60	7.74	1.85	10.95
90	7.99		10.73
120	8.24	1.84	10.51
150	8.58		10.29
180	8.94	1.86	10.07
210	9.34		9.85
240	9.82	1.35	9.63
300	10.24	1.84	9.41
360	10.56	1.83	9.02
420	10.84	1.84	8.84
480	11.00	1.85	8.78
540	11.24	1.84	8.70
600	11.56	1.82	8.62
660	11.89	1.84	8.57
720	12.19	1.85	8.51
780	12.47	1.83	8.45
840	12.73	1.84	8.40
900	12.99	1.85	8.36
960	13.10	1.84	8.30
1020	13.68	1.85	8.26
1080	13.98	1.84	8.23
1140	14.15	1.86	8.19
1200	14.36	1.85	8.05
1260	14.71	1.84	7.96
1320	14.99	1.86	7.97
1380	15.24	1.85	7.88
1440	15.60	1.84	7.84

OBSERVATION BOREHOLE 1

No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time (min)	Drawdown (m)	Recovery (m)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
60		
90		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
720		
840		
960		
1080		
1200		
1320		
1440		
1800		
2280		
2880		

OBSERVATION BOREHOLE 2

No. :	EC/008/CH
DATUM LEVEL (magl):	0.23
CASING DEPTH (mbdl):	3.21
BOREHOLE DEPTH :	71.23
WATER LEVEL:	22.58
DISTANCE (m):	100

Time (min)	Drawdown (m)	Recovery (m)
1		0.99
2		0.98
3		0.97
5		0.96
7		0.95
10		0.94
15		0.93
20		0.92
30		0.91
40		0.90
60	0.05	0.89
90		0.88
120	0.09	0.87
150		0.86
180	0.10	0.85
210		0.84
240	0.14	0.83
300	0.19	0.82
360	0.22	0.81
420	0.25	0.79
480	0.28	0.78
540	0.31	0.77
600	0.34	0.76
660	0.34	0.75
720	0.37	0.74
780	0.40	0.73
840	0.40	0.73
900	0.46	0.72
960	0.48	0.72
1020	0.50	0.71
1080	0.54	0.70
1140	0.59	0.70
1200	0.64	0.69
1260	0.68	0.69
1320	0.71	0.69
1380	0.75	0.68
1440	0.78	0.68

OBSERVATION BOREHOLE 3

No. :	
DATUM LEVEL (magl):	
CASING DEPTH (mbdl):	
BOREHOLE DEPTH :	
WATER LEVEL:	
DISTANCE (m):	

Time (min)	Drawdown (m)	Recovery (m)
1		
2		
3		
5		
7		
10		
15		
20		
30		
40		
60		
90		
120		
150		
180		
210		
240		
300		
360		
420		
480		
540		
600		
720		
840		
960		
1080		
1200		
1320		
1440		
1800		
2280		
2880		

DISCHARGE BOREHOLE				OBSERVATION BOREHOLE 1			OBSERVATION BOREHOLE 2			OBSERVATION BOREHOLE 3		
Time	Drawdown	Yield	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery	Time	Drawdown	Recovery
(min)	(m)	(l/s)	(m)	(min)	(m)	(m)	(min)	(m)	(m)	(min)	(m)	(m)
1500	15.96	1.85	7.79	1500			1500	0.80	0.67	1500		
1560	16.34	1.84	7.75	1560			1560	0.83	0.67	1560		
1620	16.34	1.85	7.71	1620			1620	0.85	0.66	1620		
1680	16.98	1.86	7.67	1680			1680	0.88	0.66	1680		
1740	17.28	1.85	7.63	1740			1740	0.90	0.65	1740		
1800	17.59	1.86	7.52	1800			1800	0.92	0.65	1800		
1860	17.84	1.85	7.48	1860			1860	0.94	0.64	1860		
1920	18.16	1.87	7.45	1920			1920	0.96	0.64	1920		
1980	18.47	1.86	7.41	1980			1980	0.98	0.63	1980		
2040	18.76	1.85	7.38	2040			2040	1.00	0.63	2040		
2100	19.05	1.84	7.35	2100			2100	1.02	0.62	2100		
2160	19.39		7.32	2160			2160	1.04	0.62	2160		
2220				2220			2220			2220		
2280				2280			2280			2280		
2340				2340			2340			2340		
2400				2400			2400			2400		
2460				2460			2460			2460		
2520				2520			2520			2520		
2580				2580			2580			2580		
2640				2640			2640			2640		
2700				2700			2700			2700		
2760				2760			2760			2760		
2820				2820			2820			2820		
2880				2880			2880			2880		

DESCRIPTION:	QUANTITY:	UNIT:
ESTABLISHMENT		Sum
INTER HOLE MOVE > 10 km		Km.
FROM: SITE NAME:		
BOREHOLE No:		
INTER HOLE MOVE < 10 km:		No.
REMOVAL AND RE-ERECTION OF PUMP HOUSE:		No.
REMOVAL OF EXISTING EQUIPMENT:		No.
RE-INSTALLATION OF EXISTING EQUIPMENT:		No.
WORK TIME RATE (REPAIRS):		Hour
STANDING TIME:		Hour
LATITUDE: LONGITUDE:		

SUMMARY

DESCRIPTION:	QUANTITY:	UNIT
STRAIGHTNESS TEST:		No.
VERTICALITY TEST:		No.
CASING DETECTION:		No.
STEEL BOREHOLE COVER:		No.
BOREHOLE MARKING:		No.
SITE CLEANING / FINISHING:		No.
REPORTING & DATA RECORDING:		No.
SLUG TEST:		No.
LAYFLAT (m):		m
BOREHOLE DEPTH AFTER TEST:		m
BOREHOLE WATERLEVEL AFTER TEST:		m

TEST DESCRIPTION	STEP	1	2	3	4	5	6	TOTAL: (min)	TOTAL: (hrs)	RECOVERY: (m)	RECOVERY: (min)
CALIBRATION TEST:											
TEST DURATION (Minutes)		15	15	15	7			52	0.87	2.69	150
TEST YIELD (l/s)		0.77	2.47	7.13	13.66			MAXIMUM (l/s)	13.7		
DRAWDOWN (m)		1.03	3.55	13.94	26.12			MAXIMUM (m)	26.1		
MULTI-RATE / STEP DRAWDOWN:											
TEST DURATION (Minutes)		100	100	50				250	4.17	4.09	420
TEST YIELD (l/s)		35.32	4.08	6.89				MAXIMUM (l/s)	35.3		
DRAWDOWN (m)		7.1	14.01	26.12				MAXIMUM (m)	26.1		

RECOVERY TEST			
TIME TOTAL (hrs):			45.50
Cal	Steps	CD	Total
150	420	2160	2730
DRAWDOWN TOTALS (CD):			
AVAILABLE	UTIL-ISED		%
26.6	19.39		72.89

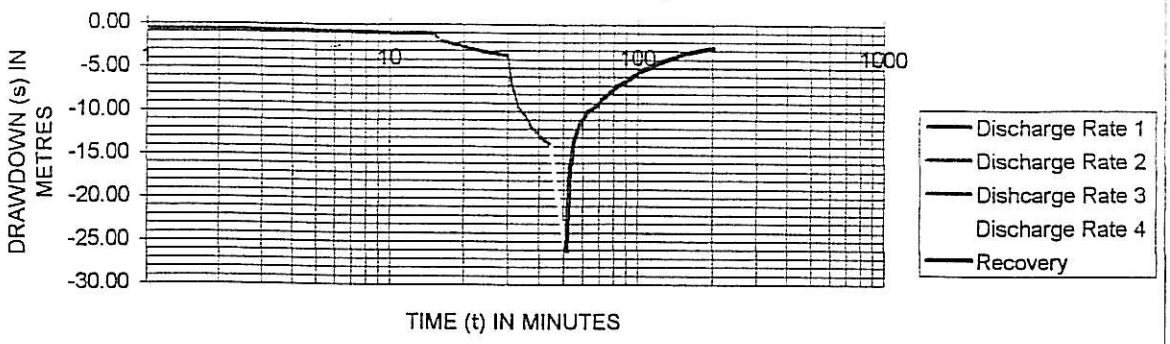
CONSTANT DISCHARGE TEST	TEST DURATION (min)	TEST DURATION (hrs)	TEST YIELD (l/s)	DRAWDOWN (m)	RECOVERY: (m)	RECOVERY: %	RECOVERY: (min)	RECOVERY: (hrs)
	2160	36.00	1.81	19.39	7.32	62.25	2160	36.00

OBSERVATION BOREHOLES:	No. of boreholes	720 (min)	1440 (min)	2880 (min)	>2880 (min) nr.	>2880 (min) Time	TOTAL: (min)	TOTAL: (hrs)
							0	0.00

BOREHOLE NUMBER: EC/009/CH

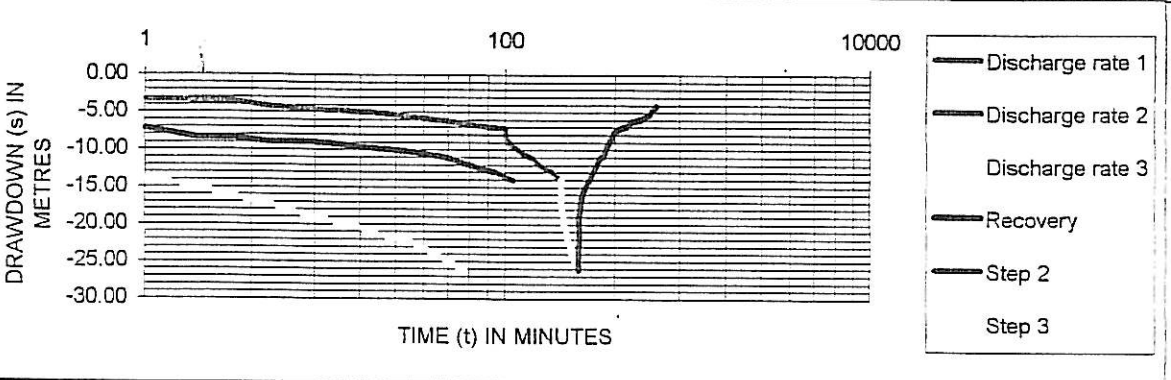
CALIBRATION TEST AND RECOVERY

Discharge 1:	0.77	Discharge 2:	2.47	Discharge 3:	7.13	Discharge 4:	13.66	Discharge 5:		Discharge 6:	
										Drawdown 1:	1.03
										Drawdown 2:	3.55
										Drawdown 3:	13.94
										Drawdown 4:	26.12
										Drawdown 5:	0.00
										Drawdown 6:	0.00
										Duration 1:	15
										Duration 2:	15
										Duration 3:	15
										Duration 4:	7
										Duration 5:	
										Duration 6:	
										Recovery (m):	2.69
										Recovery (min):	150

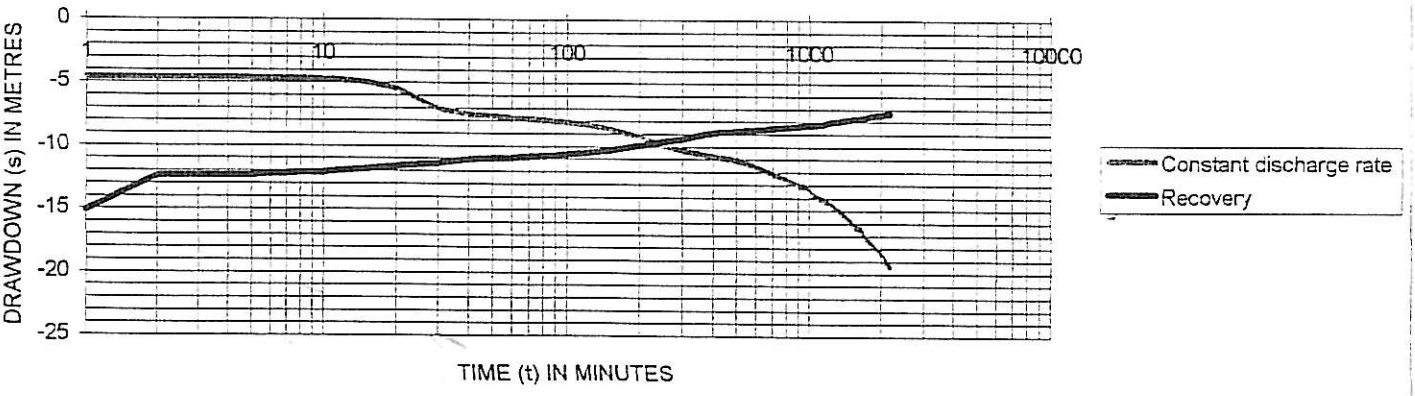


STEPPED DISCHARGE TEST AND RECOVERY

Discharge 1:	35.3167	Discharge 2:	4.08222	Discharge 3:	6.885	Discharge 4:		Discharge 5:		Discharge 6:	
										Drawdown 1:	7.10
										Drawdown 2:	14.01
										Drawdown 3:	26.12
										Drawdown 4:	0.00
										Drawdown 5:	0.00
										Drawdown 6:	
										Duration 1:	100
										Duration 2:	100
										Duration 3:	50
										Duration 4:	
										Duration 5:	
										Duration 6:	
										Recovery (m):	4.09
										Recovery (min):	420



CONSTANT DISCHARGE TEST AND RECOVERY

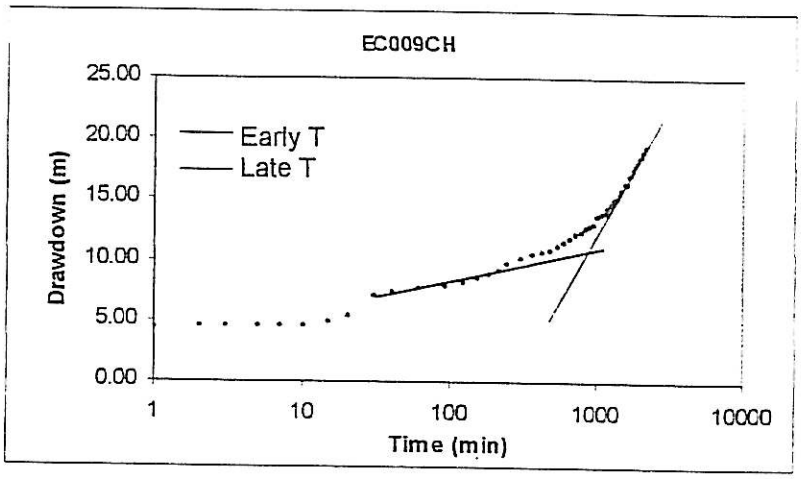


TEST INFORMATION

ate tested	16/04/2002	Water level (mbgl)	25.40	Depth of pump (mbgl)			52
D duration	2160	CD discharge rate	1.81	CD drawdown			19.39
vailable drawdown (m)	26.6	% Recovery after CD	62	%	after	2160	min

COOPER-JACOB ANALASYS GRAPH

EC/009/CH



APPENDIX C

CHEMICAL WATER ANALYSES

Project	Sterkstroom
Borehole ID	EC/002/CH
Date sampled	12/04/2002
Drinking water class	**2 (Total Hardness)**
Sample number	GP 464

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	0	0	0	0	0
Total coliforms		CFU/100 ml	0	0	0	0	0
Electrical Conductivity	*EC*	mS/m	107	1	1	0	0
Total Dissolved Solids	*TDS*	mg/L	814	1	1	0	0
pH Value	*pH*		8.4	0	0	0	0
Calcium	*Ca*	mg/l	62.8	0	0	1	1
Chloride	*Cl*	mg/l	44	0	0	0	0
Fluoride	*F*	mg/l	0.5	0	0	0	0
Iron	*Fe*	mg/l	<0.03	0	0	0	0
Total hardness	*CaCo3*	mg/l	461	2	3	3	3
Nitrate	*N*	mg/l	1.3	0	0	0	0
Orthophosphate	*P*	mg/l	0.6				
Potassium	*K*	mg/l	9	0	0	0	0
Sodium	*Na*	mg/l	66.9	0	0	0	0
Sulphate	*SO4*	mg/l	116	0	0	0	0
Ammonia	*N*	mg/l	<0.1				
Total alkalinity	*CaCO3*	mg/l	423				
Bicarbonate	*HCO3*	mg/l	423				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
12/04/2002	EC002OT	2	3	3	3

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

Project	Sterkstroom
Borehole ID	EC/004/CH
Date sampled	12/04/2002
Drinking water class	**4 (Faecal and Total coliform count)**
Sample number	GP 463

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	30000	4	4	3	3
Total coliforms		CFU/100 ml	35000	4	4	3	3
Electrical Conductivity	*EC*	mS/m	74	1	1	0	0
Total Dissolved Solids	*TDS*	mg/L	460	1	1	0	0
pH Value	*pH*		8.2	0	0	0	0
Calcium	*Ca*	mg/l	38.8	0	0	1	1
Chloride	*Cl*	mg/l	27	0	0	0	0
Fluoride	*F*	mg/l	0.6	0	0	0	0
Iron	*Fe*	mg/l	<0.03	0	0	0	0
Total hardness	*CaCo3*	mg/l	461	2	3	3	3
Nitrate	*N*	mg/l	0.1	0	0	0	0
Orthophosphate	*P*	mg/l	0.6				
Potassium	*K*	mg/l	2.1	0	0	0	0
Sodium	*Na*	mg/l	58.8	0	0	0	0
Sulphate	*SO4*	mg/l	33	0	0	0	0
Ammonia	*N*	mg/l	<0.1				
Total alkalinity	*CaCO3*	mg/l	376				
Bicarbonate	*HCO3*	mg/l	376				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
12/04/2002	EC004OT	4	4	3	3

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

Project	Sterkstroom
Borehole ID	EC/005/CH
Date sampled	26/04/2002
Drinking water class	**4 (Total Coliforms)**
Sample number	GP 479

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	1000	4	4	3	3
Total coliforms		CFU/100 ml	1300	4	4	3	3
Electrical Conductivity	*EC*	mS/m	81	1	1	0	0
Total Dissolved Solids	*TDS*	mg/L	326	0	0	0	0
Turbidity		NTU	<1				
pH Value	*pH*		8	0	0	0	0
Calcium	*Ca*	mg/l	13.1	0	0	1	1
Chloride	*Cl*	mg/l	<3	0	0	0	0
Fluoride	*F*	mg/l	1	1	1	0	0
Iron	*Fe*	mg/l	0.43	0	0	0	2
Total hardness	*CaCo3*	mg/l	57	0	0	1	0
Nitrate	*N*	mg/l	2.8	0	0	0	0
Orthophosphate	*P*	mg/l	0.1				
Potassium	*K*	mg/l	2.6	0	0	0	0
Sodium	*Na*	mg/l	124.9	1	1	0	0
Sulphate	*SO4*	mg/l	16	0	0	0	0
Ammonia	*N*	mg/l	0.3				
Total alkalinity	*CaCO3*	mg/l	413				
Bicarbonate	*HCO3*	mg/l	413				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
26/04/2002	EC005CH	4	4	3	3

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

Project	Sterkstroom
Borehole ID	EC/006/CH
Date sampled	18/04/2002
Drinking water class	1
Sample number	GP 478

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	0	0	0	0	0
Total coliforms		CFU/100 ml	0	0	0	0	0
Electrical Conductivity	*EC*	mS/m	72	1	1	0	0
Total Dissolved Solids	*TDS*	mg/L	420	0	0	0	0
Turbidity		NTU	5				
pH Value	*pH*		8	0	0	0	0
Calcium	*Ca*	mg/l	50.3	0	0	1	1
Chloride	*Cl*	mg/l	24	0	0	0	0
Fluoride	*F*	mg/l	0.7	0	0	0	0
Iron	*Fe*	mg/l	0.06	0	0	0	1
Total hardness	*CaCo3*	mg/l	216	1	2	2	2
Nitrate	*N*	mg/l	0.4	0	0	0	0
Orthophosphate	*P*	mg/l	4				
Potassium	*K*	mg/l	2.6	0	0	0	0
Sodium	*Na*	mg/l	91.4	0	0	0	0
Sulphate	*SO4*	mg/l	<10	0	0	0	0
Ammonia	*N*	mg/l	0.2				
Total alkalinity	*CaCO3*	mg/l	323				
Bicarbonate	*HCO3*	mg/l	323				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
26/04/2002	EC006CH	1	2	2	2

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

Project	Sterkstroom
Borehole ID	EC/008/CH
Date sampled	26/04/2002
Drinking water class	**2 (Total Coliforms)**
Sample number	GP 480

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	0	0	0	0	0
Total coliforms		CFU/100 ml	30	2	2	1	1
Electrical Conductivity	*EC*	mS/m	51	0	0	0	0
Total Dissolved Solids	*TDS*	mg/L	472	1	1	0	0
Turbidity		NTU	<1				
pH Value	*pH*		8	0	0	0	0
Calcium	*Ca*	mg/l	39	0	0	1	1
Chloride	*Cl*	mg/l	86	0	0	0	0
Fluoride	*F*	mg/l	0.3	0	0	0	0
Iron	*Fe*	mg/l	<0.03	0	0	0	0
Total hardness	*CaCo3*	mg/l	194	0	1	2	2
Nitrate	*N*	mg/l	0.2	0	0	0	0
Orthophosphate	*P*	mg/l	<0.1				
Potassium	*K*	mg/l	1.3	0	0	0	0
Sodium	*Na*	mg/l	32	0	0	0	0
Sulphate	*SO4*	mg/l	<10	0	0	0	0
Ammonia	*N*	mg/l	<0.1				
Total alkalinity	*CaCO3*	mg/l	234				
Bicarbonate	*HCO3*	mg/l	234				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
26/04/2002	EC008CH	2	2	2	2

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

Project	Sterkstroom
Borehole ID	EC/009/CH
Date sampled	26/04/2002
Drinking water class	3 (Faecal coliforms)
Sample number	GP 481

Parameter	Symbol	Unit	Concentration	Class			
				Drinking water	Food preparation	Bathing	Laundry
Viable organisms		CFU/1ml					
Faecal coliforms		CFU/100 ml	40	3	3	2	2
Total coliforms		CFU/100 ml	55	2	2	1	1
Electrical Conductivity	*EC*	mS/m	59	0	0	0	0
Total Dissolved Solids	*TDS*	mg/L	332	0	0	0	0
Turbidity		NTU	5	2	2	1	1
pH Value	*pH*		7.9	0	0	0	0
Calcium	*Ca*	mg/l	17.9	0	0	1	0
Chloride	*Cl*	mg/l	<3	0	0	0	0
Fluoride	*F*	mg/l	0.3	0	0	0	0
Iron	*Fe*	mg/l	<0.03	0	0	0	0
Total hardness	*CaCo3*	mg/l	79	0	0	1	0
Nitrate	*N*	mg/l	0.7	0	0	0	0
Orthophosphate	*P*	mg/l	0.1				
Potassium	*K*	mg/l	2.6	0	0	0	0
Sodium	*Na*	mg/l	162.8	1	1	0	0
Sulphate	*SO4*	mg/l	36	0	0	0	0
Ammonia	*N*	mg/l	<0.1				
Total alkalinity	*CaCO3*	mg/l	264				
Bicarbonate	*HCO3*	mg/l	264				
Carbonate	*CO3*	mg/l	<10				

Sample date	Sample number	Drinking water	Food preparation	Bathing class	Laundry class
26/04/2002	EC008CH	[redacted]	[redacted]	2	2

Colour coded classification system (DWAF, 1998)

Colour	Class	Water quality
Blue	0	Ideal – suitable for lifetime use
Green	1	Good – suitable for use, rare instances of negative effects
Yellow	2	Marginal – conditionally acceptable. Negative effects may occur in some
Red	3	Poor – unsuitable for use without treatment. Chronic effects may occur
Purple	4	Dangerous – totally unsuitable for use. Acute effects may occur

APPENDIX D

PROJECT MAPS

GeoCon

Legend
Borehole
Reservoir
New Low-Cost Housing
Solid Waste Disposal Site
Geological Formations
Alluvium
Dolerite Sheet
Molteno Formation
Burgersdorp Formation
26°34'00"
26°34'30"
26°35'00"
33°31'30"
33°32'00"
33°32'30"
33°33'00"
33°33'30"
1380
1480
1471
Rifle Range
EC/008/CH
EC/009/CH