GEOSS
Groundwater & Geo-Environmental Solutions

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GEOSS Project No: 5682_AV
17 June 2026

SANS 10299-4:2003 accredited yield testing of HBC_BH1, Helderberg Centre, Helderberg

This report specifies that borehole HBC_BH1, located on Helderberg Centre, Helderberg, was yield tested according to the South African National Standards (SANS 10299-4:2003, Part 4 - Test pumping of water boreholes). The yield test consisted of a Step Test, Constant Discharge Test (CDT) and recovery monitoring. A SACNASP-accredited professional hydrogeologist analysed the data, and abstraction from this resource is recommended to occur according to the stipulated rates below.

Table 1: Helderberg Centre Borehole Details

HBC_BH1 Borehole Details				
Borehole Name	Latitude (DD, WGS84)	Longitude (DD, WGS84)	Borehole Depth (m)	Inner Diameter (mm)
HBC_BH1	-34.08724	18.83125	40.20	110
Abstraction Recommendations				
Borehole Name	Abstraction rate (L/s)	Abstraction Duration (hrs)	Recovery Duration (hrs)	Possible Volume Abstracted (L/d)
HBC_BH1	2.70	8	16	77 760
	2.20	12	12	95 040
	1.56	24	0	134 784
Pump Installation Details				
Borehole Name	Recommended Pump Installation Depth (mbgl)	Critical Water Level (mbgl)	Dynamic Water Level (mbgl)*	Rest Water Level (mbgl)
HBC_BH1	35.00	25.34	19.59	3.56

**Typical water level expected during long-term production (pump duty point)*



Figure 1: HBC_BH1 before (left) and after (right) testing.

1. Testing Methodology

The yield testing was carried out according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This included a Step Test, Constant Discharge Test and recovery monitoring of the borehole. For the Step Test, a borehole is pumped at a constant rate for one-hour intervals and the flow rates are incrementally increased for each step. This test is followed by a Constant Discharge Test where the borehole is pumped at a constant rate for an extended period of time, followed by recovery monitoring. The water level drawdown is monitored at pre-determined intervals during these tests (drawdown refers to the difference in water level from the rest water level (RWL) measured before commencement of the yield test).

The yield test data were analysed using the Excel-based FC program, developed by the IGS (Institute for Groundwater Studies) in Bloemfontein. The sustainable yield of the borehole was calculated based upon long-term extrapolations of the Constant Discharge Test data according to (1) the Cooper-Jacob (1946) approximation of the Theis solution for confined aquifers, (2) the Barker (1988) Generalised Radial Flow Model (GRF) for hydraulic tests in fractured rock and (3) the Flow Characteristic (FC) method(s) (Van Tonder et al.,2001) using first and second derivative calculations. Boundary conditions are accounted for in multiplication factors to the rate of drawdown (derivatives), according to each of the above three methods.

2. Testing

2.1 Yield Testing HBC_BH1

The yield testing was conducted between 4 and 7 June 2026. The borehole was measured to a depth of 40.20 meters below ground level (mbgl). The test pump was installed at a depth of 39.20 mbgl. The rest water level (RWL) at the start of the step test was 3.56 mbgl and 3.59 mbgl before the start of the CDT. During the CDT, the water level had drawn down 13.32 meters below the rest water level (16.88 mbgl) after the 24-hour test period. **The data from the tests are graphically presented in Figure 2, which also indicates the available drawdown and critical water level as the red line at 21.75 meters (25.34 mbgl) as per the geomean of the water level reached during the CDT and the available drawdown to the borehole depth.**

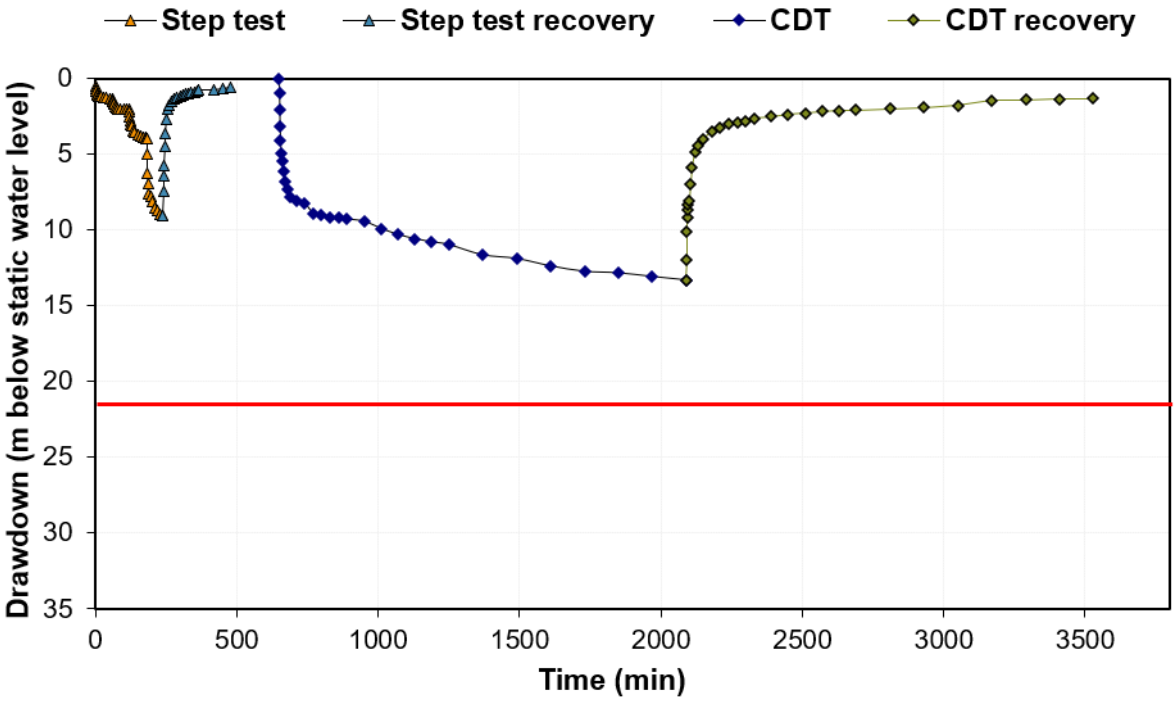


Figure 2: Drawdown vs time graph of the testing at HBC_BH1.

Several methods were used to assess the yield test data as presented in the table below. It is recommended that groundwater be abstracted at a rate of up to 2.20 L/s (7 920 L/h) for up to 12 hours per day. The assessments were based on an available drawdown (AD) of 21.75 meters below the RWL, which equates to 11.84 mbgl.

Table 2: Yield Determination – HBC_BH1

HBC_BH1			
Method	**Sustainable Yield (L/s)**	**Late *T (m^2/d)**	****AD used (m)**
Basic FC	1.65	11.8	21.75
Cooper-Jacob	1.56	11.3	21.75
Barker	1.46		21.75
Average Q_sust (L/s)	**1.56**		
Recommended Abstraction			
Abstraction Rate (L/s)	**Abstraction Duration (hours)**		**Recovery Duration (hours)**
2.70	**8**		**16**
2.20	**12**		**12**
1.56	**24**		**0**

***AD- Available Drawdown*

** T – Transmissivity*

3. Groundwater quality

A groundwater sample was collected from the borehole at the end of the yield test and submitted to a SANAS accredited laboratory (Vinlab H20) in Stellenbosch for inorganic and microbial chemical analyses. The chemistry results obtained for the borehole have been classified according to the SANS241-1: 2015 standards for drinking water (**Table 3**). **Table 4** presents the water chemistry analysis results, colour coded according to the SANS241-1: 2015 drinking water assessment standards.

Table 3: Classification table for the specific limits.

Acute Health	Aesthetic	Chronic Health	Operational	Acceptable

The limits and associated risks for drinking water as determined by the South African National Standard (SANS) 241:2015 are as follows, where:

- Health risks: parameters falling outside these limits may cause acute or chronic health problems in individuals.
- Aesthetic risks: parameters falling outside these limits indicate that water is visually, aromatically or palatably unacceptable.
- Operational risks: parameters falling outside these limits may indicate that operational procedures to ensure water quality standards are met may have failed.

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Table 4: Production borehole results classified according to SANS241-1:2015.

Analyses	HBC_BH1	SANS 241-1:2015
Date and Time Sampled	6-June-2026 08:00	
pH (at 25 °C)	6.60	5.0 ≤ Operational ≤ 9.7
Conductivity (mS/m) (at 25 °C)	358.00	Aesthetic ≤170
Total Dissolved Solids (mg/L)	2427.24	Aesthetic ≤1200
Turbidity (NTU)	8.06	Operational ≤1 Aesthetic ≤5
Colour (mg/L as Pt)	<15	Aesthetic ≤15
Sodium (mg/L as Na)	519.00	Aesthetic ≤200
Potassium (mg/L as K)	11.00	N/A
Magnesium (mg/L as Mg)	68.00	N/A
Calcium (mg/L as Ca)	105.00	N/A
Chloride (mg/L as Cl)	1049.81	Aesthetic ≤300
Sulphate (mg/L as SO_4)	69.92	Aesthetic ≤250 Acute ≤500
Combined Nitrate & Nitrite Nitrogen (as a ratio)	0.08	≤1 Acute Health
Nitrate Nitrogen (mg/L as N)	<0.70	Acute Health ≤11
Nitrite Nitrogen (mg/L as N)	<0.05	Acute Health ≤0.9
Ammonia Nitrogen (mg/L as N)	<0.15	Aesthetic ≤1.5
Total Hardness (mg/L as $CaCO_3$)	541.30	N/A
Fluoride (mg/L as F)	1.06	Chronic Health ≤1.5
Aluminium (mg/L as Al)	<0.05	Operational ≤0.3
Total Chromium (mg/L as Cr)	<0.01	Chronic Health ≤0.05
Manganese (mg/L as Mn)	0.294	Aesthetic ≤0.1 Chronic ≤0.4
Iron (mg/L as Fe)	0.273	Aesthetic ≤0.3 Chronic ≤2
Nickel (mg/L as Ni)	<0.05	Chronic Health ≤0.07
Copper (mg/L as Cu)	<0.05	Chronic Health ≤2
Zinc (mg/L as Zn)	<0.05	Aesthetic ≤5
Arsenic (mg/L as As)	<0.01	Chronic Health ≤0.01
Selenium (mg/L as Se)	<0.01	Chronic Health ≤0.04
Cadmium (mg/L as Cd)	<0.003	Chronic Health ≤0.003
Antimony (mg/L as Sb)	<0.013	Chronic Health ≤0.02
Mercury (mg/L as Hg)	<0.001	Chronic Health ≤0.006
Lead (mg/L as Pb)	<0.01	Chronic Health ≤0.01
Uranium (mg/L as U)	<0.028	Chronic Health ≤0.03
Cyanide (mg/L as CN-)	<0.01	Acute Health ≤0.2
Total Organic Carbon (mg/L as C)	1.10	N/A
E.coli (count per 100 ml)	0	Not Det. Acute Health-1
Total Coliform Bacteria (count per 100 ml)	1	Not Det.≤10 Operational
Heterotrophic Plate Count (count per ml)	4600	≤1000 Operational
Charge Balance Error %	0.50	≥-5 - ≤5 Acceptable

Based on the chemical results presented in **Table 4**, groundwater from HBC_BH1 is of poor quality for potable use and does not fully comply with the SANS 241-1:2015 drinking water standards.

The electrical conductivity (358.00 mS/m) and total dissolved solids (2 427.24 mg/L) exceed their aesthetic limit of 170 mS/m and 1 200 mg/L, respectively. This is likely caused by elevated concentrations of sodium (519.00 mg/L) and chloride (1 049.81 mg/L), which exceeds their respective aesthetic limits of 200 mg/L and 300 mg/L. These exceedances pose no direct health risk, but may result in a salty taste of the water from HBC_BH1. Additionally, turbidity (8.06 NTU) and manganese (0.294 mg/L) exceed their operational and aesthetic limit, which will cause a cloudy appearance in the water.

Microbiological results show an elevated heterotrophic plate count of 4 600 cfu/mL, exceeding the operational limits of SANS 241. Although E. coli was not detected, the high microbial count indicates possible ingress of contaminated water and underlines the need for disinfection prior to use. In its current condition, the groundwater is not suitable for human consumption without appropriate treatment.

For irrigation use, the water presents restrictions due to an elevated salinity hazard. With an electrical conductivity of 358.00 mS/m and a TDS of 2 427.24 mg/L, the water is considered brackish and generally unsuitable for irrigation under normal conditions. It poses a high risk of soil salinization and crop toxicity, meaning it can only be used for highly salt-tolerant crops on well-drained soils, paired with intensive leaching, specialized management, and continuous soil monitoring.

4. Results and Recommendations

For borehole HBC_BH1 it is recommended that abstraction can occur at a rate of up to 2.20 L/s for 12 hours per day. A pump suitable to deliver the recommended rate should be installed at a depth of 35.00 mbgl. It is anticipated that abstraction at the recommended rate will cause the water level to drop to a depth of approximately 19.59 mbgl – this is referred to as the dynamic water level. During abstraction, a maximum level cut-off switch should be installed at 25.34 mbgl to ensure the groundwater level does not drop to below the critical water level.

Groundwater from HBC_BH1 is of poor quality for potable use due to elevated EC, TDS, turbidity, sodium, chloride, manganese as well as a high heterotrophic plate count of 4 600 cfu/mL, all of which exceed SANS 241-1:2015 limits. While E. coli was not detected, the results indicate the need for disinfection and treatment before use. For irrigation, the water is suitable for high salt-tolerant crops, however, soil salinity should be monitored over time.

To facilitate monitoring and informed management of the borehole, it is recommended to equip the borehole with the following monitoring infrastructure and equipment:

- Install a 32 mm (inner diameter, class 10) observation pipe from the pump depth to the surface, closed at the bottom and slotted for the bottom 5 – 10 m.
- Install an electronic water level logger (for automated water level monitoring).
- Install a sampling tap (to monitor water quality).
- Install a flow volume meter (to monitor abstraction rates and volumes).

GEOSS South Africa (PTY) LTD cannot be held liable for the over-abstraction or misuse of this resource. The resource should only be utilised once the appropriate authorisation has been acquired from the Department of Water and Sanitation and if the resource is correctly monitored (including water level, abstraction and water quality).

Ajay Larey
Hydrogeologist

References

- Barker, J.A. (1988). A generalized radial flow model for hydraulic tests in fractured rock. Water Resources Research, 24(10), pp. 1796-1804.

- Cooper, H.H. & Jacob, C.E. (1946). A generalized graphical method for evaluating formation constants and summarizing well-field history. Transactions of the American Geophysical Union, 27(4), pp. 526-534.

- SABS (South African Bureau of Standards). (2003). South African National Standard (SANS) 10299-4:2003. Water supply - Development, maintenance and management of groundwater resources Part 4: Test pumping of water boreholes. Pretoria: SABS Standards Division.

- SABS (South African Bureau of Standards). (2015). South African National Standard (SANS) 241-1:2015. Drinking water Part 1: Microbiological, physical, aesthetic and chemical determinands. Pretoria: SABS Standards Division.

- Van Tonder, G., Bardenhagen, I., Riemann, K., van Bosch, J., Dzanga, P., & Botha, F. (2001). Manual on Pumping Test Analysis in Fractured-Rock Aquifers. Institute for Groundwater Studies (IGS), University of the Free State, Bloemfontein.

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Abbreviations	
EC	Electrical conductivity
mbgl	Meters below ground level
mbch	Meters below casing height
mbdl	Meters below datum level
magl	Meters above ground level
L/S	Litres per second
RPM	Rates per minute
S/W/L	Static water level
µS/cm	Microsiemens per centimeter

Ground water solutions t/a AB Pumps CC

BOREHOLE TEST RECORD

CONSULTANT:	Michael Bekker
DISTRICT:	Helderberg
PROVINCE:	Western Cape
FARM / VILLAGE NAME :	Helderberg Shopping Centre
DATE TESTED:	2026-06-04

PROJECT #	P3305
TEAM MEMBERS	Eddie
	Thabang
	Luthando
	Phillip
	Joseph

BOREHOLE LOCATION & ACCESS INFORMATION:

BOREHOLE COORDINATES

LATITUDE (SOUTH):	34.087246
LONGITUDE (EAST):	018.831255

COMMENTS ON ACCESS IF ANY:

BOREHOLE NO:	**HBC-BH01**
TRANSMISSIVITY VALUE:	
TYPE INSTALLATION:	**Submersble**
BOREHOLE DEPTH: (mbgl)	**40.2**

MAINTENANCE RECORD:		**REHABILITATION RECORD:**		**DIGITAL CAMERA LOGGING:**		**EQUIPMENT FISHING RECORD**	
Labour hours:		**Jetting hours:**		**Camera logged once:**		**Hours spent:**	
Cost of material:		**Brushing hours:**		**Camera logged twice:**			
Travelling (km):		**Airlifting hours:**		**Camera logged three times:**		**OTHER COSTS ON PROJECT:**	
		Sulphamic Acid KG's		**Camera work sent to client:**		**Courier of samples:**	
		Boresaver KG's				**Km's for delivery:**	
		Soda Ash KG's				**Cost of packaging:**	

COMMENTS:	**RECOMMENDATIONS / CORRECTIVE ACTIONS:**
Existing Pump was reinstalled	

SAMPLE INSTRUCTIONS :

Water sample taken	**Yes**	No	If consultant took sample, give name:		**DATA CAPTURED BY:**	IH
Date sample taken	2026-06-06		If sample courier, to where:		**DATA CHECKED BY:**	AVN
Time sample taken	08:00					

DESCRIPTION:	**UNIT**	**QTY**		**UNIT**	**QTY**
STRAIGHTNESS TEST:	**NO**	0	BOREHOLE DEPTH AFTER TEST:	**M**	40.20
VERTICALLY TEST:	**NO**	0	BOREHOLE WATER LEVEL AFTER TEST: (mbch)	**M**	4.82
CASING DETECTION:	**NO**	UPVC	SAND/GRAVEL/SILT PUMPED?	**YES/NO**	0
SUPPLIED NEW STEEL BOREHOLE COVER:	**NO**	0	DATA REPORTING AND RECORDING	**NO**	1
BOREHOLE MARKING	**NO**	0	SLUG TEST:	**NO**	0
SITE CLEANING & FINISHING	**NO**	1	LAYFLAT (M):	**M**	10
LOGGERS FOR WATERLEVEL MONITORING	**NO**	0	LOGGERS FOR pH AND EC:	**NO**	0

It is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NAME: _____ **SIGNATURE:** _____

DESIGNATION: _____ **DATE:** _____

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3305	Coordinates:	SOUTH: 34.087246	PROVINCE:	Western Cape
BOREHOLE NO:	HBC-BH01		EAST: 018.831255	DISTRICT:	Helderberg
ALT BH NO:	0			SITE NAME:	Helderberg Shopping Centre
ALT BH NO:	0				

BOREHOLE DEPTH (m)	40.20	DATUM LEVEL ABOVE CASING (m):	0.65	EXISTING PUMP:	Submersible
WATER LEVEL (mbdl):	4.21	CASING HEIGHT: (magl):	Ground Level	CONTRACTOR:	AB PUMPS
DEPTH OF PUMP (m):	39.20	DIAM PUMP INLET (mm):	110.00	PUMP TYPE:	WA22-2

STEPPED DISCHARGE TEST & RECOVERY

DISCHARGE RATE 1			RPM 229		DISCHARGE RATE 2			RPM 280		DISCHARGE RATE 3			RPM 483	
DATE: 2026-06-04		TIME: 12:00			DATE: 2026-06-04		TIME: 13:00			DATE: 2026-06-04		TIME: 14:00		
TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)
1	0.50		1		1	1.45	0.97	1		1	2.19		1	
2	0.69		2		2	1.50	1.05	2		2	2.56	2.08	2	
3	0.84		3		3	1.54	1.04	3		3	2.80		3	
5	1.00		5		5	1.59		5		5	3.02	2.08	5	
7	1.09	0.58	7		7	1.73	1.05	7		7	3.10		7	
10	1.16		10		10	1.87		10		10	3.17	2.07	10	
15	1.19	0.58	15		15	1.98	1.07	15		15	3.49		15	
20	1.21		20		20	2.01		20		20	3.59	2.08	20	
30	1.25	0.57	30		30	2.03	1.06	30		30	3.70		30	
40	1.29		40		40	2.04		40		40	3.81	2.08	40	
50	1.32	0.56	50		50	2.05	1.06	50		50	3.86		50	
60	1.36		60		60	2.07		60		60	3.92		60	
70			70		70			70		70			70	
80			80		80			80		80			80	
90			90		90			90		90			90	
100			100		100			100		100			100	
110			110		110			110		110			110	
120			120		120			120		120			120	
pH			150		pH			150		pH			150	
TEMP	19.30	°C	180		TEMP	19.60	°C	180		TEMP	18.00	°C	180	
EC	1971	µS/cm	210		EC	1831	µS/cm	210		EC	1836	µS/cm	210	

DISCHARGE RATE 4			RPM 1004		DISCHARGE RATE 5			RPM		DISCHARGE RATE 6			RPM	
DATE: 2026-06-04		TIME: 15:00			DATE:		TIME:			DATE:		TIME:		
TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)
1	3.95		1	7.46	1			1		1			1	
2	4.01	2.70	2	6.47	2			2		2			2	
3	5.03	4.06	3	5.74	3			3		3			3	
5	6.30		5	4.50	5			5		5			5	
7	6.98	4.66	7	3.62	7			7		7			7	
10	7.62		10	2.71	10			10		10			10	
15	7.80	4.66	15	1.99	15			15		15			15	
20	8.14		20	1.78	20			20		20			20	
30	8.53	4.66	30	1.50	30			30		30			30	
40	8.74		40	1.35	40			40		40			40	
50	9.00	4.66	50	1.26	50			50		50			50	
60	9.09		60	1.17	60			60		60			60	
70			70	1.11	70			70		70			70	
80			80	1.04	80			80		80			80	
90			90	1.00	90			90		90			90	
100			100	0.96	100			100		100			100	
110			110	0.91	110			110		110			110	
120			120	0.87	120			120		120			120	
pH			150	0.80	pH			150		pH			150	
TEMP	17.80	°C	180	0.72	TEMP		°C	180		TEMP		°C	180	
EC	1821	µS/cm	210	0.66	EC		µS/cm	210		EC		µS/cm	210	
			240	0.60				240					240	
			300					300					300	
			360					360					360	

S/W/L:(mbch) 3.56

FORM 5 F

CONSTANT DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3305	Coordinates: SOUTH:	34.087246	PROVINCE:	Western Cape
BOREHOLE NO:	HBC-BH01	EAST:	018.831255	DISTRICT:	Helderberg
ALT BH NO:	0			SITE NAME:	Helderberg Shopping Centre
ALT BH NO:	0				
BOREHOLE DEPTH:	40.20	DATUM LEVEL ABOVE CASING (m):	0.65	EXISTING PUMP:	Submersible
WATER LEVEL (mbdl):	4.24	CASING HEIGHT: (magl):	Ground Le	CONTRACTOR:	AB PUMPS
DEPTH OF PUMP (m):	39.20	DIAM PUMP INLET(mm):	110	PUMP TYPE:	WA22-2

CONSTANT DISCHARGE TEST & RECOVERY

TEST STARTED				TEST COMPLETED								
DATE:	2026-06-05	TIME:	08:10	DATE:	2026-06-07	TIME:	08:10	TYPE OF PUMP:				
				OBSERVATION HOLE 1			OBSERVATION HOLE 2			OBSERVATION HOLE 3		
				NR:			NR:			NR:		
DISCHARGE BOREHOLE				Distance(m			Distance(m)			Distance(m		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME:	Drawdown	Recovery	TIME:	Drawdown	Recovery	TIME:	Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1	0.96		1	12.02	1			1			1	
2	2.07	3.51	2	10.08	2			2			2	
3	3.15	3.80	3	9.20	3			3			3	
5	4.10	4.08	5	8.72	5			5			5	
7	4.96		7	8.32	7			7			7	
10	5.47	4.06	10	8.05	10			10			10	
15	6.18		15	6.97	15			15			15	
20	6.79	4.04	20	5.92	20			20			20	
30	7.34		30	4.84	30			30			30	
40	7.86	4.08	40	4.45	40			40			40	
60	8.06		60	4.02	60			60			60	
90	8.25	4.10	90	3.50	90			90			90	
120	8.90		120	3.28	120			120			120	
150	9.03	4.09	150	3.03	150			150			150	
180	9.15		180	2.96	180			180			180	
210	9.22	4.11	210	2.84	210			210			210	
240	9.30		240	2.65	240			240			240	
300	9.44	4.09	300	2.52	300			300			300	
360	9.91		360	2.38	360			360			360	
420	10.31	4.08	420	2.29	420			420			420	
480	10.59		480	2.20	480			480			480	
540	10.81	4.07	540	2.13	540			540			540	
600	10.98		600	2.11	600			600			600	
720	11.66	4.10	720	2.01	720			720			720	
840	11.90		840	1.94	840			840			840	
960	12,39,	4.08	960	1.78	960			960			960	
1080	12.75		1080	1.47	1080			1080			1080	
1200	12.85	4.10	1200	1.43	1200			1200			1200	
1320	13,09,	4.10	1320	1.37	1320			1320			1320	
1440	13.32		1440	1.35	1440			1440			1440	
1560			1560		1560			1560			1560	
1680			1680		1680			1680			1680	
1800			1800		1800			1800			1800	
1920			1920		1920			1920			1920	
2040			2040		2040			2040			2040	
2160			2160		2160			2160			2160	
2280			2280		2280			2280			2280	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640			2640		2640			2640			2640	
2760			2760		2760			2760			2760	
2880			2880		2880			2880			2880	
3000			3000		3000			3000			3000	
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600			3600		3600			3600			3600	
3720			3720		3720			3720			3720	
3840			3840		3840			3840			3840	
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
4200			4200		4200			4200			4200	
4320			4320		4320			4320			4320	
Total time pumped(min):				1440		W/L			W/L			W/L
Average yield (l/s):				4.10								

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Stellenbosch
Tel 021-8828866
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2026-06-15

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TEST REPORT

Water

Groundwater Solutions cc t/a AB Pumps

Attn: Ailene Van Niekerk

East London
+27828397258

@VinlabSA

Sample Details					
SampleID	W77824				
Water Type	Drinking Water				
Water Source	Borehole				
Sample Temperature					
Description	P3305 Helderberg HBC-BH01				
Batch Number					
PO Number	P3305				
Date Received	2026-06-09				
Condition	Cold				

Water - Routine									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
pH@25C (Water)		VIN-05-MW01	^^^	>= 5 to <= 9.7	6.60				
Conductivity@25C (Water)	mS/m	VIN-05-MW02	^	<= 170	358				
Turbidity (Water)*	ntu			<= 5	8.06				
Total dissolved solids (Water)*	mg/L			<= 1200	2427.24				
Free Chlorine (Water)*	mg/L			<= 5	<0.02				
Ammonia (NH4) as N (Water)	mg/L	VIN-05-MW08	8.90%	<= 1.5	<0.15				
Nitrate as N (Water)	mg/L	VIN-05-MW08	11.00%	<= 11	<0.70				
Nitrite as N (Water)	mg/L	VIN-05-MW08	4.50%	<= 0.9	<0.05				
Chloride (Cl-) - Water	mg/L	VIN-05-MW08	10.12%	<= 300	1049.81				
Sulphates (SO4) - Water	mg/L	VIN-05-MW08	7.56%	<= 500	69.92				
Fluoride (F) - Water	mg/L	VIN-05-MW08	12.30%	<= 1.5	1.06				
Alkalinity as CaCO3 (Water)*	mg/L				135.50				
Colour (Water)*	mg/L Pt-Co			<= 15	<15				
Total Organic Carbon (Water)*	mg/L			<=10	1.10				
Date Tested					2026-06-09				

Water - Metals									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
Calcium (Ca) - Water	mg/L	VIN-05-MW43	13.35%		105				
Magnesium (Mg) - Water	mg/L	VIN-05-MW43	15.85%		68				
Sodium (Na) - Water	mg/L	VIN-05-MW43	13.31%	<= 200	519				

Please click here for SANS241-1:2015 drinking water limits

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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

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Water

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Potassium (K) - Water	mg/L	VIN-05-MW43	6.80%		11				
Zinc (Zn) - Water	mg/L	VIN-05-MW43	13.22%	<= 5	<0.05				
Antimony (Sb) - Water*	µg/L			<=20	<13.0				
Arsenic (As) - Water*	µg/L			<= 10	<10.0				
Boron (B) Water	µg/L	VIN-05-MW43	19.29%	<= 2400	129				
Cadmium (Cd) Water	µg/L	VIN-05-MW43	14.10%	<= 3	<3				
Chromium (Cr) - Water	µg/L	VIN-05-MW43	11.39%	<= 50	<10				
Copper (Cu) - Water	µg/L	VIN-05-MW43	11.07%	<= 2000	<50				
Iron (Fe) - Water	µg/L	VIN-05-MW43	7.63%	<= 2000	273				
Lead (Pb) - Water	µg/L	VIN-05-MW43	9.38%	<= 10	<10				
Manganese (Mn) - Water	µg/L	VIN-05-MW43	10.54%	<= 400	294				
Nickel (Ni) - Water	µg/L	VIN-05-MW43	10.61%	<= 70	<50				
Selenium (Se) - Water*	µg/L			<= 40	<10.0				
Aluminium (Al) - Water	µg/L	VIN-05-MW43	13.90%	<= 300	<50				
Cyanide (CN) - Water*	µg/L			<= 200	<10.0				
Mercury (Hg) - Water*	µg/L			<= 6	<1.0				
Barium (Ba) Water	µg/L	VIN-05-MW43	12.56%	<= 700	13				
Uranium (U) - Water*	µg/L			<= 30	<28				
Date Tested					2026-06-09				

Water - Micro

	Unit	Method	Uncertainty	Limits	Results	Results	Results	Results	Results
Total Coliforms (Water)	cfu/100mL	VIN-05-MW09		<= 10	1				
E-Coli (Water)	cfu/100mL	VIN-05-MW09		not detected	nd				
Heterotrophic plate count*	cfu/mL			<= 1000	4600				
Date Tested					2026-06-09				

Comments

W77824
Two Samples received,

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TEST REPORT

Water

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Mistral Page
Senior Analyst
VIN-05-MW01, MW02, MW03, MW04, MW08, MW09, MW10, MW12, MW13, MW14, MW43

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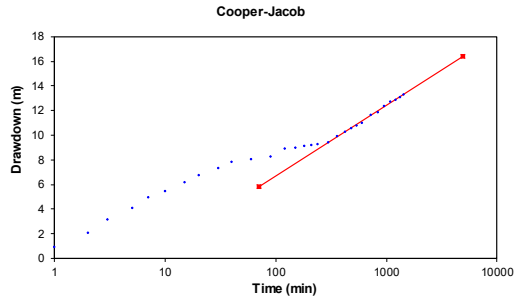
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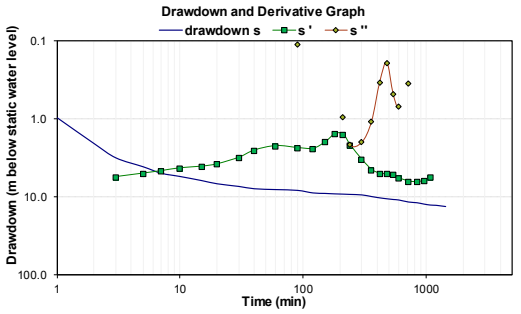


Cooper-Jacob method

T(m²/d) =	11.3	r_e (m)=	0.1
S =	1.21E+01	Q (l/s) =	4.10

	No boundaries	1 no-flow	2 no-flow	Closed
Q_sust	3.00	1.50	0.99	0.75
Avg. Q_sust =		1.56	std. dev =	1.01

Boundaries selected	0 - closed

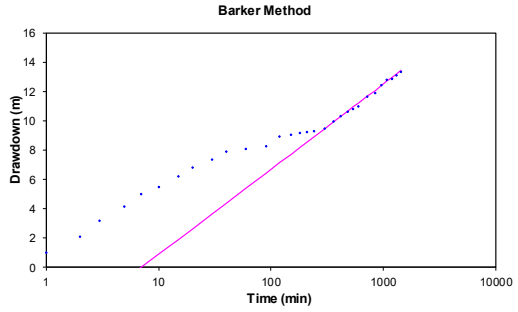


FC method

Extrapolation time in years	2	1051200	Extrapol.time in minutes	
Effective borehole radius (r_e)	49.9003717	49.90037171	Est. r_e	From r(e) sheet
Q (l/s) from pumping test	4.1	7.53472E-05	S-late	Change r_e
s_a (available drawdown), sigma_s	**21.75**	0	Sigma_s from risk	
Annual effective recharge (mm)	0	21.75	s_available w orking draw dow n(m)	
t(end) and s(end) of pumping test	1440	13.32	End time and draw dow n of test	
Average maximum derivative	**5.51**	6.379904195	Estimate of average of max deriv	
Average second derivative	**0**	0.054674237	Estimate of average second deriv	
Derivative at radial flow period	3.73151435	3.731514345	Read from derivative graph	
T-early[m²/d]		17.37255012	Aqui. thick (m)	60
T and S estimates	**T-late [m²/d]**	**11.76513975**	Est. S-late	0.0033
	S-late	0.0033		

BASIC SOLUTION

	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	29.10	44.87	60.65	107.98
Q_sust (l/s) =	3.06	1.99	1.47	0.83
Average Q_sust (l/s) =	1.65			
with standard deviation=	0.95			
Boundaries selected	0 - closed			

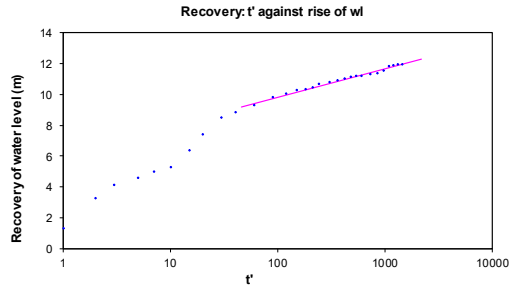


Barker method

	K_f [m/d]	S_f [1/m]	b	n	N
Fit Parameters	0.60	2.00E-03	18.62	1.99	0.0050

	No boundaries	1 no-flow	2 no-flow	Closed
sWell(Extrapol.time)	30.57	62.12	77.90	93.68
Q_sust	2.92	1.44	1.14	0.95

Fractal n = 1.99	Average Q-sust (l/s)=	1.46	std. dev = 0.89
	Boundaries selected	0 - closed	



Recovery

T [m2/d]	35.1
CDT Duration	1440
Recovery Duration	1440
Max % Recovery	89.9