Borehole Test Report - JM Landmann BB (Pty) Ltd -

Information supplied on date of borehole test. Data provided and interpretation following principles of best practice. Although every effort is made to provide the best possible recommendation on the behaviour of aquifers, the natural environment that bounds this project, can be unpredictable at best of times.

Borehole Test Report HOUR TEST

Client	COLLIN MUIR-ADELAIDE				Coordinates S		33.71907
Test Start Time	11:44			23/02/2021	Coordinates E		26.30731
Borehole No	1				Height above Sea Level (m)		544

STEP TESTS - 60 Minutes with recovery 100 min — Aftrek en Hertsel Toets - 1000 minute - Terugslag 100 min

No Calibration Required	Time	STEP1	STEP2	STEP3	Recovery	Yield (Liter)	DRAWDOWN Time START	Water Level (m)	RECOVERY
	Water Level Below Surface (m)								
Time to fill a 22 l container (seconds)		7.85	5.62	4.69			17.56	4.69	
Litre/Hour		10089	14092	16886				16886	
	0	12.160	13.158	14.476	15.580	16886	0	11.900	16.494
	0.5	12.864	13.142	14.634	14.444		62	15.012	15.030
	1	12.340	13.250	14.730	14.146		1	13.144	14.870
	1.5	12.340	13.434	14.724	13.792		1.5	13.326	14.756
	2	12.612	13.444	14.754	13.742		2	13.406	14.644
	2.5	12.752	13.514	14.776	13.660		2.5	13.502	14.558
	3	12.534	13.600	14.852	13.626		3	13.584	14.476
	3.5	12.343	13.594	14.886	13.582		3.5	13.650	14.408
	4	12.536	13.606	14.870	13.482		4	13.724	14.354
	4.5	12.562	13.622	14.902	13.392		4.5	13.782	14.292
	5	12.624	13.656	14.926	13.292		5	13.864	14.190
	6	12.616	13.692	14.954	13.216		6	13.962	14.114
	7	12.624	13.702	15.044	13.146		7	14.044	14.036
	8	12.662	13.736	15.034	13.082		8	14.102	13.962
	9	12.676	13.738	15.040	13.020		9	14.188	13.902
	10	12.696	13.772	15.086	12.962		10	14.242	13.839
	15	12.800	13.852	15.152	12.772		15	14.600	13.430
	20	12.896	13.886	15.222	12.600		20	14.674	13.362
	25	12.906	13.942	15.306	12.472		25	14.792	13.309
	30	12.942	14.022	15.346	12.376		30	14.866	13.268
	35	12.984	14.030	15.382	12.306		35	14.946	13.160
	40	13.022	14.076	15.454	12.250		40	15.044	13.038
	45	13.052	14.082	15.452	12.250		45	15.086	12.956
	50	13.062	14.100	15.522	12.170		50	15.142	12.930
	55	13.106	14.122	15.564	12.126		55	15.198	12.878
	60	13.110	14.132	15.580	12.104		60	15.236	12.842
	70				12.072		70	15.280	12.776
	80				12.022		80	15.358	12.738
	90				11.984		90	15.402	12.692
	100				11.962		100	15.498	12.652
	Please insert seconds to fill 22 liter drum				4.69	16887	200	15.848	
					4.66	16996	300	16.022	STOP
					4.70	16851	400	16.142	
					4.76	16695	500	16.206	
					4.72	16780	600	16.282	
					4.79	16536	700	16.352	
					4.67	16959	800	16.432	
					4.67	16959	900	16.702	
					4.66	16996	1000	16.494	

BOREHOLE YIELD	16996	litre/hr
Depth of Borehole:	95	m
Depth of major water strike		m
Depth of Test Pump:	60	m
Water Level at Start of Test:	11.780	m
Water Yield Step 1	10089	litre/hour
Water Yield Step 2	14092	litre/hour
Water Yield Step 3	16886	litre/hour
Water Level at Start of 16 hour test	11.900	m

MONITORING OF BOREHOLES ASSOCIATED WITH TEST BOREHOLE

STEP TESTS RELATED LEVELS

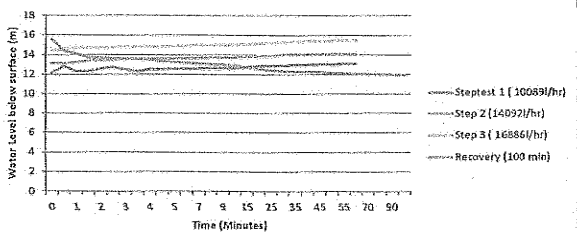
	Borehole Levels (m)							
Borehole no:	1	3						
TIME (min)								
0								
100								
Recovery								

16 hourDrawdown and recovery Tests all borehole levels in associated aquifer (m)

	Main Bore	1	3	0	0	0	0	0	0
0									
100									
200									
300									
400									
500									
600									
700									
800									
900									
1000									
Recovery									

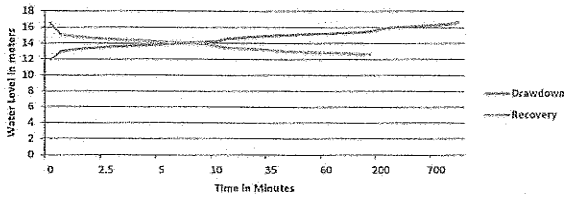
Graphs, Formulas and Information

Step Tests



Depth of Borehole (m)	95
Depth of Test Pump (m)	60
Yield of 16 hour test period (liter/hour)	16996

Drawdown and Recovery Test (16 hours)

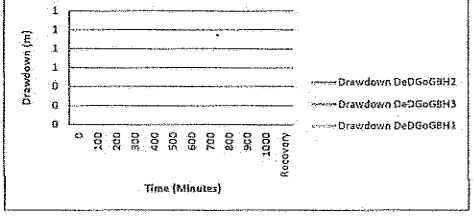


Yield of Borehole (16 hour test) (m^3/day	407.896996
Δd (m)	2.252
T-Value (m^2/day)	33.6895
Recovery after 100 min (%)	170.603908
Theoretical long term yield (m^3/uur)	57.4756695
Maximum pumping rate (liters/hour)	57475.6695
Maximum pumping rate (liters/second)	15.9654638

Special note - Dr Gideon Groenewald:

Productive water table is at 11 m and the total recovery is therefore a good indication of the inflow into the fault zone. The assumption is that the borehole can be pumped at litres/hour for 20 hours per day as an emergency borehole. Monitoring of borehole essential

Aquifer relationship 3 Boreholes



The three boreholes are connected to the same supply of water from the fault zone aquifer and pumping rates must be determined with this fact taken into account

Recommendations: The Constant drawdown and recovery test on Borehole Site EXAMPLE indicates that the fault zone is severely confined with a semi-constant supply of water and a low recharge of 35%. The borehole test indicates a severe restriction in water provision to the fault zone at 200 minute interval and the fact that extreme shortage of water is recorded above m, indicate that the recharge from the fault zone hit at m provides the only water at that depth and the country rock aquifers (quartzite) above m does not supply any water to the system. Most of the the final supply to the borehole is comming from the fault zones penetrated at m in this borehole. The fact that the deep seated fracture shows a good response during the recovery period of 100 minutes indicates no shortage of supply in the long term and although the borehole must be used with extreme caution for town supply, it is a good emergency borehole. The three boreholes are connected and penetrated the same aquifer. Drawdown and Recovery at a rate of about litres/sec can be attained from the borehole under severe conditions and pumping the borehole for 6 hours/day, 200 days of the year. From experience in the rocks of the Cape Supergroup it is therefore recommended that Borehole EXAMPLE intercepted faultzones at m that does not supply water higher than m below surface at a rate less than litres/hour. The borehole complies with the basic requirement of an emergency borehole for this project (as proposed in the Introduction to (THE CLIENT) and a pumping rate of litres/hour is therefore can be implemented at this borehole site. The aquifer is severly restricted and some adverse characteristics were displayed during testing of the borehole. The pump must be determined to yield maximum litres/sec at a head of m and the pump must hang at m from the surface. Overpumping of the borehole will damage the linear aquifer and drawdown of the borehole level below m must be prevented at all cost. Well-planned monitoring and management of this aquifer is critical.

Qualifications and Experience of the Author

Dr Gideon Groenewald has a PhDin Geology from the University of Port Elizabeth (now the Nelson Mandela Metropolitan University) (1998) and the National Diploma in Nature Conservation from Technikon RSA (now the University of South Africa) (1988). He specialises in research on South African Permian and Triassic sedimentology and groundwater with an interest in stratigraphy, and the geohydrology of Karoo dolerite dykes and sedimentary rock associations. He has extensive experience in the locating of potential aquifers in the Karoo Supergroup and has more than 35 years of experience in locating, logging and testing of boreholes, as well as determining the associated aquifer characteristics in the southern, western, eastern and north-eastern parts of South Africa. His publication record includes multiple articles in internationally recognised journals. Dr Groenewald is accredited by the Geological Society of Southern Africa (society member for 35 years), the Borehole Water Association of South Africa, and is a registered Natural Scientist (SACNASP Reg. no. 400146/88).

Declaration of Independence

I, Gideon Groenewald, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of geohydrological assessment services. There are no circumstances that compromise the objectivity of my performing such work.

Dr Gideon Groenewald (PhD; Pr Sci Nat Earth Scientist)
Geologist