Borehole Management
Recommended Pumping Regime

Parsons & Associates
specialist groundwater consultants cc
CK 96/27895/23

Borehole Information

Project No.	AD0267
Locality	Lottershof
Borehole No.	BH01
Latitude	S34.307336
Longitude	E19.465878
Elevation (mamsl)	275
Contractor	AB Pumps
Supervisor	Michael Bekker
Start of step drawdown test	17/01/2023 16:00
Start of constant discharge test	18/01/2023 07:00
Borehole depth (m)	114.6
Borehole diameter (mm)	-
Depth of casing (m)	-
Equipment in borehole	Existing pump
Depth of installation (m)	-
Water level (mbc)	20.6
Pump inlet depth (mbc)	90.2
Available drawdown - test (m)	69.6
Step drawdown test	4 x 1hr, with 4 hr recovery monitoring
Constant discharge test rate (L/s)	3.3
Constant discharge test duration (hrs)	24 - with equivalent recovery monitoring
Observation boreholes	None

Recommendations

Pump inlet depth (m)	50
Operational yield (L/s)	4.0
Duration (hrs/d)	24
Daily yield (m3/d)	346
Long-term yield (L/s)	4.0
Duration (hrs/d)	24
Sustainable yield (m3/d)	346
Monitoring required	yes
Water level - frequency	see comments
Water quality - frequency	quarterly i.e. every 3 months
Water quality - parameter	pH, electrical conductivity (EC), iron (Fe), manganese (Mn)

Comments

1 In the absence of a borehole log, it is interpreted that borehole BH01 was drilled into rocks belonging to the Table Mountain Group (TMG).

2 Both the step drawdown test and constant discharge test induced limited drawdown. The available drawdown amounted to 69.6 m, while the maximum drawdown induced during the tests was only 11.29 m.

3 No significant turbulence losses where observed during the step drawdown test. In hindsight one or two additional steps would have been useful.

4 A 24 hr CD test was conducted at 3.3 L/s. Fracture flow and dewatering is evident in both the drawdown and recovery data. Because of the limited drawdown induced during testing, a conservative approach is required in setting the recommended

5 On completion of the CD test, the borehole recovered to within 7.9% of the rest water level.

6 Groundwater quality was relatively stable during testing, with electrical conductivity (EC) being in the order of 23 mS/m.

7 The groundwater quality is characteristic of groundwater from TMG Aquifers. The water has a low salinity, is slightly acidic and has slightly elevated iron (Fe) and manganese (Mn) concentrations (see attached laboratory analysis). The water is also aggressive to cement and corrosive to steel.

8 Both Fe and Mn are below health limits, but above aesthetic limits. This could negatively affect the taste and colour of the water.

9 Based on the information available, the recommended pumping rate of BH01 is set at 4.0 L/s when pumped continuously. This equates to a daily yield of 346 KL/d.

10 Because of the limited drawdown induced during testing and the observed fracture flow, it is strongly recommended that a data logger be installed 1 m above the pump inlet and set to record a water level every 3 hrs. The data should be downloaded every quarter and the performance of the borehole reviewed,

11 While groundwater level monitoring can be done manually, this approach typically provides a level somewhere between a rest level and a dynamic level. This data is not useful in assessing the long term sustainable yield of the borehole.

Because Fe and Mn concentrations are at or above aesthetically acceptable levels, treatment of the water to remove Fe and Mn should be considered. The stabilisation to prevent corrosion is also recommended.

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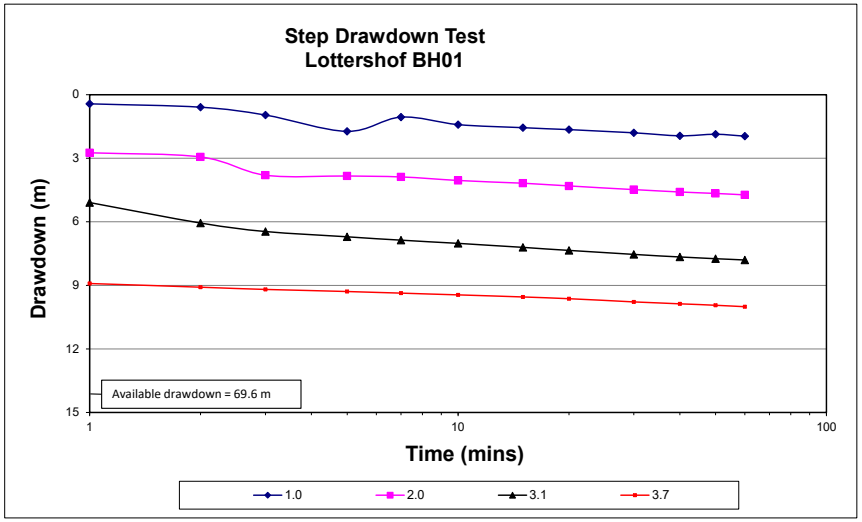
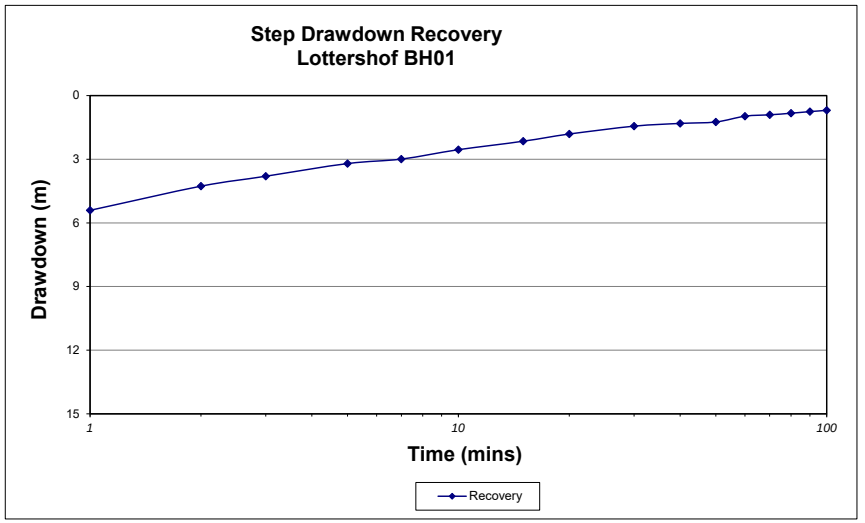
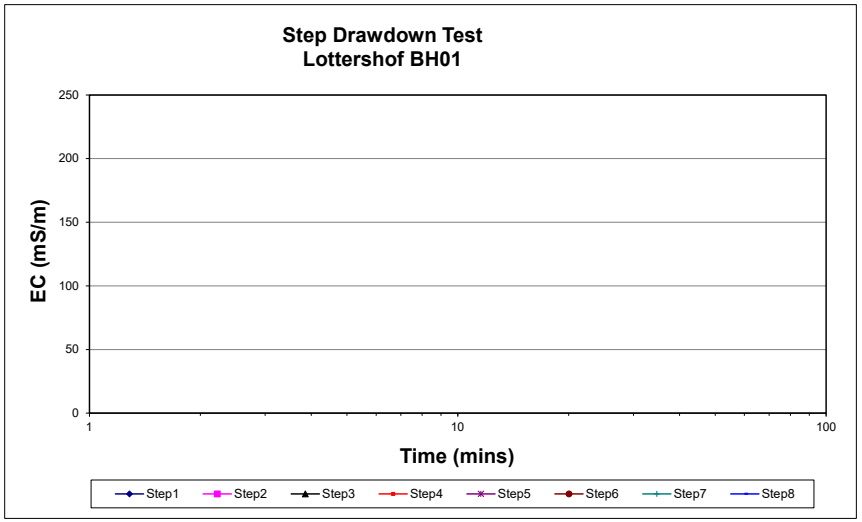
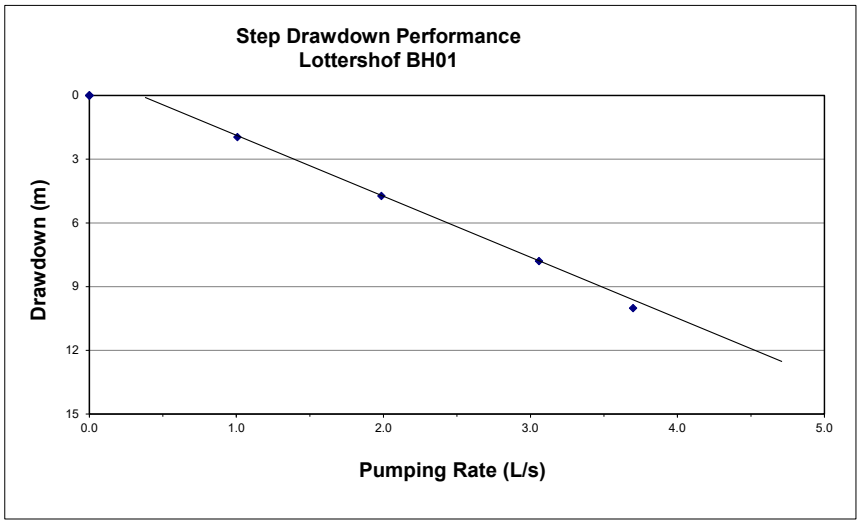
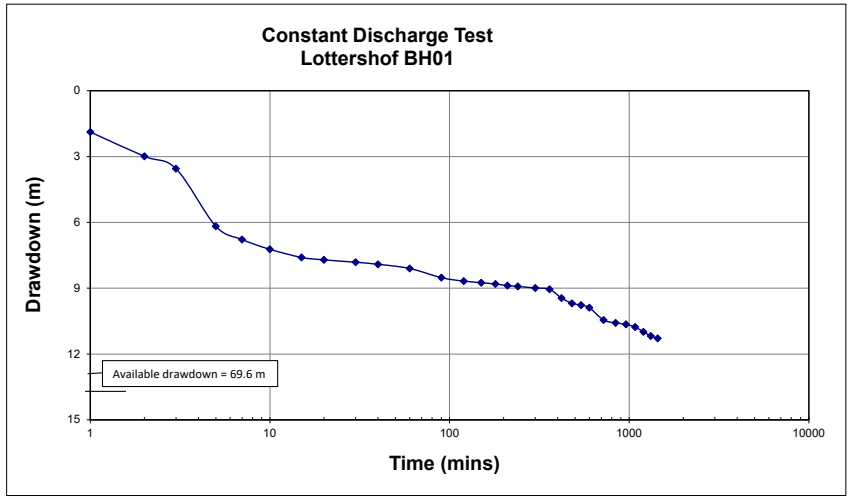
email roger@pasgc.co.za

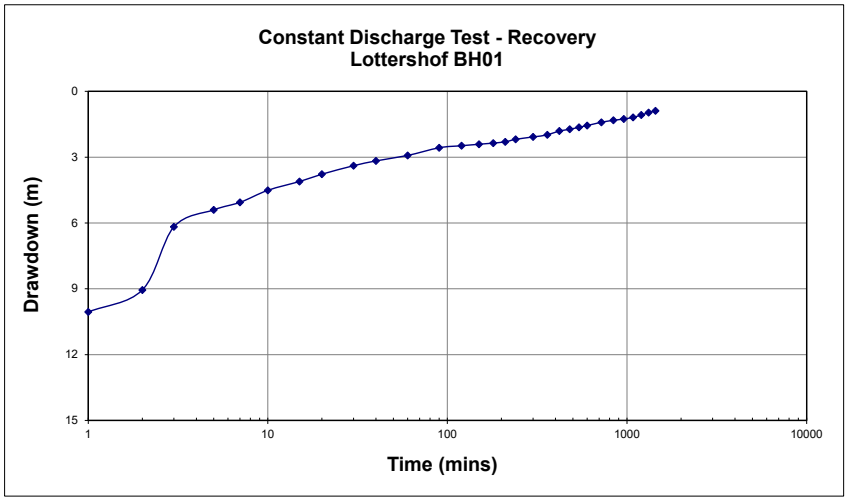

Step Drawdown Test
Lottershof BH01
Drawdown (m)
0
3
6
9
12
15
Available drawdown = 69.6 m
1
10
100
Time (mins)
1.0
2.0
3.1
3.7

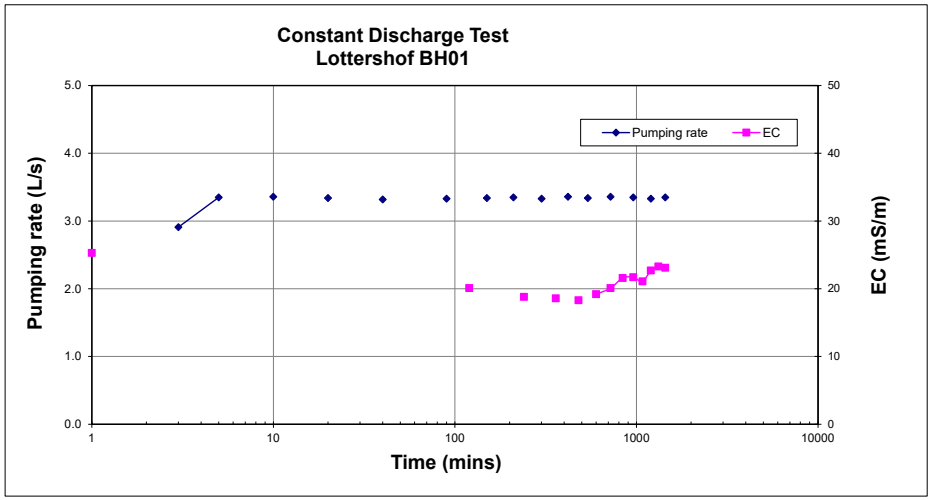

Step Drawdown Recovery
Lottershof BH01
Drawdown (m)
0
3
6
9
12
15
1
10
100
Time (mins)
Recovery

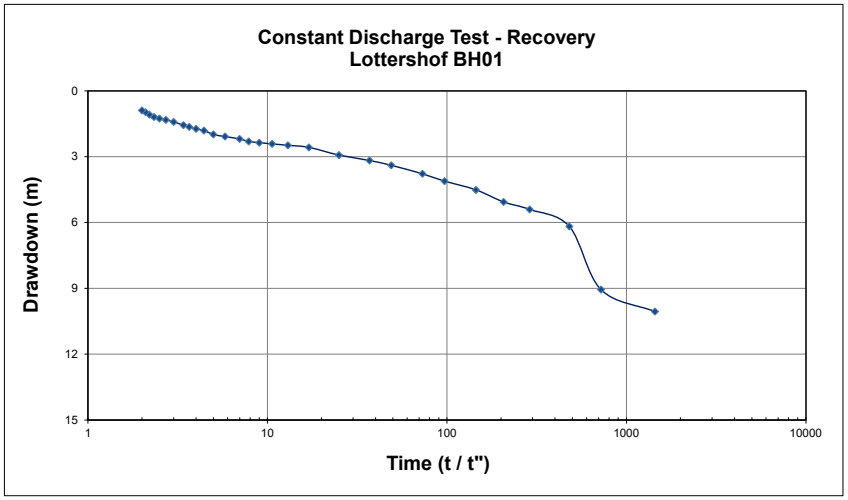

Step Drawdown Test
Lottershof BH01
EC (mS/m)
250
200
150
100
50
0
1
10
100
Time (mins)
Step1
Step2
Step3
Step4
Step5
Step6
Step7
Step8


Step Drawdown Performance
Lottershof BH01
Drawdown (m)
0
3
6
9
12
15
0.0
1.0
2.0
3.0
4.0
5.0
Pumping Rate (L/s)


Constant Discharge Test
Lottershof BH01
Drawdown (m)
Time (mins)
Available drawdown = 69.6 m
0
3
6
9
12
15
1
10
100
1000
10000


Constant Discharge Test - Recovery
Lottershof BH01
Drawdown (m)
Time (mins)
0
3
6
9
12
15
1
10
100
1000
10000


Constant Discharge Test
Lottershof BH01
Pumping rate (L/s)
EC (mS/m)
Time (mins)
Pumping rate
EC
5.0
4.0
3.0
2.0
1.0
0.0
50
40
30
20
10
0
1
10
100
1000
10000


Constant Discharge Test - Recovery
Lottershof BH01
Drawdown (m)
Time (t / t")
0
3
6
9
12
15
1
10
100
1000
10000

vinlab H2O
Your partner in quality water analysis

Distillery Road
Stellenbosch
Tel 021-8828866/7
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www.vinlab.com
2023-01-27

TEST REPORT

Water

Groundwater Solutions cc t/a AB Pumps

Attn: - Ailene

-
East London
-
-
27828397258


@VinlabSA

Sample Details					
SampleID	W34930				
Water Type	Drinking Water				
Water Source	Borehole				
Sample Temperature					
Description	Borehole Water				
Batch Number	P2770 Elgin Lottershof				
PO Number	23039				
Date Received	2023-01-24				
Condition	Good				

Water - Routine									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
pH@25C (Water)		VIN-05-MW01	^^^	>= 5 to <= 9.7	5.41				
Conductivity@25C (Water)	mS/m	VIN-05-MW02	^	<= 170	21.3				
Turbidity (Water)*	ntu			<= 5	8.15				
Total dissolved solids (Water)*	mg/L			<= 1200	144.41				
Free Chlorine (Water)*	mg/L			<= 5	0.02				
Ammonia (NH4) as N (Water)	mg/L	VIN-05-MW08	2.5%	<= 1.5	<0.15				
Nitrate as N (Water)	mg/L	VIN-05-MW08	10%	<= 11	<1.00				
Nitrite as N (Water)	mg/L	VIN-05-MW08	10%	<= 0.9	<0.05				
Chloride (Cl-) - Water	mg/L	VIN-05-MW08	2.73%	<= 300	49.72				
Sulphates (SO4) - Water	mg/L	VIN-05-MW08	7.56%	<= 500	7.02				
Fluoride (F) - Water	mg/L	VIN-05-MW08	9.74%	<= 1.5	<0.15				
Alkalinity as CaCO3 (Water)*	mg/L				<10.00				
Colour (Water)*	mg/L Pt-Co			<= 15	<15				
Total Organic Carbon (Water)*	mg/L			<=10	1.76				
Date Tested					2023-01-24				

Water - Metals									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
Calcium (Ca) - Water	mg/L	VIN-05-MW43	14.60%		3				

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^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD, LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

sanas Testing Laboratory T0885

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Stellenbosch
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2023-01-27

TEST REPORT

Water

Groundwater Solutions cc t/a AB Pumps

Attn: - Ailene

-
East London
-
-
27828397258

@VinlabSA

Magnesium (Mg) - Water	mg/L	VIN-05-MW43	8.49%		4				
Sodium (Na) - Water	mg/L	VIN-05-MW43	11.45%	<= 200	27				
Potassium (K) - Water	mg/L	VIN-05-MW43	9.42%		3				
Zinc (Zn) - Water	mg/L	VIN-05-MW43	19.40%	<= 5	0.076				
Antimony (Sb) - Water*	µg/L			<=20	<13.0				
Arsenic (As) - Water*	µg/L			<= 10	<10.0				
Boron (B) Water	µg/L	VIN-05-MW43	11.79%	<= 2400	31				
Cadmium (Cd) Water	µg/L	VIN-05-MW43	12.26%	<= 3	6				
Chromium (Cr) - Water	µg/L	VIN-05-MW43	13.03%	<= 50	5				
Copper (Cu) - Water	µg/L	VIN-05-MW43	11.57%	<= 2000	5				
Iron (Fe) - Water	µg/L	VIN-05-MW43	12.49%	<= 2000	950				
Lead (Pb) - Water	µg/L	VIN-05-MW43	16.32%	<= 10	14				
Manganese (Mn) - Water	µg/L	VIN-05-MW43	12.44%	<= 400	406				
Nickel (Ni) - Water	µg/L	VIN-05-MW43	17.38%	<= 70	<8				
Selenium (Se) - Water*	µg/L			<= 40	<10.0				
Aluminium (Al) - Water	µg/L	VIN-05-MW43	13.49%	<= 300	155				
Cyanide (CN) - Water*	µg/L			<= 200	<10.0				
Mercury (Hg) - Water*	µg/L			<= 6	<1.0				
Barium (Ba) Water	µg/L	VIN-05-MW43	14.09%	<= 700	58				
Uranium (U) - Water*	µg/L			<= 30	<28				
Date Tested					2023-01-25				

Water - Micro

	Unit	Method	Uncertainty	Limits	Results	Results	Results	Results	Results
Total Coliforms (Water)	cfu/100mL	VIN-05-MW09		<= 10	nd				
E-Coli (Water)	cfu/100mL	VIN-05-MW09		not detected	nd				
Heterotrophic plate count*	cfu/mL			<= 1000	600				
Date Tested					2023-01-24				

Comments

W34930
Two Samples received,

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Water

Groundwater Solutions cc t/a AB Pumps

Attn: - Ailene

@VinlabSA

-
East London
-
-
27828397258

Adelize Fourie
Laboratory Manager (Waterlab)

VIN-05-
M01,M02,M03,M04,M05,MO8,M10,M28,
M43, MW01, MW02, MW03, MW04,
MW05, MW06, MW07, MW08/9/10,
MW12, MW13, MW14

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Test results relate only to the items tested as received. This Document shall not be reproduced without the written approval of Vinlab (Pty) Ltd.Opinions and interpretations expressed herein are outside
the scope of SANAS accreditation. Results for methods VIN-05-MW12, 13 and 14, are based on Cq values, a positive result (detected) indicates a Cq value <35 and a negative result (non-detected) indicates a Cq value of >35.

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