

Calvinia, Hantam municipality Additional groundwater supply, Northern Cape (2018).

REPORT: GEOSS Report No: 2018/10-18 **PREPARED FOR:** Gert Meiring BVI - Upington Office Director - Civil Department 55 Bult Street Upington 8800 South Africa

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EXECUTIVE SUMMARY

BVi Consulting Engineers have been appointed by the Hantam Municipality to conduct a feasibility study and find a long-term solution for the bulk water supply to Calvinia in the Northern Cape. It has recently faced water shortages due to drought conditions in the area. The current water usage for the town equates to approximately 14.5 L/s. GEOSS was subcontracted, as groundwater consultants, in order to site additional boreholes to be drilled and tested for sustainable supply to the town, with a target of 45 L/s.

Current supply boreholes were reassessed and six new areas were investigating for possible groundwater development:

- Rhenosterhoek Farm
- Nature reserve
- Ceres Karroo area (Kruitberg)
- Keiskie
- Downes
- North-west region

The study included an initial remote geological and topographical investigation of the area and lineament mapping; this preceded the site visit. The site visit included a hydrocensus, an evaluation of the site geology and geophysics.

Thirty-one boreholes were drilled, of which twelve were viable for testing. The total estimate sustainable yield from these boreholes is 68 L/s which meets the target yield of the project, although it will require careful management, informed by groundwater level monitoring, to ensure it is correctly utilised.

Overall the groundwater quality is classified as "good to moderate". The fluoride concentration of all the tested sites is a concern (of varying degrees) and should be addressed before production begins. Exploration borehole Cal_Phase3_4A had an anomalous high iron concentration of 22 mg/L, typical iron concentrations range between 0.024 - 0.3 mg/L in the Calvinia area.

It is recommended that monitoring equipment be installed in the boreholes, in order to ensure data informed management. The boreholes will also need to be authorised via a Water Use License Application.

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ABBREVIATIONS

CGS	The Council of Geoscience
CDT	Constant discharge test
DWA	Department of water affairs
DWAF	Department of Water and Forestry
L/s	litres per second
m	metres
mamsl	meters above mean sea level
mbch	metres below collar height
mbgl	metres below ground level
mm/a	millimetres per annum
mS/m	milliSiemens per meter
NGA	National Groundwater Archive

GLOSSARY OF TERMS

- Aquifer: a geological formation, which has structures or textures that hold water or permit appreciable water movement through them [from National Water Act (Act No. 36 of 1998)].
- Borehole: includes a well, excavation, or any other artificially constructed or improved groundwater cavity which can be used for the purpose of intercepting, collecting or storing water from an aquifer; observing or collecting data and information on water in an aquifer; or recharging an aquifer [from National Water Act (Act No. 36 of 1998)].
- Fractured aquifer: Fissured and fractured bedrock resulting from decompression and/or tectonic action. Groundwater occurs predominantly within fissures and fractures.
- Groundwater: water found in the subsurface in the saturated zone below the water table or piezometric surface i.e. the water table marks the upper surface of groundwater systems.
- Intergranular Aquifer: Generally unconsolidated but occasionally semi-consolidated aquifers. Groundwater occurs within intergranular interstices in porous medium. Typically occur as alluvial deposits along river terraces.
- Intergranular and fractured aquifers: Largely medium to coarse grained granite, weathered to varying thicknesses, with groundwater contained in intergranular interstices in the saturated zone, and in jointed and occasionally fractured bedrock.
- Transmissivity: the rate at which a volume of water is transmitted through a unit width of aquifer under a unit hydraulic head (m^2/d) ; product of the thickness and average hydraulic conductivity of an aquifer.

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Cover photo:

Borehole drilling within the Calvinia nature reserve.

GEOSS project number:

2017_03-2026.

Reviewed by:

Julian Conrad (23 October 2018)

1. INTRODUCTION

BVi Consulting Engineers have been appointed by the Hantam Municipality to conduct a feasibility study to find a long-term solution for the bulk water supply to Calvinia in the Northern Cape.

Calvinia is a small town in the Northern Cape province of South Africa, located 380 km north-east of Cape Town in the Namakwa District (**Map 1, Appendix A**). It is currently facing water shortages due to low levels in the Karee dam and the bulk supply is limited due to problems with the supply boreholes water levels declining. The current water usage for the town is 1250 cubes/pd, this equates to 14.5 L/s. Groundwater in the region does show potential and a revised assessment is required of the groundwater options for groundwater supply. This includes investigating the following areas and re-assessing current supply boreholes:

- Rhenosterhoek Farm
- Nature reserve
- Ceres Karroo area (Kruitberg)
- Keiskie
- Downes
- North-west region

The study included an initial remote geological and topographical investigation of the area and lineament mapping; this preceded the site visit. The site visit included a hydrocensus, an evaluation of the site geology and geophysics.

2. TERMS OF REFERENCE

The project Terms of Reference were to assess the existing utilised groundwater resources and develop additional groundwater resources by:

- Obtain all relevant data to the project (i.e. obtain data from the National Groundwater Archive (NGA), etc), including geological maps and geohydrological maps. Any relevant groundwater reports will also be sourced.
- Evaluating the potential of locating additional boreholes within the current well fields
- Map potential groundwater bearing structures and formations on the satellite imagery and aerial photographs using the ArcGIS desktop software. The lineaments will be mapped using false-colour composites and grey-scale pansharpened aerial images. The satellite lineament data will then be overlain on the 1:50 000 scale digital geological maps. The geological data of the area will be digitised and attributed from the published geological and other relevant maps. The boreholes and other relevant groundwater information will be superimposed on GIS generated maps for analysis.

- Surface geological and geophysical (electromagnetic and magnetic) mapping will be conducted in detail in areas where boreholes with groundwater potential may occur
- Analyse the data, using geohydrological methods and address the questions set out in the project objectives.
- Mange drilling and yield testing of additional boreholes
- Undertake safe yield and water quality assessment of current supply boreholes. The test pumping data will be analysed using various methods (Theis, Cooper-Jacob and FC).
- A 24, 48 or 72-hour sustainable pumping schedule for each borehole will be determined as well as alternative pumping schedule to maximise the boreholes. Optimum allowable water level drawdown and pump depth will be advised.

3. REGIONAL SETTING

3.1 *General*

Calvinia falls under the jurisdiction of the Hantam Local Municipality in Namakwa District which is located in the southern part of the Northern Cape Province. The town is just south of the Hantam mountains on the banks of the Oorlogskloof River. The town is 380 km north of Cape Town and 400 km south west of Upington. The town's elevation is approximately 1050 m above mean sea level, and positioned on a water divide, with streams radiating outwards in all directions. The town is located in quaternary catchment E40B, but positioned close to the boundary with E40A (East) and D58B (North). The Hantam Local Municipality is the Water Services Authority and the Water Services Provider for all the settlements under its jurisdiction (DWA, 2009).

The Town is dependent on the Karee Dam located 4.5 km north of the town, during dry periods when the dam is empty the town use its alternative groundwater source as a backup. The town currently uses six production boreholes located east of the town.

3.2 *Climate*

Hantam Municipal Area lies in an area that falls on the boundary between regions with summer and winter rainfall, and rainfall therefore occurs throughout the year. The long-term average climatic data for Calvinia (1981 – 2010) indicate an approximate rainfall of 198 mm/a for the period (**Figure 1**). The data indicates that >70% of the rainfall occurs during the summer months (November to April). December and January are the wettest months whilst June and July are the driest.

	Climate data for Calvinia (1981-2010)												
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C	32	32.3	30.1	26	21.5	18.2	17.9	19.4	22.5	25.9	28.2	30.3	25.3
Daily mean °C	22.7	22.9	21.1	17.4	13.8	10.8	10.5	11.2	13.7	16.8	19.1	21.1	16.8
Average low °C	13.4	13.8	12.3	9.5	6.4	3.8	3.6	3.4	5	7.9	10	12	8.3
Average rainfall mm	29.49	26.94	27.31	18.56	9.33	0.64	1.09	5.07	11.41	18.87	22.48	27.73	198.92
Average rainy days (≥ 1.0 mm)	1	1	3	4	3	4	4	4	4	3	2	2	35

Figure 1: Long term annual climatic data for Calvinia (online, meteo-climat-bzh access 2017)

3.3 Regional Geology

The Geological Survey of South Africa (now the Council for Geoscience) has mapped the area at 1:250 000 scale (3118 Calvinia). The geological setting is shown in **Map 3** (**Appendix A**). The geology underlying Calvinia can be broken down into different lithologies.

3.3.1 Unconsolidated units

Alluvial and colluvium deposits are limited in thickness and extent in the Calvinia area. They comprise mostly of weathering products of argillaceous rocks which have been deposited by sheet wash process. Majority of the alluvial is located within the Oorlogskloof River and Vlakfontein River channel. The thickness of the alluvium material varies between 5 - 30 meters below ground level.

3.3.2 Sedimentary units

The sediments in the Calvinia area belong to the Ecca Group of the Karoo Sequence. The formation present in the area is:

• Tierberg Shale Formation (Ecca Group)

These formations are all argillaceous in nature. The formation consists of quartzitic sandstone and subordinate shale bands. The Tierberg Formation comprises upward – coarsening sequence of thin laminated, dark-brown to light grey shale. Thin yellow weathering layers of volcanic ash may be present.

3.3.3 Dolerite Intrusions

An attempt was made to correlate the dolerite sheets with those of the Calvinia area some 80 km away (DWAF, 1981). A regular horizontal dolerite sheet with a thickness of 120 m was identified in Calvinia with an upper contact of 880 mamsl. This may correlate with the Rheeboksfontein Sheet which displays the same thickness but is at a lower elevation (\sim 100 m lower).

The outcrop of dolerite in Calvinia with a lower contact at $1\ 010 - 1\ 040$ mamsl may correspond with the Loeriesfontein Sheet. These correlations are tentative, but are potentially important considering the significant bearing that dolerite sheets have on groundwater occurrence in this geological setting.

3.3.4 Breccia Pipes

Additionally, there are a number of breccia pipes in the study area. These have been drilled by the Council for Geoscience and Department of water Affairs for investigation and water supply. They are evident in the field as dome shaped hills, as the pipes and surrounding metamorphosed rock is more resistant to weathering than the host rock. From aerial photography the pipes are evident as a dark spherical structure surrounded by a while alteration halo in the surrounding sedimentary formation.

The pipes consist of baked and dislocated shale and mudstone of the Prince Albert and Whitehill Formations, but molten, recrystallized and contorted sediments containing clasts from underlying strata are also found. These pipes resulted from localised hydrothermal activity generated by the emplacement of the lowermost dolerite sills.

3.4 Regional Hydrogeology

3.4.1 Aquifer type and yield

According to the 1:500 000 scale groundwater map of Calvinia (3118) the area does host a fractured aquifer. These semi-confined aquifers are formed by jointing and fracturing within the solid bedrock. (**Map 4, Appendix A**). The average borehole yield in the region has been classified as 0.5 to 2 L/s according to Department of Water Affairs and Forestry (DWAF 1998).

Primary or intergranular aquifers do occur within the area along the river banks/channels of the Oorlogskloof River. Groundwater flows within the unconsolidated sediment and weathered bedrock formations. The average thickness of the unconsolidated and weathered zone is 25 - 35 meters. In general, these aquifers are poorly developed and vulnerable to drought conditions.

3.4.2 Groundwater quality

Based on the DWAF (1998) classification the regional groundwater quality underlying the town and its surrounds is good to marginal with an associated electrical conductivity (EC) of 70 - 300 mS/m. (Map 5, Appendix A).

4. SITE VISIT - HYDROCENSUS

4.1 Site visit

Prior to the field work being carried out all relevant borehole data was obtained for the area and current production boreholes. In addition, the field work was used as an opportunity to collect as much anecdotal information as possible. The individual boreholes were visited to determine their state.

4.1.1 **Production boreholes**

Calvinia currently has seven production boreholes of which six are used for Town supply (**Table 1**). Calvinia-Ceres Rd BH was identified as a potential site during the site visit to conduct a pumping test. The Breccia BH was initially a study site for a potential artificial recharge scheme conducted by Dr. Murray. The borehole is used to store water during times of excess surface water for the purpose of supplying water during periods of drought. Currently (2018) the borehole is not been used to supply water.

Bhole ID	Latitude	Longitude	Elevation (mamsl)	Pump Depth (m)
Calvinia-Ceres Rd_BH	-31.635482	19.749442	1067	-
Golf_course_BH	-31.482959	19.763893	979	200
Witwal_BH	-31.452398	19.811102	1004	-
Sandgat_3_BH	-31.498032	19.874576	1007	17.00
Sandgat_4_BH	-31.502987	19.875842	1006	?38
Sandgat_5_BH	-31.509516	19.850230	1005	200
Breccia_BH	-31.485347	19.900996	1066	>100
Deon_Vlok_BH	-31.481290	19.968414	1083	250

Table 1: Calvinia Production boreholes information

Temporal data was provided by DWS for the period of October 2017 – April 2018. The data indicates water level, yield and volume abstracted. **Table 2**

Bh ID	Water level Oct 2017 (mbgl)	Sustainable Yield (m³/h)	Sustainable Yield (L/s)	Sust. Yield (m ³ /day)	Water level 10 Feb 2018 (mbgl)	Delivery on 10 Feb 2018 (m ³ /h)	Sustainable Yield (L/s)	on 10 Feb 2017 (m ³ /d)	Water level 23 Feb 2018 (mbgl)	Delivery on 23 Feb 2018 (m ³ /h)	Sustainable Yield (L/s)	on 23 Feb 2017 (m ³ /d)
Sandgat 3		5	1.5	129.60	12	5.14	1.43	123.36	12	4.4	1.2	105.6
Sandgat 4		3	0.8	69.12	30	2.9	0.81	69.6	30	4	1.1	96
Sandgat 5		11	3	259.20	40	3.15	0.88	75.6	40	3.4	0.9	81.6
Deon Vlok		58	16	1382.40	61.6	24	6.67	576	57.9	30	8.3	720
Witwal		36	10	864.00	54.9	6.8	1.89	163.2	57.5	5.7	1.6	136.8
Golfcourse BH		7	2	172.80	60	10.9	3.03	261.6	70.5	10.5	2.9	252

Table 2: Temporal data water level data was provided by DWS

Water level 2 Mar 2018 (mbgl)	Delivery on 2 Mar 2018 (m ³ /h)	Sustainable Yield (L/s)	on 2 Mar 2017 (m ³ /d)	Water level 6 Apr 2018 (mbgl)	Delivery on 6 Apr 2018 (m ³ /h)	Sustainable Yield (L/s)	on 6 Apr 2017 (m ³ /day)	Water level 10 Apr 2018 (mbgl)	Delivery on 10 Apr 2018 (m ³ /h)	Sustainable Yield (L/s)	on 10 Apr 2017 (m ³ /d)
12	4	1.1	96	12	3.8	1.1	91.2		3.75	1.0	90
30	3.6	1.0	86.4	30	2.75	0.8	66		2.83	0.8	67.92
40	3.4	0.9	81.6	40	2.47	0.7	59.28		2.43	0.7	58.32
63	26	7.2	624	80.3	17	4.7	408		17.6	4.9	422.4
58.4	6.3	1.8	151.2	65.3	6.8	1.9	163.2		6.8	1.9	163.2
69	10	2.8	240	?	1.9	0.5	45.6		0	0.0	0

5. DESKTOP STUDY AND GROUNDWATER EXPLORATION

5.1 Desktop study

The desktop study was conducted using the following information in order to identify higher potential areas for groundwater exploration;

- National Ground water archive (NGA)
- 1: 50 000 and 1: 250 000 Geological Maps
- South African airborne magnetic data
- Lineament maps provided by the CGS
- Climatic data for the region.
- Previous reports (Private and government sector)

The desktop study was stipulated to target areas either owned by municipality or government initially and then private owned land. Previous reports/literature indicated that groundwater is generally located within alluvial channels, dolerite dykes or dolerite sills. The above-mentioned data was collated into a Geographical information system (GIS) software package. Five areas of interest were identified which met the criteria of geological structures, and sufficient recharge/rainfall. The Nature reserve located 1 km north of Calvinia was re assessed for groundwater potential and the re-drilling of existing abandoned/dilapidated boreholes.

A study area identified by SRK Consulting (Report No: 345429/4) 18 km to the north-east of Calvinia on a farm known as Rhenosterhoek was assessed for groundwater potential. The report identified the area as a potential area for groundwater exploration, however, GEOSS reassessed the area and data. Based on GEOSS assessment the area was classified as a low priority due to changes in climatic data and limited information pertaining to aquifer yield potential.

- Rhenosterhoek Farm (SRK study area)
- Ceres Karoo area / Kruitberg (Study area 1)
- Keiskie / Keiskie road (Study area 2)
- Downes (study area 3)
- North-west region along the R355 (Study area 4)
- Nature reserve (Re-drilling of existing boreholes)
- De Vlok farm (Study area 5)

The 1:250 000 and 1:50 000 geological maps were also used where possible, to increase the level of geological detail used in understanding target areas. The geological maps used in conjunction with aerial imagery were used to conduct lineament and fault mapping was at site specific scales, to more closely define target areas. These target areas were then compared to the available groundwater information surrounding them, to obtain estimate outcomes and expectations of groundwater exploration in these sites.

5.2 *Exploration study*

Once the desktop study targets had been identified, field work was completed to finalise the exploration drill sites. The field work took the form of onsite structural verification (field geology), where the target structures were visible at surface. In areas where the target structures were covered by alluvium, geophysical techniques were used to further define the exploration drill sites.

The electromagnetic geophysical techniques were used, the method is a no intrusive and rapid for covering large areas. the geophysical survey was undertaken using a CMD-DUO Electromagnetic conductivity meter which measures the ground conductivity of the subsurface. It is a rapid data acquisition instrument that can be successfully applied to groundwater exploration. The CMD-DUO induces a changing electromagnetic (EM) field with a known frequency into the subsurface using a sender coil. This changing EM field induces current flow in conductive subsurface areas (for example fractured sandstone saturated with groundwater), which is measured by the receiver coil. This is then automatically converted to ground conductivity. In general, the ground conductivity measured has a direct correlation with formation porosity and groundwater salinity; i.e. if porosity of the formation or groundwater salinity increases, this will be reflected as a higher ground conductivity measurement (Telford et al, 1990).

The geophysical profiles are attached in Appendix B and spatial overlain on Map 2 (1-4).

Access to two of the study areas were limited by the private land owners. Rhenosterhoek Farm owner refused access to the land. The second target area Downes, GEOSS was allowed access to conduct geophysical and structure mapping work. However, the Land owner stipulated that he does not want drilling to take place on his land.

GEOSS took careful consideration when siting exploration boreholes on private land in order to not impact current groundwater use on the property or obstruct the works of the farm.

5.3 *Exploration Borehole sites*

Boreholes sites were selected based on the lineament mapping, geology mapping and geophysics. The exploration drill programme was broken into three phases, this was due to funding constraints during the initial phase of the project. The phases were broken down into the following criteria;

- **Phase 1:** Priority sites were selected with the highest groundwater potential.
- **Phase 2:** All sites delineated during the initial groundwater exploration phase.
- **Phase 3:** Additional sites added through exploration results **Phase 2**. Additional funding allowed for the expansion of the study site and additional explorations areas were identified.

 Table 3 list the drill targets and their phase number.

Drill phase	Drill No.	Name	Latitude	Longitude
			(WGS 84)	(WGS 84)
Phase 1	1	Cal_DV1	-31.455414	19.773937
Phase 1	2	Cal_DV2	-31.429912	19.785117
Phase 1	3	Cal_DV3	-31.430694	19.7883
Phase 1	4	Cal_DV4	-31.411629	19.775115
Phase 1	5	Cal-S2-1	-31.558677	19.821479
Phase 1	6	Cal-S2-3	-31.651334	19.801571
Phase 1	7	Cal-S2-3TV	-31.565842	19.828691
Phase 1	8	Cal-S1-1	-31.643388	19.883707
Phase 1	9	Cal-S1-2	-31.618573	19.893546
Phase 1	10	Cal-S1-3	-31.618808	19.893628
Phase 2	11	Cal-S2-4	-31.650359	19.801047
Phase 2	12	Cal-S2-2	-31.555085	19.818219
Phase 2	13	Cal-S2-3B	-31.650182	19.802443
Phase 2	14	Cal-S2-7	-31.650782	19.76698
Phase 2	15	Cal-S2-8	-31.649895	19.770142
Phase 2	16	Cal-S2-9	-31.65117	19.783061
Phase 2	17	Cal-S1-KB	-31.636869	19.758089
Phase 2	18	Cal-S1-KB-B	-31.643077	19.758324
Phase 2	19	Cal-S1-KB-B2	-31.642809	19.758577
Phase 2	20	Cal_S2_10	-31.617462	19.744726
Phase 2	21	Cal-S3-1	-31.598452	20.017608
Phase 2	22	Cal-S3-2	-31.384946	19.539153
Phase 2	23	Cal-S3-3	-31.593047	19.999782
Phase 2	24	Cal_Nat5	-31.435236	19.784485
Phase 2	25	Cal_Nat6	-31.451284	19.770548
Phase 3	26	Cal_Phase3_1	-31.417054	19.94251

Table 3: Exploration boreholes

Phase 3	27	Cal_Phase3_2	-31.393491	19.547516
Phase 3	28	Cal_Phase3_3	-31.398477	19.553632
Phase 3	29	Cal_Phase3_6	-31.357725	19.6915
Phase 3	30	Cal_Phase3_4	-31.401169	19.556679
Phase 3	31	Cal_Phase3_5	-31.396265	19.55079
Phase 3	32	Cal_Phase3_7	-31.375992	19.667129
Phase 3	33	Cal_Phase3_8	-31.630381	19.749189
Phase 3	34	Cal_Phase3_8_Alt	-31.63271	19.748168
Phase 3	35	Cal_Phase3_9	-31.632714	19.756781
Phase 3	36	Cal_Phase3_10	-31.625006	19.755166
Phase 3	37	Cal_Phase3_11	-31.619652	19.753778
Phase 3	38	Cal_phase3_12	-31.626433	19.776246
Phase 3	39	Cal_phase3_13	-31.641369	19.76428
Phase 3	40	Cal_Phase3_14	-31.59096	20.001357
Phase 3	41	Cal_Phase3_15	-31.565631	19.959059
Phase 3	42	Cal_vlok1	-31.382153	19.956044
Phase 3	43	Re-Drill 39602	-31.372864	19.970834
Phase 3	44	Cal_Vlok2	-31.401289	20.007778

Calvinia, Hantam municipality- Additional groundwater supply, Northern Cape (2018).

6. DRILLING RESULTS

A total of 44 boreholes were sited for the exploration phase of the project (Map 2 (1 - 4), Appendix A). 31 boreholes were drilled by the company H&A drilling during the period of March to August 2018. Drill locations each represented its own challenges which ranged from access due to bad weather conditions and difficult drilling conditions. Table 4 summarize the drill results. Boreholes for each location can be found in Appendix D: Borehole logs.

On average exploration boreholes were drilled to a depth of 150 m with the deepest borehole been drilled to a depth of 207 m. Dolerite dikes and deep-seated sills were the primary drill targets for exploration. Drilling was either stopped due to high water pressure decreasing drill bit penetration, unfavourable geology been intersected or target depth of 212 m was reached (the maximum of 212 m was due to limited drill strings been available).

A total of 13 successful borehole were drilled with a cumulative blow yield of 136 L/s. The newly boreholes were then yield tested to determine sustainability and the results are presented in **Section 8**.

Drill Phase	Name	Latitude (DD)	Longitude (DD)	Borehole depth (m)	Fractures (mbgl)	Blow yield (L/s)	Borehole diameter 1 (casing) and Depth (m)	Borehole diameter 2 and Depth (m)
Phase 1	Cal_DV1	-31.455414	19.773937	160	144 and 155	25	#8.5" (0 - 165)	
Phase 1	Cal_DV2	-31.429912	19.785117	200		0.1	6.5" (0 -200)	
Phase 1	Cal_DV3	-31.430694	19.7883	205	189	2.7	6.5" (0 -202)	
Phase 1	Cal_DV4	-31.411629	19.775115	207	49; 82 and 85	3.1	6.5"(0 - 207)	
Phase 1	Cal-S2-3	-31.651334	19.801571	120	31	2.8	6.5" (0 - 120)	
Phase 1	Cal-S1-1	-31.643388	19.883707	180		0.1	6.5" (0 - 180)	
Phase 1	Cal-S1-2	-31.618573	19.893546	152		0.1	6.5" (0 -152)	
Phase 1	Cal-S1-3	-31.618808	19.893628	128		0.1	6.5" (0 -128)	
Phase 2	Cal-S2-4	-31.650359	19.801047	180	144 and 155	4.9	6.5" (0 -180)	
Phase 2	Cal-S2-3B	-31.650182	19.802443	120	28	0.2	6.5" (0 -120)	
Phase 2	Cal-S2-7	-31.650782	19.76698	153		0.1	6.5" (0 -153)	
Phase 2	Cal-S2-8	-31.649895	19.770142	200	-	1.3	6.5" (0 -200)	
Phase 2	Cal-S2-9	-31.65117	19.783061	180		0.3	6.5" (0 -180)	
Phase 2	Cal-S1-KB	-31.636869	19.758089	180	30	1.3	6.5" (0 -180)	
Phase 2	Cal-S1-KB-B	-31.643077	19.758324	120		0.3	6.5" (0 -120)	
Phase 2	Cal-S1-KB-B2	-31.642809	19.758577	83		0.1	6.5" (0 -83)	
Phase 2	Cal_S2_10	-31.617462	19.744726	152	79	8.2	#8" (0 - 111)	6.5" (111 - 151)
Phase 2	Cal_Nat5	-31.435236	19.784485	170	168	5	6.5" (0 - 170)	
Phase 2	Cal_Nat6	-31.451284	19.770548	200	19 and 80	3	6.5" (0 - 200)	
Phase 3	Cal_Phase3_3	-31.398477	19.553632		37 and 143	1.1	6.5" (0 - 150)	
Phase 3	Cal_Phase3_6	-31.357725	19.6915	112	92	>25	8" (0 - 112)	

Table 4: Drilling results summary

Phase 3	Cal_Phase3_4A	-31.401169	19.556679	79	22, 43 and 71	> 10	8" (0 - 79)	
Phase 3	Cal_Phase3_5	-31.396265	19.55079	127			6.5" (0 - 127)	
Phase 3	Cal_Phase3_7	-31.375992	19.667129	137	70	0.1	6.5" (0 - 137)	
Phase 3	Cal_Phase3_8_Alt	-31.63271	19.748168	182		0.1	6.5" (0 - 182)	
Phase 3	Cal_Phase3_9	-31.632714	19.756781	117	36,39,62,68,72	>10	# 8" (0 - 117)	
					and 96			
Phase 3	Cal_phase3_12	-31.626433	19.776246	180		0.1	6.5" (0 - 180)	
Phase 3	Cal_phase3_13	-31.641369	19.76428	192			6.5" (0 - 192)	
Phase 4	Cal_vlok_2	-31.401289	20.007778	152		0.1	6.5" (0 - 152)	
Phase 3	Cal_vlok_1	-31.382153	19.956044	200		0.1	6.5" (0 - 200)	
Phase 3	ReDrill 39602	-31.372864	19.970834	180	52	30	8" (0 - 60)	6.5" (60 - 180)

* Metres below ground level (approximate, from borehole logs)

borehole reamed to 8" to allow for large pumps to be installed

** figures in bold denotes main water strikes in terms of blow yield

7. PUMPING TESTS: EXISTING PRODUCTION BOREHOLE

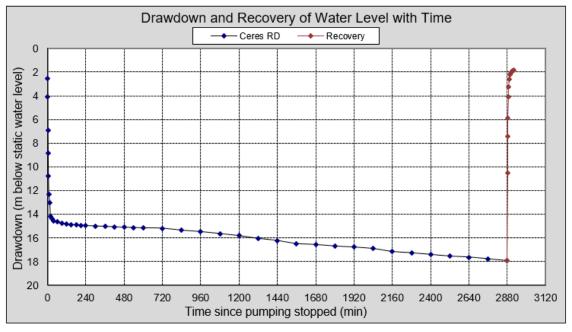
Seven boreholes existing boreholes, six boreholes are currently been used for water supply and one borehole (Calvinia-Ceres Rd_BH) was identified during the hydrocensus phase of the project. Concerns were raised as to the groundwater levels which haven shown a decline during the drought. Revaluation of the current production boreholes were conducted in order to determine the sustainable yields of the boreholes during drought conditions for both present and future. (**Map 2, Appendix A**).

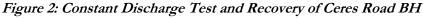
7.1 Ceres Road

The step test commenced on the September 2017. The rest water level (RWL) was measured at 14.01 mbgl in the borehole of 51.90 m depth. The pump was only installed to 49.10 m. The Step Test involved four steps of increasing abstraction rates and the water level was drawn down to 35 m below the RWL at the end of the 3rd step, conducted at a rate of 5.06 L/s.

Based on the borehole response to the Step Test, the CDT was conducted at an abstraction rate of the installed pump at 2 L/s. The test was conducted for 48 hours (2880 minutes). The water level was drawn down to a maximum of 17.94 m below the rest water level at the completion of the CDT.

The recovery of the water level was monitored for 40 minutes. The water level recovery was relatively fast and indicates that long pumping periods per day will be sustained. Based on the data analysis the sustainable yield of the borehole is recommended to be 2 L/s, pumping for 24 hours per day and allowing 4 hours for recovery with a pump installed at 50 m below ground level. **Figure 2** graphically indicates the CDT and recovery data.





7.2 Sandgat 3

The step test commenced on the 16 September 2017, with the RWL measured at 8.41 mbgl in the borehole and the pump was installed to 13.20 m. The Step Test involved four steps of increasing abstraction rates and the water level was drawn down to 1.25 m below the RWL at the end of the fourth step, conducted at a rate of 2.5 L/s.

Based on the borehole response to the Step Test, the CDT was conducted at an abstraction rate of 2.2 L/s. The test was conducted for 48 hours (2880 minutes) and the water level was drawn down to a maximum 2.77 m below the rest water level at the completion of the CDT.

The recovery of the water level was monitored for 1.5 hours (90 minutes) and is presented. The borehole's recovery is relatively quick and can be related to it's unconfined nature. Based on the data analysis the sustainable yield of the borehole is recommended to be 1.2 L/s, pumping for 16 hours per day and allowing 8 hours for recovery with a pump installed at 160 m below ground level. The borehole can be pumped at 1.5 L/s for 24 hrs but monitoring of the borehole on a monthly basis will allow for refining of abstraction rate. **Figure 3** graphically indicates the CDT and recovery data.

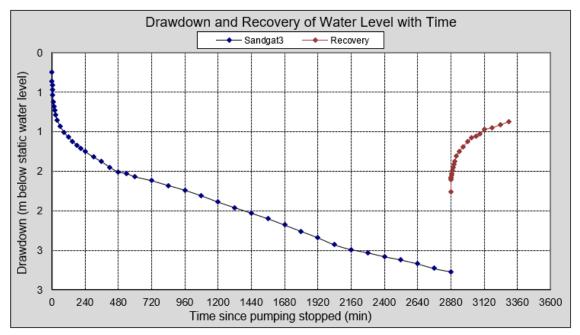


Figure 3: Constant Discharge Test and Recovery of Sandgat3

7.3 Sandgat 4

The step test commenced on the 29 September 2017, with the RWL measured at 8.59 mbgl in the borehole and the pump was installed to 55.10 m. The Step Test involved four steps of increasing abstraction rates. The water level was drawn down to pump inlet after step 3 run at a rate of 2 L/s.

Based on the borehole response to the Step Test, the CDT was conducted at an abstraction rate of 0.85 L/s. The test was conducted for 48 hours (2880 minutes) and the water level was drawn down to a maximum 19.78 m below the rest water level at the completion of the CDT.

The recovery of the water level was monitored for 20 minutes. The borehole's recovery is rapid, is may be linked to the unconfined nature of the borehole. The rapid recovery may indicate a highly transmissive zone around the borehole. Based on the data analysis the sustainable yield of the borehole is recommended to be 0.8 L/s, pumping for 24 hours per day and allowing 4 hours for recovery with a pump installed at 55 m below ground level. The sustainable yield of 0.8 L/s is classified as low. **Figure 4** graphically indicates the CDT and recovery data.

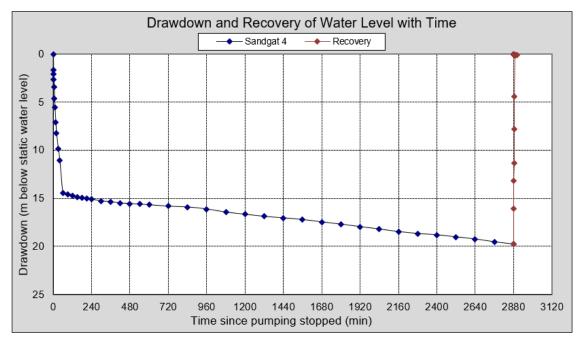


Figure 4: Constant Discharge Test and Recovery of Sandgat 4

7.4 Sandgat 5

The step test commenced on the 23 September 2017. The RWL was measured at 20.91 mbgl in the borehole of approximately 197 m depth. The Step Test involved four steps of increasing abstraction rates and the water level was drawn down to 25.74 m below the RWL at the end of the fourth step, conducted at a rate of 18 L/s, with the pump installed at 189.20 m.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 16 L/s. The test was conducted for 480 min and the water level was drawn down pump inlet. Due to the rapid drawdown a second CDT was conducted at 5 L/s for 48 hours, which resulted in 7.39 m of drawdown.

The recovery of the water level was monitored for 480 minutes. The borehole's recovery is slow. Based on the data analysis the available drawdown of the borehole is limited to 30 m. The sustainable yield of the borehole is recommended to be 3 L/s, pumping for 24 hours per day with 8 hours for recovery, with a pump installed at 60 m below ground level. The sustainable yield of 3 L/s is classified as moderate. **Figure 5** graphically indicates the CDT and recovery data.

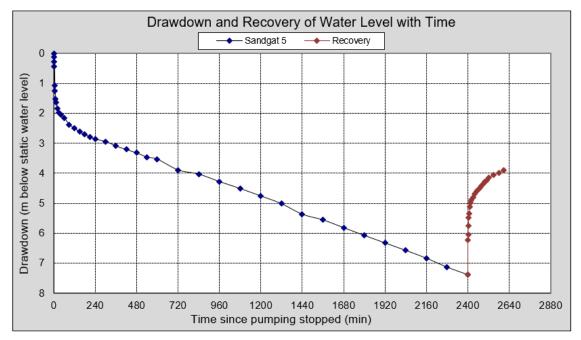


Figure 5: Constant Discharge Test and Recovery of Sandgat 5

7.5 De Vlok Bh

The step test commenced on the 26 September 2017. The RWL was measured at 22.6 mbgl in the borehole of approximately 250 m depth. The Step Test involved four steps of increasing abstraction rates and the water level was drawn down to 7.89 m below the RWL at the end of the fourth step, conducted at a rate of 18 L/s, with the pump installed at 150 m.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 16 L/s. The test was conducted for 72 hours (4320 minutes) and the water level was drawn down to 11.62 meters below rest water level.

The recovery of the water level was monitored for 480 minutes. Based on the data analysis the available drawdown is assumed to be 127 m. However, no detailed geological logs could be obtained for the hole to identify the main water strike and the pumping test did not indicate a critical drawdown. The sustainable yield of the borehole is recommended to be 16 L/s, pumping for 24 hours per day with 8 hours for recovery, with a pump installed at 150 m below ground level. Only monitoring will show if the recommended rate is correct. **Figure 6** graphically indicates the CDT and recovery data.

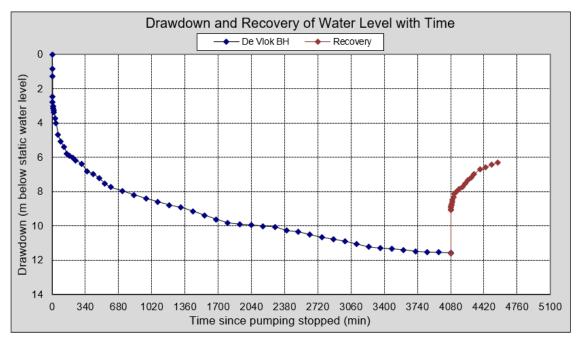


Figure 6: Constant Discharge Test and Recovery of De Vlok Bh

7.6 Witvaal

The step test commenced on the 29 September 2017. The RWL was measured at 22.90 mbgl in the borehole of approximately 193 m depth. The Step Test involved four steps of increasing abstraction rates and the water level was drawn down to 8.89 m below the RWL at the end of the fourth step, conducted at a rate of 12.25 L/s, with the pump installed at 91 m

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 10 L/s. The test was conducted for 48 hours (2880 minutes) and the water level was drawn down to 19.3 meters below rest water level.

The recovery of the water level was monitored for 480 minutes. Based on the data analysis the available drawdown is assumed to be 67.3 m. However, no detailed geological logs could be obtained for the hole to identify the main water strike and the pumping test did not indicate a critical drawdown. The sustainable yield of the borehole is recommended to be 6 L/s, pumping for 24 hours per day with 8 hours for recovery, with a pump installed at 150 m below ground level. Only monitoring will show if the recommended rate is correct. **Figure 7** graphically indicates the CDT and recovery data.

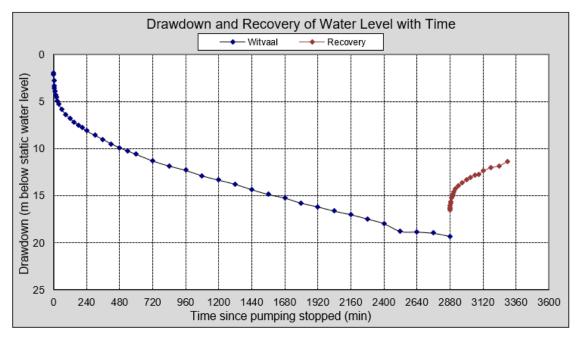


Figure 7: Constant Discharge Test and Recovery of Witvaal.

7.7 Golf course Bh

The step test commenced on the 26 September 2017. The RWL was measured at 36 mbgl in the borehole of approximately 225 m depth. The Step Test involved three steps of increasing abstraction rates and the water level was drawn down to 33.07 m below the RWL at the end of the third step, conducted at a rate of 12. L/s, with the pump installed at 100 m (Current depth of equipped pump).

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 3 L/s due to slow recovery results over a 24-hr period, the new RWL from the CDT was 48 mbgl. The test was conducted for 48 hours (2880 minutes) and the water level was drawn down to 30.67 meters below rest water level.

The recovery of the water level was monitored for 1140 minutes. Based on the data analysis the available drawdown is assumed to be 64 m. However, no detailed geological logs could be obtained for the hole to identify the main water strike and the pumping test did not indicate a critical drawdown. The sustainable yield of the borehole is recommended to be 2.5 L/s, pumping for 24 hours per day, with a pump installed at 150 m below ground level. Only monitoring will show if the recommended rate is correct. **Figure 8** graphically indicates the CDT and recovery data.

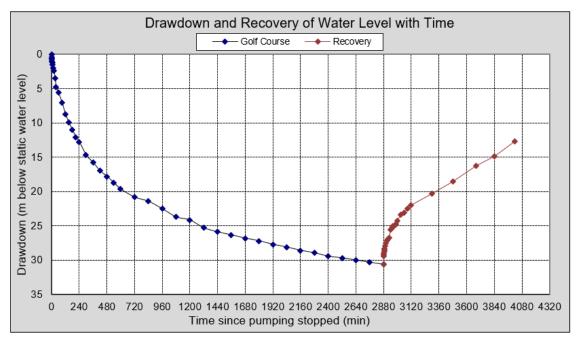


Figure 8: Constant Discharge Test and Recovery of Golf course

Table 5: Summary of existing boreholes yield test Rest Test Max water CDT Available Sustainable CDT level reached water pump **BH ID** duration drawdown yield level depth (L/s)after CDT (L/s)(hr) (m) (mbgl) (mbgl) (mbgl) Calvinia-Ceres 49 2 2.0 14.01 48 35 31 Rd_BH Golf_course_BH 36.39 100 3 48 51 67.06 2.5 Witwal_BH 22.9 91 10 48 67.3 42.2 6.0 Sandgat_3_BH 8.41 13.20 2.2 48 11.4 1.2 5 Sandgat_4_BH 8.59 48 33 28.37 0.8 55.1 0.85 3.0 Sandgat_5_BH 20.91 189.20 5 48 30 28.31 Breccia_BH Not tested Deon_Vlok_BH 22.6 150 16 72 127m (?) 34.22 16.0

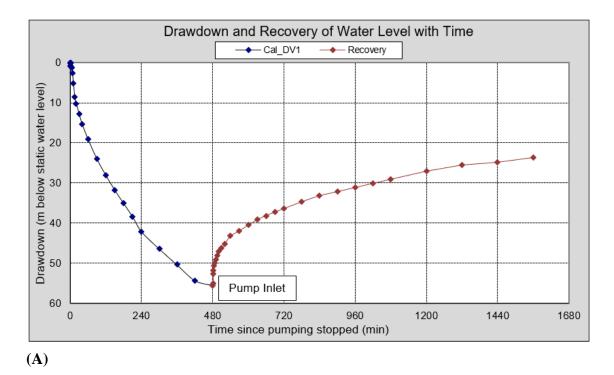
7.8 *Summary of results*

8. PUMPING TEST: EXPLORATION BOREHOLES (2018)

8.1 Cal_Nat1 (Cal_DV1)

Exploration borehole Cal_DV1 had a blow yield of around 27 L/s and was drilled to a depth of 151 m. The step test commenced on the 9 May 2018. The rest water level was 49.5 mbgl with pump installation depth at 124 mbgl. Five 100-minute steps were conducted on the borehole, the fifth step was run at 25 L/s with the water level drawing down to 55.51 m.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 22 L/s. the test was stopped prematurely as the rate proved to be too high and the water level reached pump inlet after 8 hr (480 min). The borehole was allowed to recover for 16 hrs, however, the borehole only recovered 60%. The second CDT was run at a rate of 15 L/s. Again, the rate proved too high and reached pump inlet after 8 hrs. The borehole was allowed to recover for 36 hrs. the borehole however only recovered by 45% of the original rest water level. **Figure 9 A-B** graphically indicates both the CDT and recovery data.



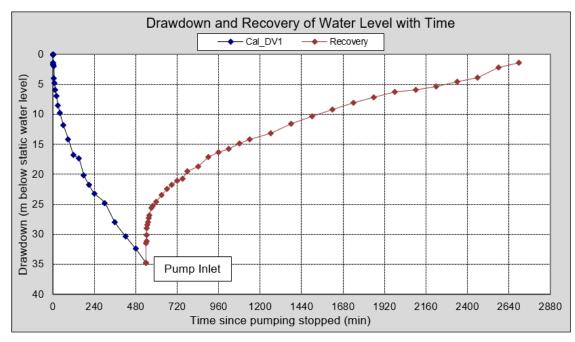




Figure 9: Constant Discharge Test and Recovery of Cal_DV1. (A) 22 L/s CDT and recovery. (B) 15 L/s CDT and Recovery.

8.2 *Cal_Nat2 (Cal_DV3)*

The testing of exploration borehole Cal_DV3 commenced on the 16 May 2018. The borehole had a blow yield of around 2.7 L/s and was drilled to a depth of 205 m. The rest water level was 41 mbgl with pump installation depth at 147 mbgl. An intended four 100-minute steps were conducted on the borehole, on the third step the water level was drawdown down to pump inlet at a rate of 3 L/s.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 0.8 L/s. this included a drawdown of 45 m after 24 hours. The borehole recovered within 3.5 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 76 m. The sustainable yield of the borehole is recommended to be 1 L/s, pumping for 24 hours per day, with a pump installed at 150 m below ground level. monitoring will show if the recommended rate is sustainable for long term use. **Figure 10** graphically indicates the CDT and recovery data.

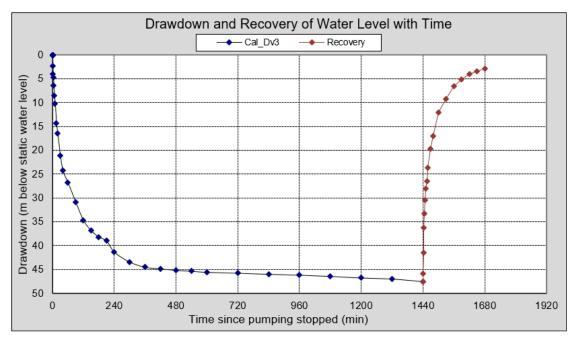


Figure 10: Constant Discharge Test (0.8 L/s) and Recovery of Cal_DV3

8.3 *Cal_Nat3 (Cal_DV4)*

The testing of exploration borehole Cal_DV4 commenced on the 20 May 2018. The borehole had a blow yield of around 2.7 L/s and was drilled to a depth of 205 m. The rest water level was 12.11 mbgl with pump installation depth at 99 mbgl. Four 100-minute steps were conducted on the borehole, the fourth step was run at 4.5 L/s with the water level drawing down to pump inlet 88 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 2.8 L/s. this included a drawdown of 54 m after 24 hours. The borehole recovered to 83 % after 10 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 80 m. The sustainable yield of the borehole is recommended to be 1.5 L/s, pumping for 24 hours per day, with a pump installed at 100 m below ground level. monitoring will show if the recommended rate is sustainable for long term use. **Figure 11** graphically indicates the CDT and recovery data.

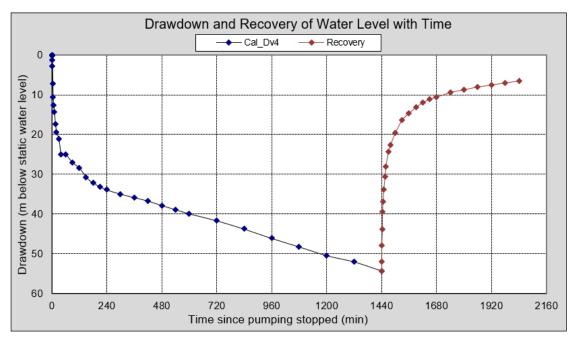


Figure 11: Constant Discharge Test (2.8 L/s) and Recovery of Cal_DV4

8.4 *Cal_KB1 (Cal_S2_3)*

The testing of exploration borehole Cal_S2_3 commenced on the 25 May 2018. The borehole had a blow yield of around 2.75 L/s and was drilled to a depth of 120 m. The rest water level was 6.92 mbgl with pump installation depth at 39.15 mbgl. Four 100-minute steps were conducted on the borehole, the fourth step attempted at rate at 4.5 L/s with the water level drawing down to pump inlet 39 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 2.8 L/s. this included a drawdown of 23.97 m after 24 hours. The borehole recovered to 83 % after 10 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 25 m. The sustainable yield of the borehole is recommended to be 1.3 L/s, pumping for 24 hours per day, with a pump installed at 40 m below ground level. Exploration borehole Cal_S2_4 was monitored during the pumping test, the borehole showed a decrease in water level during the test. Therefore, it can be concluded that the boreholes are linked. **Figure 12** graphically indicates the CDT and recovery data.

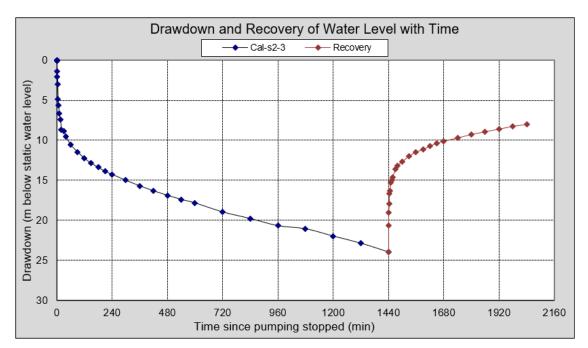


Figure 12: Constant Discharge Test (2.8 L/s) and Recovery of Cal_s2-3

8.5 *Cal_S2_4*

The testing of exploration borehole Cal_S2_4 commenced on the 25 May 2018. The borehole had a blow yield of around 4.9 L/s and was drilled to a depth of 180 m. The rest water level was 6.29 mbgl, it must be noted that the borehole was artesian after drilling and the reported rest water level is due pumping test done on Cal_S2_3 and slow recovery. The pump installation depth at 154 mbgl. Four 100-minute steps were conducted on the borehole, the fourth step rate was run at 6.8 L/s with the water level drawing down to 72.55 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 4 L/s. this included a drawdown of 34.8 m after 24 hours. The borehole recovered to 85 % after 10 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 130 m. The sustainable yield of the borehole is recommended to be 4 L/s, pumping for 24 hours per day, with a pump installed at 150 m below ground level. Exploration borehole Cal_S2_3 was monitored during the pumping test, the borehole showed a substantial decrease in water level during the test. Based on the pumping test data, borehole Cal_S2_3 cannot be pumped at the same time as Cal_S2_4 as cone of depression caused will dewater the main Fracture at Cal_S2_3, this will make it un-useable. **Figure 13** graphically indicates the CDT and recovery data.

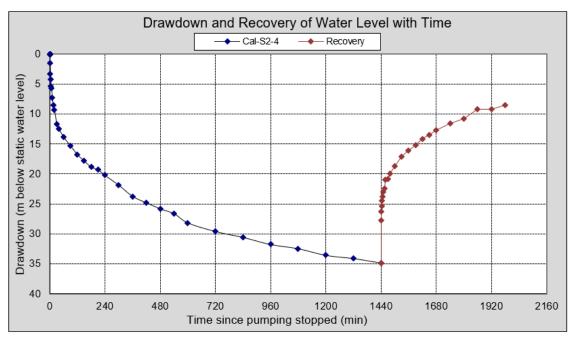


Figure 13: Constant Discharge Test (4 L/s) and Recovery of Cal-S2-4

8.6 *Cal_S2_10*

The testing of exploration borehole Cal_S2_10 commenced on the 28 June 2018. The borehole had a blow yield of around 8.8 L/s and was drilled to a depth of 151 m. The rest water level was 19.5 mbgl. The pump installation depth at 154 mbgl. Three 60-minute steps were conducted on the borehole, the duration of steps changes due time constraints. The fourth step rate was run at 19 L/s for a duration of 120-minutes during which the water level drawing down to 11.28 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 20 L/s (Max pump rate). This included a drawdown of 18.95 m after 48 hours. The borehole recovered was rapid with a 90 % after 16 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 60 m. The sustainable yield of the borehole is recommended to be 15 L/s, pumping for 24 hours per day, with a pump installed at 80 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 14** graphically indicates the CDT and recovery data.

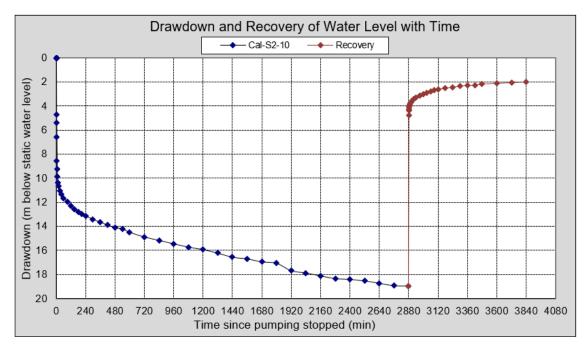


Figure 14: Constant Discharge Test (20 L/s) and Recovery of Cal-S2-10

8.7 *Cal_Nat 5*

The testing of exploration borehole Cal_Na5 commenced on the 5 July 2018. The borehole had a blow yield of around 5 L/s and was drilled to a depth of 200 m. The rest water level was 30 mbgl. The pump installation depth at 154 mbgl. Five 60-minute steps were conducted on the borehole. The fifth step rate was run at >5 L/s for a duration of 3-minutes during which the water level was drawn to pump inlet.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 5 L/s. This included a drawdown of 82.12 m after 24 hours. The borehole recovered was rapid with a 90 % after 0.5 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 107 m. The sustainable yield of the borehole is recommended to be 4.3 L/s, pumping for 24 hours per day, with a pump installed at 150 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 15** graphically indicates the CDT and recovery data.

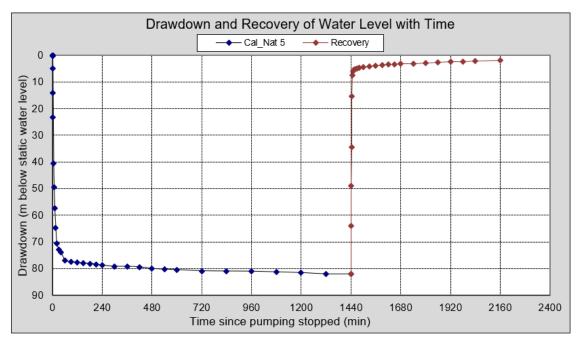


Figure 15: Constant Discharge Test (5 L/s) and Recovery of Cal_Nat 5

8.8 *Cal_Nat6*

The testing of exploration borehole Cal_Na6 commenced on the 10 July 2018. The borehole had a blow yield of around 3 L/s and was drilled to a depth of 200 m. The rest water level was 11.75 mbgl. The pump installation depth at 100 mbgl. Four 60-minute steps were conducted on the borehole. The fourth step rate was run at >5 L/s for a duration of 10-minutes during which the water level was drawn to pump inlet.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 3.5 L/s. This included a drawdown of 8 .01 m after 24 hours. The CDT rate was then increased to 4.3 L/s, the water level was drawdown to pump inlet after 3 minutes. The borehole recovered was rapid with a 90 % after 0.5 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 11 m. The sustainable yield of the borehole is recommended to be 1.2 L/s, pumping for 24 hours per day, with a pump installed at 25 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 16** graphically indicates the CDT and recovery data.

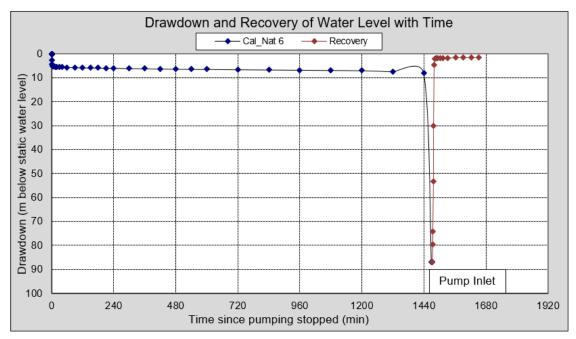


Figure 16: Constant Discharge Test (3.5 & 4.3 L/s) and Recovery of Cal_ Nat 6

8.9 *Cal_Phase3_6*

The testing of exploration borehole Cal_Phase3_6 commenced on the 28 August 2018. The borehole had a blow yield of around 25 - 30 L/s and was drilled to a depth of 111 m. The rest water level was 0.6 mbgl. The pump installation depth at 96 mbgl. Four 100-minute steps were conducted on the borehole. The fourth step rate was run at 25 L/s during which the water level drawing down to 70 mbgl.

Based on the borehole response to the Step Test and monitored recovery data, which in this case was extremely slow. After the step test the borehole recovery was monitored for 24-hrs in which the borehole only recovered to 55 %. A CDT was conducted at an abstraction rate of 12 L/s. This included a drawdown of 43.21 m after 36 hours. The borehole recovered was monitored for 24-hrs with 13 % recovery after cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 95 m. The sustainable yield of the borehole is recommended to be 2.5 L/s, pumping for 24 hours per day, with a pump installed at 96 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 17** graphically indicates the CDT and recovery data.

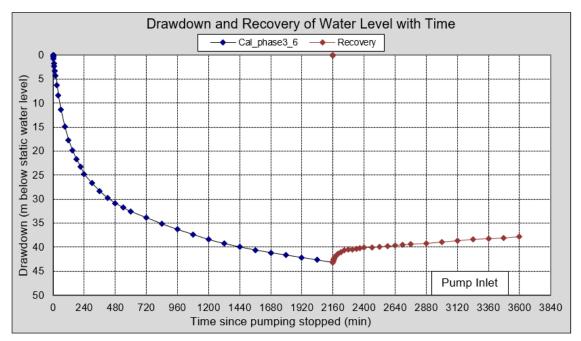


Figure 17: Constant Discharge Test (12 L/s) and Recovery of Cal_phase3_6

8.10 *Cal_Phase3_4A*

The testing of exploration borehole Cal_Phase3_4A commenced on the 21 August 2018. The borehole had a blow yield of around > 30 L/s and was drilled to a depth of 77 m, drilling stopped due to high water pressure. The rest water level was 20.16 mbgl. The pump installation depth at 70 mbgl (as recommended by the driller). Four 100-minute steps were conducted on the borehole. The fourth step rate was run at 30 L/s during which the water level drawing down to 3.6 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 28 L/s (Pump maximum). This included a drawdown of 7.08 m after 48 hours. The borehole recovery was moderate with a 70 % after 24-hrs of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 55 m. The sustainable yield of the borehole is recommended to be 15 L/s, pumping for 24 hours per day, with a pump installed at 70 m below ground level. It is recommended that a pump be installed that is able to abstracting 25 L/s. Yield analysis data, indicated 25 L/s to be the maximum yield range, however, this will require long term monitoring to determine sustainability. **Figure 18** graphically indicates the CDT and recovery data.

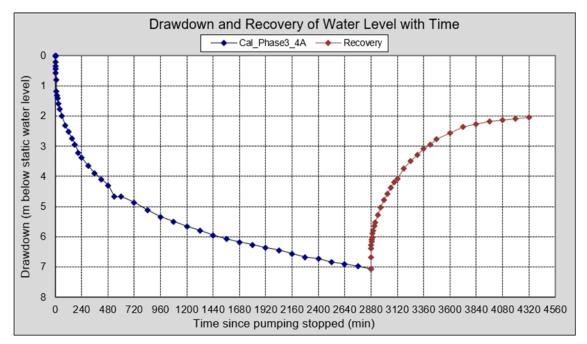


Figure 18: Constant Discharge Test (28 L/s) and Recovery of Cal_Phase3_4A

8.11 *Cal_Phase3_9*

The testing of exploration borehole Cal_Phase3_9 commenced on the 31 August 2018. The borehole had a blow yield of around >25 L/s and was drilled to a depth of 117 m. The rest water level was 22.62 mbgl. The pump installation depth at 96 mbgl. Four 100-minute steps were conducted on the borehole. The fourth step rate was run at 30 L/s during which the water level drawdown was 7.70 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 28 L/s. This included a drawdown of 14.78 m after 48 hours. The borehole recovery was moderate with a 54 % after 24 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 75 m. The sustainable yield of the borehole is recommended to be 15 L/s, pumping for 24 hours per day, with a pump installed at 96 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 19** graphically indicates the CDT and recovery data.

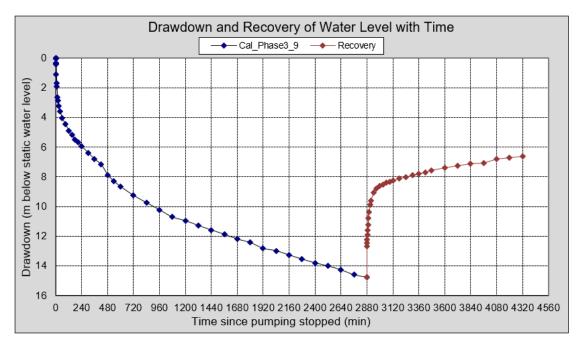


Figure 19: Constant Discharge Test (28 L/s) and Recovery of Cal_Phase3_9

8.12 *Re-Drill 39602*

The testing of exploration borehole Re-Drill 39602 commenced on the 16 August 2018. The borehole had a blow yield of around 25 L/s and was drilled to a depth of 151 m. The rest water level was 8.79 mbgl. The pump installation depth at 79.25 mbgl. Four 60-minute steps were conducted on the borehole. The fourth step rate was run at >11 L/s during which the water level drawing down to 62.17 mbgl.

Based on the borehole response to the Step Test, a CDT was conducted at an abstraction rate of 7 L/s. This included a drawdown of 28 .22 m after 48 hours. The borehole recovery was rapid with a 95 % after 2.5 hours of the cessation of pumping.

Based on the data analysis the available drawdown is assumed to be 50 m. The sustainable yield of the borehole is recommended to be 4.5 L/s, pumping for 24 hours per day, with a pump installed at 80 m below ground level. Monitoring will show if the recommended rate is sustainable for long term use. **Figure 20** graphically indicates the CDT and recovery data.

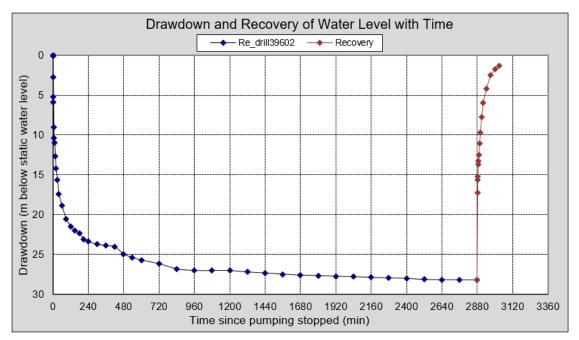


Figure 20: Constant Discharge Test (7 L/s) and Recovery of Re_drill39602

8.13 summary of results

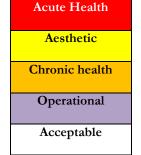
Borehole Name	Latitude (DD)	Longitude (DD)	Rest water level (mbgl)	Test pump depth (mbgl)	CDT (L/s)	CDT duration (hr)	Available drawdown (m)	Max water level reached after CDT (mbgl)	Sustainable yield (L/s)
Cal_DV1	-31.455414	19.773937	49.5	150	15	2 x 8	74.5	Pump inlet	5
Cal_DV3	-31.430694	19.788300	41	150	0.8	24	76	45	0.8
Cal_DV4	-31.411629	19.775115	12.11	100	2.8	24	80	45	1
Cal-S2-3	-31.651334	19.801571	6.92	35	2.8	24	25	23.97	1.3
Cal-S2-4	-31.650359	19.801047	6.29	150	4	24	130	34.8	4
Cal_S2_10	-31.617462	19.744726	19.5	80	20	48	60	18.95	15
Cal_Nat5	-31.435236	19.784485	30	178	5	24	107	82.12	4.3
Cal_Nat6	-31.451284	19.770548	11.75	100	3.5	24	11	8	1.5
Cal_Phase3_6	-31.357725	19.691500	0.6	96	12	36	95	43.21	2
Cal_Phase3_4A	-31.401169	19.556679	20	70	28	48	55	7.08	15
Cal_Phase3_9	-31.632714	19.756781	22.62	96	28	48	74	14.78	15
Re-Drill 39602	-31.372864	19.970834	8.79	79	7	48	50	28.22	4.5

Table 6: Summary of exploration boreholes yield test

9. CHEMISTRY

Groundwater samples were collected at the end of all the yield test for each borehole. The samples were submitted for inorganic chemical analysis to a SANAS accredited laboratory. Existing production boreholes samples were sent to Bemlab in the Western Cape. Exploration borehole samples were sent to A.L Abbot & Associates in the Western Cape, the change in lab was due to different phases and budget. The certificate of analysis of the samples is presented in **Appendix C**. The chemistry results obtained have been classified according to the SANS241-1: 2015 standards for domestic water. **Table 7** enables an evaluation of the water quality with regards to the various limits. **Table 8** and **Table 9** presents the water chemistry analysis results, colour coded according to the SANS241-1: 2015 drinking water assessment standards.





9.1 Groundwater quality analysis for existing production boreholes

The chemistry results obtained have been classified according to the SANS241-1: 2015 standards for domestic water. The groundwater chemistry analysis results, colour coded according to the SANS241-1: 2015 drinking water assessment standards are listed in the **Table 8**.

Analyses	Ceres_RD	Sandgat_4	Golf_course	Witwal_BH	Sandgat_3	Deon_Vlok	Sandgat_5	SANS 241-1:2015
pH (at 25 °C)	7.6	7.4	7.4	8.4	7.5	7.5	7.0	≥5 - ≤9.7 Operational
Conductivity (mS/m) (at 25 °C)	59.2	598.6	214.0	93.0	605.0	150.0	279.0	≤170 Aesthetic
Total Dissolved Solids (mg/l)	379.0	3831.0	1283.0	561.0	3600.0	901.0	1670.0	≤1200 Aesthetic
Turbidity (NTU)	0.6	0.3	1.4	0.4	0.2	1.4	0.4	≤5 Aesthetic ≤1 Operational
Colour (mg/l as Pt)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤15 Aesthetic
Sodium (mg/l as Na)	38.7	706.9	190.3	175.6	929.4	128.3	305.7	≤200 Aesthetic
Potassium (mg/l as K)	1.4	1.0	5.1	7.4	1.8	3.1	4.6	N/A
Magnesium (mg/l as Mg)	12.5	118.8	60.4	0.4	139.1	55.3	70.8	N/A
Calcium (mg/l as Ca)	52.5	227.6	127.7	0.0	131.8	92.1	116.1	N/A
Chloride (mg/l as Cl)	51.0	1420.0	542.8	157.3	1564.2	225.3	761.9	≤300 Aesthetic
Sulphate (mg/l as SO4)	26.0	664.0	112.0	94.0	769.0	177.0	194.0	≤250 Aesthetic ≤500 Acute Health
Nitrate Nitrogen (mg/l as N)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	≤11 Acute Health
Nitrite Nitrogen (mg/l as N)	0.4	0.8	0.0	0.0	0.6	0.0	0.6	≤0.9 Acute Health
Ammonia Nitrogen (mg/l as N)	0.3	0.4	0.3	0.6	0.3	0.0	0.3	≤1.5 Aesthetic
Total Alkalinity (mg/l as CaCO3)	284.0	511.0	167.9	181.4	388.0	278.6	132.5	N/A
Fluoride (mg/l as F)	0.5	0.2	0.2	1.4	0.0	0.8	0.0	≤1.5 Chronic Health
Aluminium (mg/l as Al)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.3 Operational
Vanadium (mg/l as V)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A
Total Chromium (mg/l as Cr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.05 Chronic Health
Manganese (mg/l as Mn)	0.0	0.0	0.0	0.0	0.0	0.0	0.4	≤0.1 Aesthetic ≤0.4 Chronic Health
Iron (mg/l as Fe)	0.1	0.1	0.2	0.2	0.2	0.2	0.1	≤0.3 Aesthetic ≤2 Chronic Health
Cobalt (mg/l as Co)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A
Nickel (mg/l as Ni)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.07 Chronic Health
Copper (mg/l as Cu)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤2 Chronic Health
Zinc (mg/l as Zn)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	≤5 Aesthetic
Arsenic (mg/l as As)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.01 Chronic Health
Selenium (mg/l as Se)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.04 Chronic Health
Cadmium (mg/l as Cd)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.003 Chronic Health
Antimony (mg/l as Sb)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.02 Chronic Health
Mercury (mg/l as Hg)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.006 Chronic Health
Lead (mg/l as Pb)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.01 Chronic Health
Uranium (mg/l as U)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.03 Chronic Health
Cyanide (mg/l as CN-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	≤0.2 Acute Health

Table 8: Water chemistry of existing production boreholes

9.2 Groundwater quality analysis on newly drilled exploration boreholes 2018

The chemistry results obtained have been classified according to the DWAF (1998) standards for domestic water. **Table 9** enables an evaluation of the water quality with regards to the various parameters measured (DWAF, 1998). **Table 10** presents the water chemistry analysis results colour coded according to the DWAF drinking water assessment standards.

Table 9.	2018 explor	ation boreho	ole results cla	assified acco	ording the SA	NS241-1:20	15
Analyses	DV1	DV3	DV4	Cal-NAT5	Cal-NAT6	CalS2-3	SANS 241-1:2015
pH (at 25 °C)	8.4	9.6	8.3	8.2	7.4	9.2	≥5 - ≤9.7 Operational
Conductivity (mS/m) (at 25 °C)	54.5	49.5	73.5	45.0	60.5	70.5	≤170 Aesthetic
Total Dissolved Solids (mg/l)	361.0	327.0	495.0	265.0	381.0	474.0	≤1200 Aesthetic
Turbidity (NTU)	2.1	2.0	10.3	0.4	0.13	8.8	≤5 Aesthetic ≤1 Operational
Colour (mg/l as Pt)	<4	<4	<4	<4	<4	<4	≤15 Aesthetic
Sodium (mg/l as Na)	86.0	76.1	116.0	70.8	53.5	125.0	≤200 Aesthetic
Potassium (mg/l as K)	0.7	0.5	1.4	0.7	0.7	1.2	N/A
Magnesium (mg/l as Mg)	<1.1	<1.1	6.4	1.7	18.9	<1.1	N/A
Calcium (mg/l as Ca)	5.0	3.4	16.2	6.7	41.6	2.8	N/A
Chloride (mg/l as Cl)	66.4	89.9	60.7	41.7	36.6	58.1	≤300 Aesthetic
Sulphate (mg/l as SO4)	19.0	4.3	7.9	6.6	27.2	10.0	≤250 Aesthetic ≤500 Acute Health
Nitrate & Nitrite Nitrogen (mg/l as N)	< 0.20	<0.2	0.2	< 0.20	<0.2	0.3	≤12 Acute Health
Combined Nitrate plus Nitrite (mg/l as N)	0.22	0.22	0.23	0.22	0.22	0.23	≤1.0
Nitrate Nitrogen (mg/l as N)	< 0.2	< 0.2	< 0.2	< 0.20	<0.2	< 0.2	≤11 Acute Health
Nitrite Nitrogen (mg/l as N)	< 0.2	< 0.2	< 0.2	< 0.20	<0.2	<0.2	≤0.9 Acute Health
Ammonia Nitrogen (mg/l as N)	0.20	0.28	0.23	< 0.10	<0.1	0.47	≤1.5 Aesthetic
Total Alkalinity (mg/l as CaCO3)	105.0	36.3	285.0	124.0	222.0	254.0	N/A
Fluoride (mg/l as F)	3.3	6.8	3.1	5.1	1.3	3.6	≤1.5 Chronic Health
Aluminium (mg/l as Al)	0.108	0.092	0.187	0.039	< 0.012	0.323	≤0.3 Operational
Total Chromium (mg/l as Cr)	< 0.007	< 0.007	0.014	< 0.007	< 0.007	0.0	≤0.05 Chronic Health
Manganese (mg/l as Mn)	< 0.019	< 0.019	0.037	< 0.019	0.1	< 0.019	≤0.1 Aesthetic ≤0.4 Chronic Health
Iron (mg/l as Fe)	0.080	0.083	0.175	< 0.024	< 0.024	0.294	≤0.3 Aesthetic ≤2 Chronic Health
Nickel (mg/l as Ni)	0.006	0.005	0.004	0.004	0.004	0.004	≤0.07 Chronic Health
Copper (mg/l as Cu)	0.016	0.014	0.015	<0.006	< 0.006	0.015	≤2 Chronic Health
Zinc (mg/l as Zn)	0.020	0.007	0.010	0.003	0.003	0.006	≤5 Aesthetic
Arsenic (mg/l as As)	0.167	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	≤0.01 Chronic Health
Selenium (mg/l as Se)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	≤0.04 Chronic Health
Cadmium (mg/l as Cd)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	≤0.003 Chronic Health
Antimony (mg/l as Sb)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	≤0.02 Chronic Health
Mercury (mg/l as Hg)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	≤0.006 Chronic Health
Lead (mg/l as Pb)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	≤0.01 Chronic Health
Uranium (mg/l as U)	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	≤0.03 Chronic Health
Cyanide (mg/l as CN-)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	≤0.2 Acute Health
Total Organic Carbon (mg/l as C)	13.2	2.1	1.0	0.82	0.58	0.98	N/A

Table 9: 2018 exploration borehole results classified according the SANS241-1:2015

Analyses	CalS2-4	CalS2-10	Cal-Ph3-4	Cal-Ph-3-6	Cal-Ph-3-9	Cal-39602-redrill	SANS 241-1:2015
pH (at 25 °C)	9.8	7.4	7.5	9.5	8.6	8.1	\geq 5 - \leq 9.7 Operational
Conductivity (mS/m) (at 25 °C)	74.0	127.0	173.0	48.5	75.5	175.0	≤170 Aesthetic
Total Dissolved Solids (mg/l)	488.0	823.0	1354.0	377.0	553.0	1381.0	≤1200 Aesthetic
Turbidity (NTU)	7.20	0.4	82.0	0.6	0.2	0.5	≤5 Aesthetic ≤1 Operational
Colour (mg/l as Pt)	6.0	<4	<4	5.0	<4	5.0	≤15 Aesthetic
Sodium (mg/l as Na)	127.0	108.0	95.7	77.1	77.9	160.0	≤200 Aesthetic
Potassium (mg/l as K)	1.0	2.9	6.2	0.6	2.8	2.3	N/A
Magnesium (mg/l as Mg)	<1.1	28.0	92.7	<1.1	20.1	58.3	N/A
Calcium (mg/l as Ca)	0.4	97.0	130.0	5.7	31.8	80.2	N/A
Chloride (mg/l as Cl)	66.0	188.0	96.9	96.2	98.1	307.0	≤300 Aesthetic
Sulphate (mg/l as SO4)	5.5	100.0	616.0	4.4	18.0	118.0	≤250 Aesthetic ≤500 Acute Health
Nitrate & Nitrite Nitrogen (mg/l as N)	0.2	< 0.2	< 0.2	< 0.20	< 0.20	2.1	≤12 Acute Health
Combined Nitrate plus Nitrite (mg/l as N)	0.22	0.22	0.22	0.22	0.22	0.39	≤1.0
Nitrate Nitrogen (mg/l as N)	<0.2	<0.2	<0.2	<0.2	< 0.2	1.9	≤11 Acute Health
Nitrite Nitrogen (mg/l as N)	<0.2	< 0.2	< 0.2	<0.2	< 0.2	< 0.2	≤0.9 Acute Health
Ammonia Nitrogen (mg/l as N)	0.31	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	≤1.5 Aesthetic
Total Alkalinity (mg/l as CaCO3)	238.0	247.0	96.4	41.3	201.0	281.0	N/A
Fluoride (mg/l as F)	7.2	1.6	1.5	3.4	1.8	0.9	≤1.5 Chronic Health
Aluminium (mg/l as Al)	0.238	< 0.012	< 0.012	0.020	0.141	< 0.012	≤0.3 Operational
Total Chromium (mg/l as Cr)	0.011	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	≤0.05 Chronic Health
Manganese (mg/l as Mn)	< 0.019	< 0.019	1.0	< 0.019	< 0.019	< 0.019	≤0.1 Aesthetic ≤0.4 Chronic Health
Iron (mg/l as Fe)	0.296	< 0.024	22.4	0.027	0.053	< 0.024	≤ 0.3 Aesthetic ≤ 2 Chronic Health
Nickel (mg/l as Ni)	0.004	0.005	0.010	< 0.001	< 0.001	< 0.001	≤0.07 Chronic Health
Copper (mg/l as Cu)	0.016	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	≤2 Chronic Health
Zinc (mg/l as Zn)	0.006	0.003	0.004	< 0.001	0.006	0.003	≤5 Aesthetic
Arsenic (mg/l as As)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	≤0.01 Chronic Health
Selenium (mg/l as Se)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	≤0.04 Chronic Health
Cadmium (mg/l as Cd)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	≤0.003 Chronic Health
Antimony (mg/l as Sb)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	≤0.02 Chronic Health
Mercury (mg/l as Hg)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	≤0.006 Chronic Health
Lead (mg/l as Pb)	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	≤0.01 Chronic Health
Uranium (mg/l as U)	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	< 0.015	≤0.03 Chronic Health
Cyanide (mg/l as CN-)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	≤0.2 Acute Health
Total Organic Carbon (mg/l as C)	0.79	0.52	< 0.10	< 0.01	< 0.01	40.0	N/A

	Blue	(Class 0)	Ideal water quality - suitable for lifetime use.
	Green	(Class I)	Good water quality - suitable for use, rare instances of negative effects.
Ŋ	Yellow	(Class II)	Marginal water quality - conditionally acceptable. Negative effects may occur.
	Red	(Class III)	Poor water quality - unsuitable for use without treatment. Chronic effects may occur.
]	Purple	(Class IV)	Dangerous water quality - totally unsuitable for use. Acute effects may occur.

Table 10: Classification table for the groundwater results (DWAF, 1998)

Sample Marked :	Ceres_RD	Sandgat_4	Golf_course	Witwal_BH	Sandgat_3	Deon_Vlok	Sandgat_5							
								Class 0	Class I	Class II	Class III	Class IV		
рН	7.6	7.4	7.4	8.4	7.5	7.5	7	5-9.5	4.5-5 & 9.5-10	4-4.5 & 10-10.5	3-4 & 10.5-11	< 3 & >11		
Conductivity (mS/m)	59.2	598.6	214	93	605	150	279	<70	70-150	150-370	370-520	>520		
Turbidity (NTU)	0.6	0.34	1.36	0.38	0.23	1.41	0.36	<0.1	0.1-1	1.0-20	20-50	>50		
							mg/L							
Total Dissolved Solids	379	3831	1283	561	3600	901	1670	<450	450-1000	1000-2400	2400-3400	>3400		
Sodium (as Na)	38.7	706.9	190.3	175.6	929.4	128.3	305.7	<100	100-200	200-400	400-1000	>1000		
Potassium (as K)	1.4	1	5.1	7.4	1.8	3.1	4.6	<25	25-50	50-100	100-500	>500		
Magnesium (as Mg)	12.5	118.8	60.4	0.4	139.1	55.3	70.8	<70	70-100	100-200	200-400	>400		
Calcium (as Ca)	52.5	227.6	127.7	0	131.8	92.1	116.1	<80	80-150	150-300	>300			
Chloride (as Cl)	51	1420	542.8	157.3	1564.2	225.3	761.9	<100	100-200	200-600	600-1200	>1200		
Sulphate (as SO4)	26	664	112	94	769	177	194	<200	200-400	400-600	600-1000	>1000		
Nitrate& Nitrite (as N)	0	0	0	0	0	0	0	<6	6.0-10	10.0-20	20-40	>40		
Fluoride (as F)	0.5	0.2	0.2	1.4	0	0.8	0	<0.7	0.7-1.0	1.0-1.5	1.5-3.5	>3.5		
Manganese (as Mn)	0.03	0	0	0	0	0	0.38	<0.1	0.1-0.4	0.4-4	4.0-10.0	>10		
Iron (as Fe)	0.1	0.1	0.2	0.2	0.2	0.2	0.1	<0.5	0.5-1.0	1.0-5.0	5.0-10.0	>10		
Copper (as Cu)	0	0	0	0	0	0	0	<1	1-1.3	1.3-2	2.0-15	>15		
Zinc (as Zn)	0	0	0	0	0	0	0.15	<20	>20					
Arsenic (as As)	0.007	0.005	0	0	0.0084	0	0.0072	<0.010	0.01-0.05	0.05-0.2	0.2-2.0	>2.0		
Cadmium (as Cd)	0	0	0	0	0	0	0	< 0.003	0.003-0.005	0.005-0.020	0.020-0.050	>0.050		
Hardness (as CaCO3)	0	0	0	0	0	0	0	<200	200-300	300-600	>600			

Table 11: Classified existing production borehole results

Sample Marked :	Cal_DV1	Cal_DV3	Cal_DV4	Cal-NAT5	Cal-NAT6	CalS2-3	CalS2-4	CalS2-10	Cal-Ph3-4	Cal-Ph-3-6	Cal-Ph-3-9	Cal-39602-redrill	DWA (1998) Drinking Water Assessment Guide				
													Class 0	Class I	Class II	Class III	Class IV
рН	8.39	9.59	8.32	8.18	7.36	9.22	9.83	7.39	7.45	9.45	8.55	8.09	5-9.5	4.5-5 & 9.5-10	4-4.5 & 10-10.5	3-4 & 10.5-11	< 3 & >11
Conductivity (mS/m)	54.5	49.5	73.5	45	60.5	70.5	74	127	173	48.5	75.5	175	<70	70-150	150-370	370-520	>520
Turbidity (NTU)	2.1	2	10.3	0.37	0.13	8.8	7.2	0.37	82	0.6	0.18	0.52	<0.1	0.1-1	1.0-20	20-50	>50
										mg/L							
Total Dissolved Solids	361	327	495	265	381	474	488	823	1354	377	553	1381	<450	450-1000	1000-2400	2400-3400	>3400
Sodium (as Na)	86	76.1	116	70.8	53.5	125	127	108	95.7	77.1	77.9	160	<100	100-200	200-400	400-1000	>1000
Potassium (as K)	0.73	0.52	1.4	0.68	0.67	1.2	1	2.9	6.2	0.63	2.8	2.3	<25	25-50	50-100	100-500	>500
Magnesium (as Mg)	<1.1	<1.1	6.4	1.7	18.9	<1.1	<1.1	28	92.7	<1.1	20.1	58.3	<70	70-100	100-200	200-400	>400
Calcium (as Ca)	5	3.4	16.2	6.7	41.6	2.8	0.43	97	130	5.7	31.8	80.2	<80	80-150	150-300	>300	
Chloride (as Cl)	66.4	89.9	60.7	41.7	36.6	58.1	66	188	96.9	96.2	98.1	307	<100	100-200	200-600	600-1200	>1200
Sulphate (as SO4)	19	4.3	7.9	6.6	27.2	10	5.5	100	616	4.4	18	118	<200	200-400	400-600	600-1000	>1000
Nitrate& Nitrite (as N)	<0.20	<0.2	0.24	<0.20	<0.2	0.26	0.22	<0.2	<0.2	<0.20	<0.20	2.1	<6	6.0-10	10.0-20	20-40	>40
Fluoride (as F)	3.3	6.8	3.1	5.1	1.3	3.6	7.2	1.6	1.5	3.4	1.8	0.91	<0.7	0.7-1.0	1.0-1.5	1.5-3.5	>3.5
Manganese (as Mn)	<0.019	<0.019	0.037	<0.019	0.067	<0.019	<0.019	<0.019	1.005	<0.019	<0.019	<0.019	<0.1	0.1-0.4	0.4-4	4.0-10.0	>10
Iron (as Fe)	0.08	0.083	0.175	<0.024	<0.024	0.294	0.296	<0.024	22.4	0.027	0.053	<0.024	<0.5	0.5-1.0	1.0-5.0	5.0-10.0	>10
Copper (as Cu)	0.016	0.014	0.015	< 0.006	<0.006	0.015	0.016	<0.006	<0.006	<0.006	<0.006	<0.006	<1	1-1.3	1.3-2	2.0-15	>15
Zinc (as Zn)	0.02	0.007	0.01	0.003	0.003	0.006	0.006	0.003	0.004	<0.001	0.006	0.003	<20	>20			
Arsenic (as As)	0.167	<0.003	<0.003	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.010	0.01-0.05	0.05-0.2	0.2-2.0	>2.0
Cadmium (as Cd)	<0.001	<0.001	< 0.001	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.003	0.003-0.005	0.005-0.020	0.020-0.050	>0.050

Table 12: Classified exploration borehole results

From the chemical results presented in **Table 11** and **Table 12** it is clear that the groundwater from the boreholes are predominantly marginal quality in terms of dissolved mineral concentrations (which is in line with the expected groundwater quality of the area). There is however, elevated levels of fluoride, sulphate, chloride and sodium in some of the groundwater samples analysed. Exploration borehole Cal_Phase3_4A water sampled showed high levels of iron. Boreholes selected for production boreholes will require treatment if used for regular human consumption.

10. DISCUSSION

The geohydrology of the area has been characterized by means of a historical data. GEOSS identified four new sites to be explored for groundwater potential. Exploration boreholes were drilled on geological structures and geophysical anomalies identified through both onsite and regional data sets. A total of 31 exploration boreholes were drilled, 12 boreholes met the yield requirements and were yield tested for sustainable yield and groundwater chemistry.

GEOSS identified two areas that could be potentially developed into wellfield for bulk water supply, Ceres Karroo area (Kruitberg) and the North-west region (study area 4).

Overall the groundwater quality is classified as good to moderate. The fluoride concentration of all the tested sites is a concern (of varying degrees) and should be addressed before production begins. Exploration borehole Cal_Phase3_4A had an anomalous high iron concentration of 22 mg/L, typical iron concentration range between 0.024 - 0.3 mg/L.

Groundwater usage needs regular monitoring and management. If a groundwater scheme is left unattended it will eventually fail. Regular monitoring and site visits to the abstraction boreholes will ensure their long-term viability. This is especially important in such a low rainfall area.

11. RECOMMENDATIONS

The newly drilled and completed boreholes should be equipped and connected to the water supply scheme and using the abstraction rates recommended by GEOSS in order to maintain sustainability. The boreholes will also require monitoring infrastructure and need to be authorised via a Water Use License Application.

It is recommended that the abstraction boreholes' water levels be monitored with in-situ logger monitoring, to be assessed quarterly for two years, before optimisation can be done, potentially reducing monitoring to bi-annual data analyses.

The following pumping recommendations and comments are made in order to begin abstraction:

Site	Latitude	Longitude	Abstraction	Pump Depth
Site	(WGS84)	(WGS84)	Rate (L/s)	(m)
Cal_DV1	-31.455414	19.773937	5	150
Cal_DV3	-31.430694	19.788300	0.8	150
Cal_DV4	-31.411629	19.775115	1	100
Cal-S2-3	-31.651334	19.801571	1.3	35
Cal-S2-4	-31.650359	19.801047	4	150
Cal_S2_10	-31.617462	19.744726	15	80
Cal_Nat5	-31.435236	19.784485	4.3	178
Cal_Nat6	-31.451284	19.770548	1.5	100
Cal_Phase3_6	-31.357725	19.691500	2	96
Cal_Phase3_4A	-31.401169	19.556679	15	70
Cal_Phase3_9	-31.632714	19.756781	15	96
Re-Drill 39602	-31.372864	19.970834	4.5	79

It is recommended that the Hantam Municipality look to develop the Ceres Karroo area (Kruitberg), the North-west region (study area 4) and Calvinia nature reserve into functional well fields. The wellfields should then be used in a rotation, this will allow for groundwater levels to recovery and not over stress the system.

12. ACKNOWLEDGEMENTS

The following people are gratefully thanked for their input and support into this project:

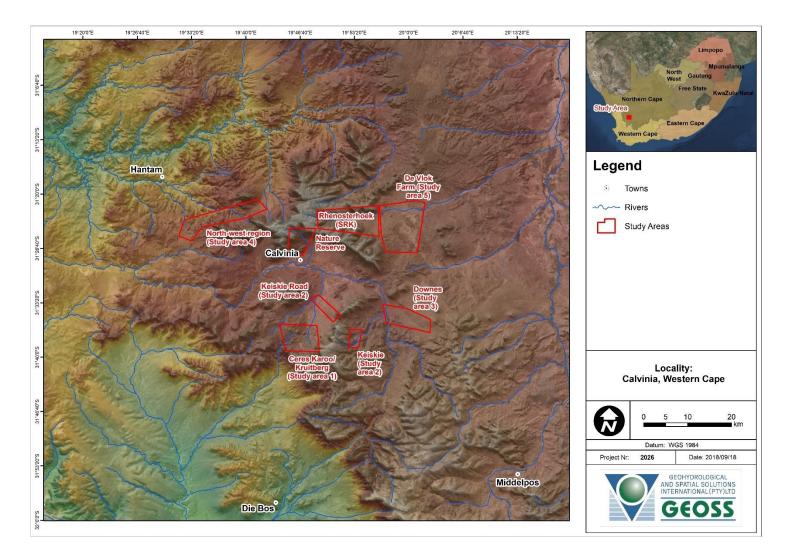
• Gert Meiring (BVi) is thanked for his guidance into the project.

13. REFERENCES

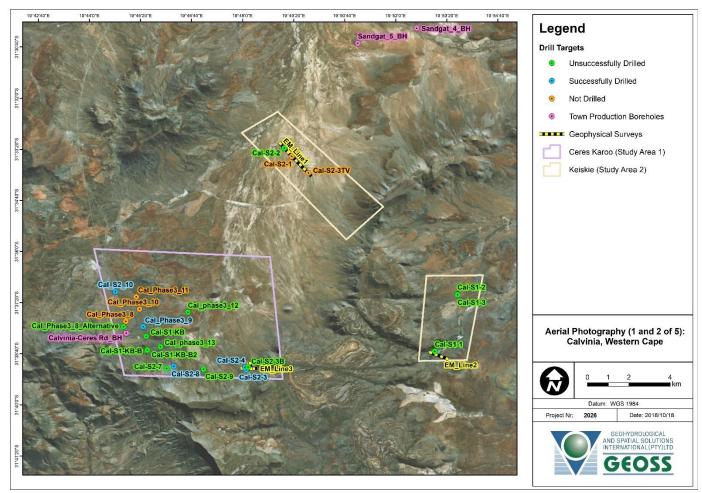
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WRC, 2012. A Groundwater Planning Toolkit for the Main Karoo Basin: Identifying and quantifying groundwater development options incorporating the concept of wellfield yields and aquifer firm yields. WRC Report No. 1763/1/11, Pretoria, South Africa.

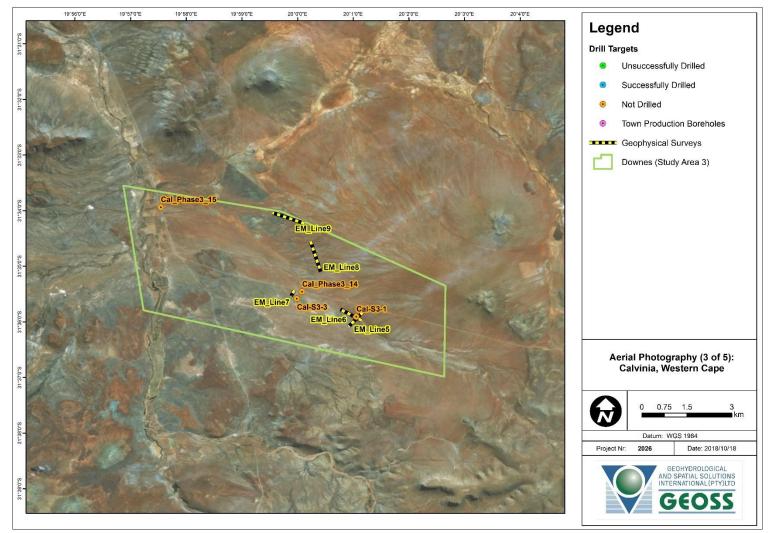
14. APPENDIX A: MAPS



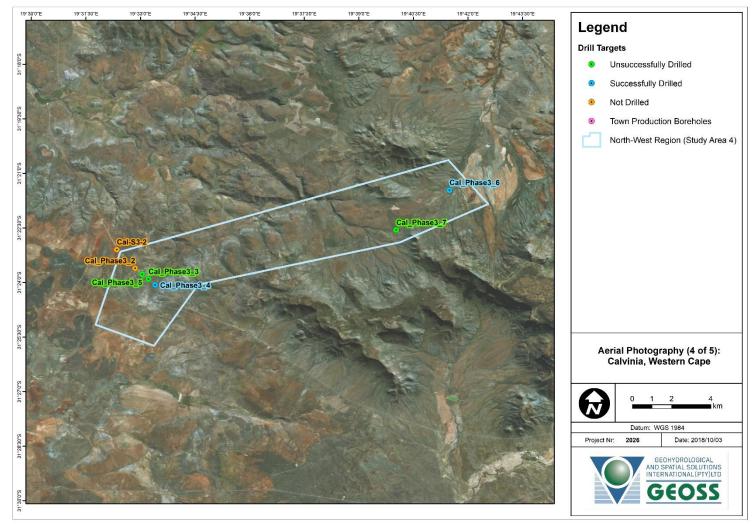
Map 1: Location of the study areas within a regional setting



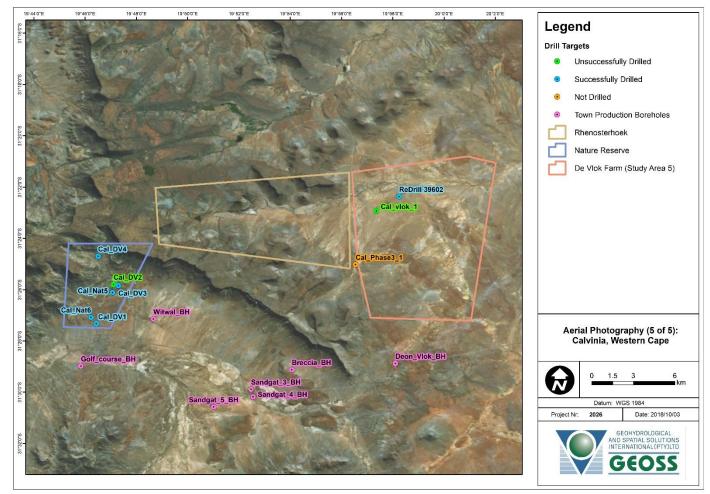
Map 2-1: The study site, Exploration borehole details (ESRI base map – Bing imagery)



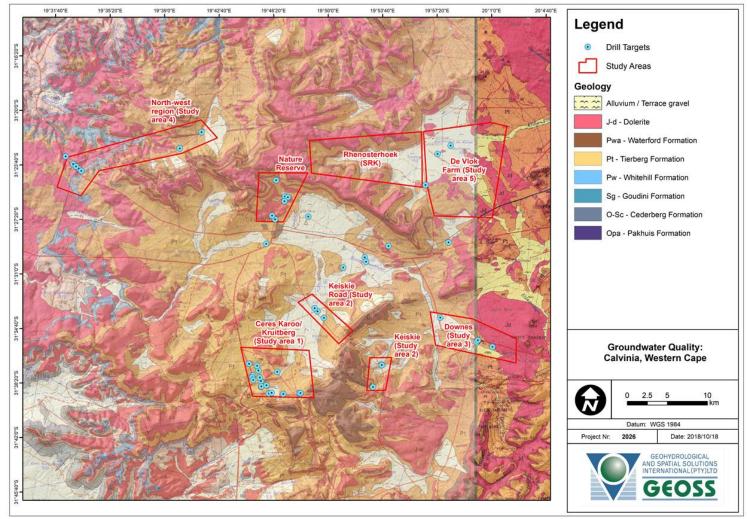
Map 2-2: The study site, Exploration borehole details (ESRI base map – Bing imagery)



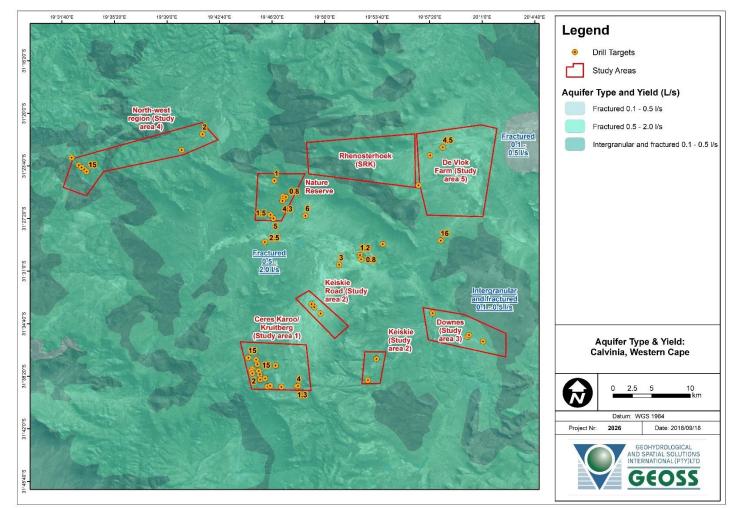
Map 2-3: The study site, Exploration borehole details (ESRI base map – Bing imagery)



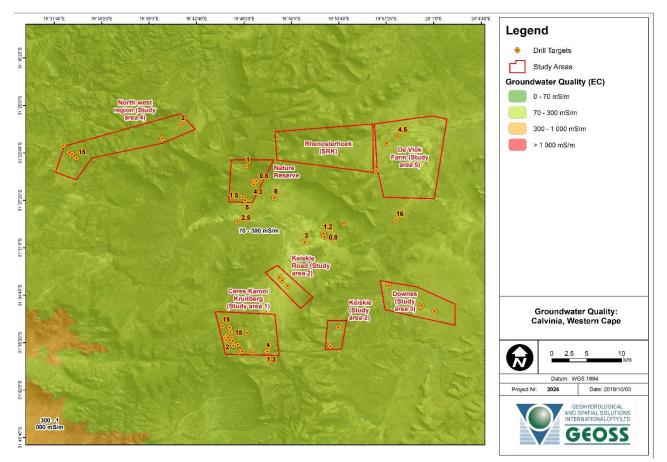
Map 2-4: The study site, Exploration borehole details (ESRI base map – Bing imagery)



Map 3: Geological setting of the study area and exploration boreholes (Council for Geoscience map: 1:250 000 scale 3118 Calvinia)

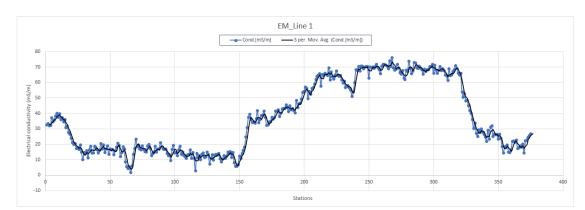


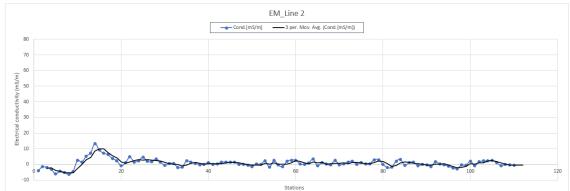
Map 4: Regional aquifer type and yields with tested borehole yields for exploration boreholes (L/s) (Background data 1:500 000 DWAF map 3118 - Calvinia)

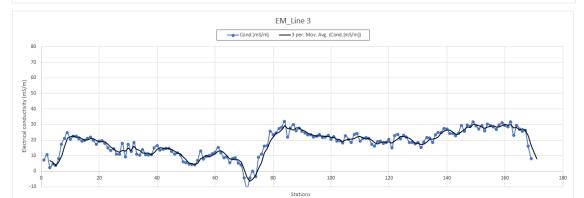


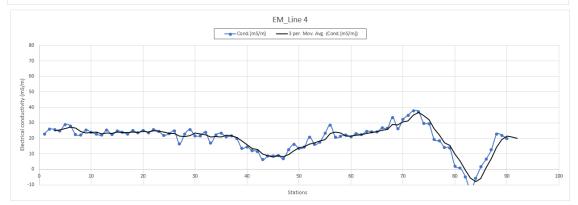
Map 5: Regional groundwater quality (EC in mS/m) with measured borehole quality (EC in mS/m) (Background data 1:500 000 DWAF map 3118 - Calvinia)

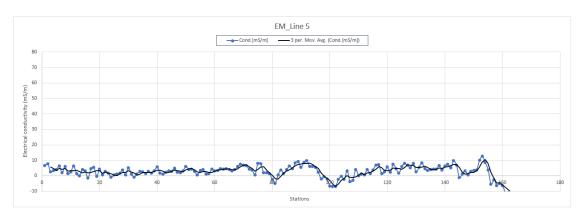
15. APPENDIX B: GEOPHYSICS

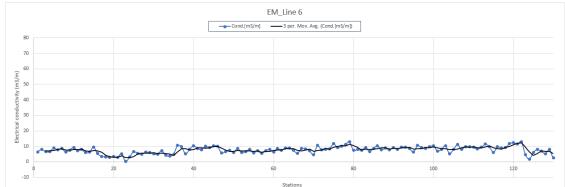


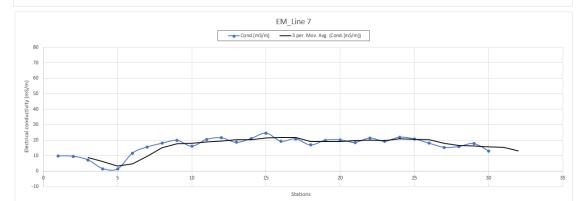


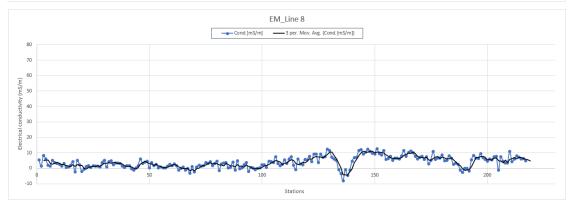


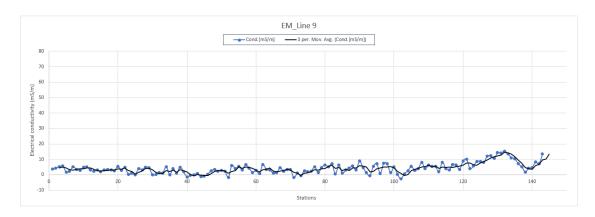












16. APPENDIX C: LABORATORY RESULTS – BEMLAB/ A.L ABBOT AND ASSOCIATES

CERTIFICATE OF ANALYSES

Report Nr.: WT014712.DOC

Julian Conrad GEOSS (Pty) Ltd Unit 19, Technostell Building 9 Quantum Street, Technopark Stellenbosch 7600 Date received: 22-09-2017 Order nr.: #2026

Sampled by client

Water Analyses Report

										19303									
SANS241																			
Origin	Lab.	pl	H EC	C @ 25°C	Na	Κ	Ca	Mg	Fe	CI	SO ₄	В	Mn	Cu	Zn	Р	NH₄-N	NO ₃ -N	*NO ₂ -N
	Nr.	@2	5°C	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Calvinia BH1/Ceres R	14712	7.	6	59.2	38.7	1.4	52.5	12.5	0.1	51.0	26	0.13	0.03	<0.02	< 0.03	<0.01	<0.28	0.37	0.02
Sandgat BH4	14713	7.	4	598.6	706.9	1.0	227.6	118.8	0.1	1420.0	664	1.01	<0.03	<0.02	<0.03	0.02	0.44	0.82	0.02
Norm		≥5.0-	≤9.7	≤170.0	≤200.0				≤2.0	≤300.0	≤500	≤2.40	≤0.40	≤2.00	≤5.00		≤1.50	≤11.00	≤0.90
Origin	Lab.	*F	*TDS	Alkalinit		As	B	a (Cd C	Co Cr	*Hg	J Ni	Pb	Sb	Se	*U	v	*CN	Date
Origin		*F mg/l	*TDS mg/l	Alkalinity mg/l	γ Al μg/l	As µg/		-		Co Cr g/l μg/			Pb µg/l			_	V µg/l	*CN µg/l	Date Sampled
Origin Calvinia BH1/Ceres R		mg/l	mg/l	mg/l	μg/l		/I µg	μ/I	g/l µ		Ί μg/	ί μg/l			µg/l	µg/l			
	Nr.	mg/l	mg/l	mg/l 0 284.00	μg/l	μg	/I µg 7 6.	<mark>ј/I µ</mark> 3 <	g/I µ 3.1	g/l µg/	<mark>Ι μg</mark> / 7 5.7	i μg/l 0.6	µg/l	µg/l	µg/l	μg/l <13.	3 1.6	µg/l	Sampled

Origin	Lab. Nr.	Temperature at reception (°C)			*TOC mg/l	*Cl ₂ (Free) mg/l	Date Analysed
Calvinia BH1/Ceres R	14712	20.5	<1	0.60	6.80	0.28	27/09/2017
Sandgat BH4	14713	20.6	<1	0.34	30.20	0.29	27/09/2017
Norm			≤15	≤5	≤10.00	≤5.00	

* = Not SANAS Accredited

Norms according to SANS 241-1:2015.

Statement: The reported results may be applied only to samples received. Any recommendations included with this report are based on the assumption that the samples were representative of the source from which they were taken.

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This Laboratory participate in the Agrilasa proficiency and SABS water testing scheme

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CERTIFICATE OF ANALYSES

Report Nr.: WT008965.DOC

SANS241

Julian Conrad GEOSS (Pty) Ltd Unit 19, Technostell Building 9 Quantum Street, Technopark Stellenbosch 7600 Date received: 19-06-2017 Order nr.: 369/PhJ/T6

vet.

Sampled by client

Water Analyses Report

Origin	Lab.	pH	E	C @ 25°C		ĸ	Ca	Mg	Fe	CI	SO		B	Mn	Cu	Zn	P	NH4			*NO ₂ -N
	Nr.	@ 25	°C	mS/m	mg/l	mg/l	mg/l	mg/l	mg/l	mg/	mg			mg/l	mg/l	mg/l	mg/l	mg		ng/l	mg/l
Dysseldorp_Drill 3	8965	5.0		24.1	19.9	2.4	8.4 2.3 3.8	5.7		44		36	<0.08	0.69	<0.02	0.10	0.0			<0.36	0.01
Vermaaks Drill- BH1	8966	5.3		12.5	13.0	0.6	2.3	2.2	0.3	36	0.0	4	<0.08	< 0.03	<0.02	< 0.03	<0.0	1 <0.	28	<0.36	0.02
Vermaaks_Drill- BH4	8967	5.8		18.8	16.6	2.2	3.8	4.6	1.0	48	0.0	10	<0.08	2.19	<0.02	< 0.03	0.0	2 <0.	28 •	<0.36	0.03
Norm		≥5.0-≤	9.7	≤170.0	≤200.0				≤2.0	≤300	0 <50	0 ≤	2.40	⊴0.40	≤2.00	\$5.00		≤1.5	0 ≤1	1.00	≤0.90
			100											_							
Origin	Lab.	*F	*TDS	Alkalinit		A		Ba	Cd	Co	Cr	*Hg		Pb				~		*CN	Date
112	Nr.	mg/l	mg/l	mg/l	µg/	PS	μ/I μ	g/l	µg/l	µg/l	µg/l	µg/l	l µg/	l µg	1 µg	1 µg	η μ	g/I µ	g/l	µg/l	Sampled
Dysseldorp Drill 3	8965	0.1	154	.0 <11.4	9 <30	<	5 1	0.6	<3.1	4.3	<27	7.1	34.5	5 <7	8.6	3 27.	0 1	9.4 2	6	9.0	12/06/2017
Vermaaks Drill- BH1	8966	0.0	80	.0 <11.4	62.6	9 <	5 6	3.4	<3.1	1.8	<27	3.1	4.7	16.	1 15.	1 66.	2 <1	3.8 0	9.0	6.0	14/06/201
Vermaaks Drill- BH4	8967	0.0	120				5 5	5.2	<3.1	6.6	<27	3.1	6.7	43.	3 9.4	49.	8 14	1.3 0	.5	0.0	13/06/2011
Norm		≤1.5 :	s1200.	0	≤300.	00 ≤1	0.0 ≤7	00.00	\$3.0		≤50.0	≤6.0	≤70.	0 ≤10	0 <20	0 \$40	.0 \$	0.0	1	200.0	
				~		1.1.1.1	1.0						23	1.1	10.10				100		
Origin	Lab.		peratu		ur *Tur	bidity	*TOC	*Cl ₂	(Free)	D	ate										
	Nr.	at rece	eption	(°C) mg/l	Pt N	ru [mg/l	п	ng/l	Ana	lysed										
Dvsseldorp Drill 3	8965		9.2		<1	1.35	7.00	D	0.07	20/0	3/2017										
Vermaaks Drill- BH1	8966		9.1		7	8.49	6.20		0.08	20/0	3/2017										
Vermaaks_Drill- BH4	8967		9.8		6	15.20	7.20		0.17	20/0	3/2017										
Norm				\$15	5	5	≤10.00	5	5.00												
* = Not SANAS Acct	edited	-				- •		-													
The or and to river	conco																				
Norms according to S	ANIC 2	44 4.00	145																		

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This Laboratory participate in the Agrilasa proficiency and SABS water testing scheme

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Gant's Centre Strand	Fax	(021) 853-1423
	E-Mail	admin@bemlab.co.za
P O Box 684 Somerset Mall, 7137	Vat Re	g. Nr. 4200161414

CERTIFICATE OF ANALYSES

Report Nr.: WT015384.DOC

Julian Conrad GEOSS (Pty) Ltd Unit 19, Technostell Building 9 Quantum Street, Technopark Stellenbosch 7600 Date received: 04-10-2017 Order nr.: #2026

Sampled by client

Water Analyses Report

SANS241																			
Origin	Lab.	pH	EC @ 25	5°C Na	K	Ca	Mg	Fe	CI	SO4	В	Mn	Cu	Zn	Ρ	NH ₄ -N	NO ₃ -N	*NO ₂ -N	*F
	Nr.	@ 25°C	mS/m	n mg	/I mg	/l mg/l	mg/l	mg/l	mg/l	mg/	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Gof Course_BH	15384	7.4	214	19	0.3 5	.1 124.7	60.4	0.2	542.	8 11	2 0.18	< 0.03	< 0.02	<0.03	<0.01	0.29	< 0.36	0.02	2 0.2
Witwal_BH3	15385	8.4	93	17	5.6 7	.4 <0.05	0.4	0.2	157.3	3 9	4 0.53	< 0.03	< 0.02	< 0.03	< 0.01	0.57	< 0.36	0.09	9 1.4
Sandgat_3_BH4	15386	7.5	605	92		.8 131.8							< 0.02	< 0.03	<0.01	0.31	0.61	0.0	
Deon_Vlok_BH	15387	7.5	150		8.3 3	.1 92.1	55.3	0.2					<0.02	< 0.03	<0.01	<0.28	< 0.36	0.02	
Sandgat_5_BH3	15388	7.0	279	30	5.7 4	.6 116.1	70.8	0.1	761.	9 19	4 0.32	0.38	< 0.02	0.15	< 0.01	0.31	0.64	0.06	6 0.0
Norm		≥5.0-≤9.7	≤170	≤200	0.0			≤2.0	≤300.0) ≤500	≤2.40	≤0.40	≤2.00	≤5.00		≤1.50	≤11.00	≤0.90	≤1.5
Origin	Lab.	*TDS A	Alkalinity	AI	As	Ba	Cd	Co	Cr *	Hg	Ni P	b S	b So	e *U	V	*CN	1 0	ate	Temperatu
	Nr.	mg/l	mg/l	µg/l	µg/l	µg/l	µg/l	µg/l	μg/l μ	ug/l μ	g/l µ	g/I µg	μg μg	/I µg	l µg	/l µg/	I Sar	npled	at reception
Gof Course_BH	15384	1283.0	167.86	<30	<5	<5	<3.1	<1	<27 <	3.1 5	5.7 <	7 11	.2 <1	2 <13	.8 <0.	13 5.0	25/0	9/2017	13.3
Witwal_BH3	15385	561.0	181.40	<30	<5	69.2	<3.1	<1	<27 3	3.2 2	9.1 <	7 13	.2 <1	2 <13	.8 <0.	13 6.0	29/0	9/2017	13.6
Sandgat_3_BH4	15386	3600.0	388.04	<30	8.4	15.2	<3.1	<1	47.7 <	3.1 2	3.7 9	.3 11	.9 <1	2 20.	0 2.	2 4.0	29/0	09/017	11.8
Deon_Vlok_BH	15387	901.0	278.56	<30	<5	41.3	<3.1	<1	<27 <	3.1 2	8.8 <	7 10	.3 <1	2 15.	2 1.	7 7.0	29/0	09/017	14.3
Sandgat_5_BH3	15388	1670.0	132.51	<30	7.2	56.5	<3.1	1.2	<27 <	3.1 2	6.6 8	.1 5.	5 17	5 14.	4 <0.	13 6.0	29/0	09/017	13.0
Norm		≤1200.0		≤300.00	≤10.0	≤700.0	≤3.0	1	≤50.0 ≤	6.0 ≤7	′0.0 ≤1	0.0 ≤2	0.0 ≤40	.0 ≤30	.0	≤200	.0		

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Origin	Lab. Nr.	*Colour mg/l Pt	*Turbidity NTU	*TOC mg/l	*Cl ₂ (Free) mg/l	Date Analysed
Gof Course_BH	15384	<1	1.36	4.80	0.04	05/10/2017
Witwal_BH3	15385	<1	0.38	5.90	0.06	05/10/2017
Sandgat_3_BH4	15386	<1	0.23	16.70	0.06	05/10/2017
Deon_Vlok_BH	15387	<1	1.41	8.70	0.10	05/10/2017
Sandgat 5 BH3	15388	<1	0.36	3.60	0.09	05/10/2017
Norm		≤15	≤5	≤10.00	≤5.00	

* = Not SANAS Accredited

Norms according to SANS 241-1:2015.

Statement: The reported results may be applied only to samples received. Any recommendations included with this report are based on the assumption that the samples were representative of the source from which they were taken.

Notes:

To ensure sample integrity, samples are stored only for seven days after release of the report. Thereafter it is disposed of and a fresh sample will be required if additional analyses are requested.

Results marked with "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory. These results relate to the items tested. This test report shall not be reproduced except in full, without written approval of the laboratory.

Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

Refer to website for uncertainty of measurement and referenced methods.

Sample condition: Samples received in good condition.

Dr. Pieter Raath General Manager

Lauren Taylor Technical Signatory(Microbiology)

13-10-2017 Date reported

----END OF REPORT------

A.L. ABBOTT AND ASSOCIATES (PTY) LTD

Consulting Analytical & Industrial Chemists Specialists in Water & Waste Water Treatment Telephone (021)448 6340/1 After Hours (0833263887) Telefax (021)448 6342 e-Mail Address : info@alabbott.co.za



(Reg. No. 1982/004379/07)

Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS CALVINIA DV1

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/22 2018/05/22 2018/05/22

OUR REF.: 2018/05/22/14687 REPORT NO .: 3606

	Sample Number	14687	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	54.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	361	≤1200 Aesthetic
27	Turbidity (NTU)	2.1	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	8.39	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	19.0	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	3.3	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	0.20	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	66.4	≤300 Aesthetic
92	Sodium (mg/l as Na)	86.0	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.02	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/I as As)	167	≤10 Chronic Health
92	Barium (µg/I as Ba)	37	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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Certificate of Analysis

Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS CALVINIA DV1

DATE SAMPLED : 2018/05/22 DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/22 2018/05/22

OUR REF.: 2018/05/22/14687 REPORT NO .: 3606

	Sample Number	14687	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	16	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	80	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/I as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	6	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/I as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	108	≤300 Operational
105	Total Organic Carbon (mg/l as C)	13.2	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	18.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.43	≤1.0
N/A	Total Microcystin (µg/I)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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GEOSS ANALYSIS CALVINIA DV1

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/22 2018/05/22 2018/05/22

OUR REF.: 2018/05/22/14687 REPORT NO .: 3606

	Sample Number	14687	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	10	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	902	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	5.0	N/A
92	Magnesium (mg/l as Mg)	<1.1	N/A
92	Potassium (mg/l as K)	0.73	N/A
94	Total Alkalinity (mg/l as CaCO3)	105	N/A

>

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 04 June 2018

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS CALVINIA DV3

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/22 2018/05/22

2018/05/22

OUR REF.: 2018/05/22/14688 REPORT NO .: 3606

	Sample Number	14688	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	49.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	327	≤1200 Aesthetic
27	Turbidity (NTU)	2.0	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	9.59	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20 .	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	4.3	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	6.8	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	0.28	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	89.9	≤300 Aesthetic
92	Sodium (mg/l as Na)	76.1	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.007	≤5 Aesthetic
92	Antimony (µg/l as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	\$	≤10 Chronic Health
92	Barium (µg/l as Ba)	2	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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CALVINIA DV3

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/22 2018/05/22

2018/05/22

OUR REF.: 2018/05/22/14688 REPORT NO .: 3606

	Sample Number	14688	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	14	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	83	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	5	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/I as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	92	≤300 Operational
105	Total Organic Carbon (mg/l as C)	2.1	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	11.2	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.40	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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GEOSS ANALYSIS CALVINIA DV3

 DATE SAMPLED :
 2018/05/22

 DATE RECEIVED :
 2018/05/22

 DATE ANALYSIS
 2018/05/22

 COMMENCED :
 2018/05/22

OUR REF.: 2018/05/22/14688 REPORT NO .: 3606

	Sample Number	14688	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	7	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	3.4	N/A
92	Magnesium (mg/l as Mg)	<1.1	N/A
92	Potassium (mg/l as K)	0.52	N/A
94	Total Alkalinity (mg/l as CaCO3)	36.3	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 05 June 2018

TO: 'Julian Conrad' <jconrad@geoss.co.za>

'Alison McDuling' <amcduling@geoss.co.za>

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BVI CONSULTING ENGINEERS ANALYSIS

CALVINIA-CAL-DV4

DATE SAMPLED :	2018/05/21
DATE RECEIVED :	2018/05/30
DATE ANALYSIS	2018/05/30
COMMENCED :	

OUR REF .: 2018/05/21/15509 REPORT NO .: 3840

	Sample Number	15509	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	73.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	495	≤1200 Aesthetic
27	Turbidity (NTU)	10.3	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	8.32	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	< 0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	0.24	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.23	≤1.0
102	Sulphate (mg/l as SO4)	7.9	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	3.1	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	0.23	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	60.7	≤300 Aesthetic
92	Sodium (mg/l as Na)	116	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.01	≤5 Aesthetic
92	Antimony (µg/l as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<	≤10 Chronic Health
92	Barium (µg/I as Ba)	388	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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BVI CONSULTING ENGINEERS ANALYSIS

CALVINIA-CAL-DV4

DATE SAMPLED :	2018/05/21
DATE RECEIVED :	2018/05/30
DATE ANALYSIS COMMENCED :	2018/05/30

OUR REF.: 2018/05/21/15509 REPORT NO.: 3840

Analyses admium (µg/l as Cd) tal Chromium (µg/l as Cr) opper (µg/l as Cu) ranide (µg/l as CN-) n (µg/l as Fe) ad (µg/l as Pb)	Results <1 14 15 <20 175	SANS 241-1:2015 ≤3 Chronic Health ≤50 Chronic Health ≤2000 Chronic Health ≤200 Acute Health ≤300 Aesthetic ≤2000 Chronic Health
tal Chromium (µg/l as Cr) pper (µg/l as Cu) ranide (µg/l as CN-) n (µg/l as Fe) ad (µg/l as Pb)	14 15 <20 175	≤50 Chronic Health ≤2000 Chronic Health ≤200 Acute Health
opper (µg/l as Cu) ranide (µg/l as CN-) n (µg/l as Fe) ad (µg/l as Pb)	15 <20 175	≤2000 Chronic Health ≤200 Acute Health
anide (μg/l as CN-) n (μg/l as Fe) ad (μg/l as Pb)	<20 175	≤200 Acute Health
n (µg/l as Fe) ad (µg/l as Pb)	175	
ad (µg/l as Pb)		<200 Apatholia <2000 Chaptic Upath
		≥300 Aesthetic ≥2000 Chronic Mealth
	<7	≤10 Chronic Health
anganese (µg/l as Mn)	37	≤100 Aesthetic ≤400 Chronic Health
ercury (µg/l as Hg)	<5	≤6 Chronic Health
ckel (µg/l as Ni)	4	≤70 Chronic Health
lenium (µg/l as Se)	<10	≤40 Chronic Health
anium (µg/l as U)	<15	≤30 Chronic Health
uminium (µg/I as AI)	187	≤300 Operational
tal Organic Carbon (mg/l as C)	1.0	≤10 Chronic Health
halomethane (Chloroform) (µg/l)	54.0	≤300 Chronic Health
halomethane (Bromoform) (µg/l)	120	≤100 Chronic Health
halomethane (Dibromochloromethane) (µg/l)	192	≤100 Chronic Health
halomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
mbined Trihalomethane	3.5	≤1.0
tal Microcystin (µg/l)	<0.15	≤1
enols (mg/l)	<0.01	≤0.01 Aesthetic
coli (count per 100 ml)	<1	Not Detected
	kel (µg/l as Ni) enium (µg/l as Se) minum (µg/l as U) minium (µg/l as U) al Organic Carbon (mg/l as C) halomethane (Chloroform) (µg/l) halomethane (Bromoform) (µg/l) halomethane (Bromodichloromethane) (µg/l) malomethane (Bromodichloromethane) (µg/l) mbined Trihalomethane al Microcystin (µg/l) enols (mg/l)	rcury (µg/l as Hg) <5

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BVI CONSULTING ENGINEERS

ANALYSIS CALVINIA-CAL-DV4

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/30 2018/05/30

2018/05/21

OUR REF. : 2018/05/21/15509 REPORT NO .: 3840

	Sample Number	15509	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	1	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	16.2	N/A
92	Magnesium (mg/l as Mg)	6.4	N/A
92	Potassium (mg/I as K)	1.4	N/A
94	Total Alkalinity (mg/l as CaCO3)	285	N/A

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N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 13 June 2018

TO: BVI CONSULTING ENGINEERS P O Box 1155 UPINGTON 8800

Attention : GERT MEIRING

Consulting Analytical & Industrial Chemists Specialists in Water & Waste Water Treatment Telephone (021)448 6340/1 After Hours (0833263887) Telefax (021)448 6342 e-Mail Address : info@alabbott.co.za





No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS ANALYSIS

KRUITBERG CALVINIA-CAL-S2-3

DATE SAMPLED :	2018/05/30
DATE RECEIVED :	2018/05/30
DATE ANALYSIS COMMENCED :	2018/05/30

OUR REF.: 2018/05/30/15510 REPORT NO .: 3840

Analyses	Results	
		SANS 241-1:2015
Colour (mg/l as Pt)	<4	≤15 Aesthetic
Conductivity (mS/m) (at 25 °C)	70.5	≤170 Aesthetic
Total Dissolved Solids (mg/l)	474	≤1200 Aesthetic
Turbidity (NTU)	8.8	≤1 Operational : ≤5 Aesthetic
pH (at 25 °C)	9.22	≥5 - ≤9.7 Operational
Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
Monochloramine (mg/l)	< 0.05	≤3 Chronic Health
Nitrate Nitrogen (mg/I as N)	<0.20	≤11 Acute Health
Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
Nitrate & Nitrite Nitrogen (mg/l as N)	0.26	≤12 Acute Health
Combined Nitrate plus Nitrite (mg/l as N)	0.23	≤1.0
Sulphate (mg/l as SO4)	10.0	≤250 Aesthetic ≤500 Acute Health
Fluoride (mg/l as F)	3.6	≤1.5 Chronic Health
Ammonia Nitrogen (mg/l as N)	0.47	≤1.5 Aesthetic
Chloride (mg/l as Cl)	58.1	≤300 Aesthetic
Sodium (mg/l as Na)	125	≤200 Aesthetic
Zinc (mg/l as Zn)	0.006	≤5 Aesthetic
Antimony (µg/l as Sb)	<10	≤20 Chronic Health
Arsenic (µg/l as As)	\$	≤10 Chronic Health
Barium (µg/l as Ba)	10	≤700 Chronic Health
Boron (mg/l as B)	<0.10	≤2.4 Chronic Health
	Conductivity (mS/m) (at 25 °C) Total Dissolved Solids (mg/l) Turbidity (NTU) pH (at 25 °C) Free Chlorine (mg/l) Monochloramine (mg/l) Nitrate Nitrogen (mg/l as N) Nitrate Nitrogen (mg/l as N) Nitrate & Nitrite Nitrogen (mg/l as N) Combined Nitrate plus Nitrite (mg/l as N) Sulphate (mg/l as SO4) Fluoride (mg/l as F) Ammonia Nitrogen (mg/l as N) Chloride (mg/l as Cl) Sodium (mg/l as Cl) Sodium (mg/l as Sb) Arsenic (µg/l as As) Barium (µg/l as Ba)	Conductivity (mS/m) (at 25 °C) 70.5 Total Dissolved Solids (mg/l) 474 Turbidity (NTU) 8.8 pH (at 25 °C) 9.22 Free Chlorine (mg/l) <0.05

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Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS

ANALYSIS

KRUITBERG CALVINIA-CAL-S2-3

DATE SAMPLED :	2018/05/30
DATE RECEIVED :	2018/05/30
COMMENCED :	2018/05/30

OUR REF.: 2018/05/30/15510 REPORT NO .: 3840

	Sample Number	15510	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	11	≤50 Chronic Health
92	Copper (µg/l as Cu)	15	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	294	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	4	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	323	≤300 Operational
105	Total Organic Carbon (mg/l as C)	0.98	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	103	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/I)	130	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	317	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	5.0	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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ANALYSIS KRUITBERG CALVINIA-CAL-S2-3

 DATE SAMPLED:
 2018/05/30

 DATE RECEIVED:
 2018/05/30

 DATE ANALYSIS
 2018/05/30

 COMMENCED:
 2018/05/30

OUR REF.: 2018/05/30/15510 REPORT NO .: 3840

	Sample Number	15510	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	4	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	2.8	N/A
92	Magnesium (mg/l as Mg)	<1.1	N/A
92	Potassium (mg/l as K)	1.2	N/A
94	Total Alkalinity (mg/l as CaCO3)	254	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 13 June 2018

TO: BVI CONSULTING ENGINEERS P O Bax 1155 UPINGTON 8800

Attention : GERT MEIRING

Consulting Analytical & Industrial Chemists Specialists in Water & Waste Water Treatment Telephone (021)448 6340/1 After Hours (0833263887) Telefax (021)448 6342 e-Mail Address : info@alabbott.co.za



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Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS ANALYSIS

Certificate of Analysis

KRUITBERG-CAL-S2-4

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/05/30 2018/05/30 2018/05/30

OUR REF.: 2018/05/30/15511 REPORT NO.: 3840

	Sample Number	15511	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	6	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	74.0	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	488	≤1200 Aesthetic
27	Turbidity (NTU)	7.2	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	9.83	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/I as N)	0.22	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	5.5	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	7.2	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/I as N)	0.31	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	66.0	≤300 Aesthetic
92	Sodium (mg/l as Na)	127	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.006	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	2	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	<2.4 Chronic Health

(Reg. No. 1982/004379/07)

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BVI CONSULTING ENGINEERS ANALYSIS

KRUITBERG-CAL-S2-4

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/30 2018/05/30 2018/05/30

OUR REF.: 2018/05/30/15511 REPORT NO .: 3840

	Sample Number	15511	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	11	≤50 Chronic Health
92	Copper (µg/l as Cu)	16	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	296	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	4	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/I as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	238	≤300 Operational
105	Total Organic Carbon (mg/l as C)	0.79	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.40	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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KRUITBERG-CAL-S2-4

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/05/30 2018/05/30 2018/05/30

OUR REF. : 2018/05/30/15511 REPORT NO.: 3840

	Sample Number	15511	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	727	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	0.43	N/A
92	Magnesium (mg/l as Mg)	<1.1	N/A
92	Potassium (mg/l as K)	1.0	N/A
94	Total Alkalinity (mg/l as CaCO3)	238	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 11 June 2018

TO: BVI CONSULTING ENGINEERS P O Box 1155 UPINGTON 8800

Attention : GERT MEIRING

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS CAL-NAT5-NATURE RESERVE CALVINIA

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/07/20 2018/07/20 2018/07/20

OUR REF. : 2018/07/20/20641 REPORT NO .: 4995

	Sample Number	20641	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	45.0	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	265	≤1200 Aesthetic
27	Turbidity (NTU)	0.37	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	8.18	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	6.6	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	5.1	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/I as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	41.7	≤300 Aesthetic
92	Sodium (mg/l as Na)	70.8	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.003	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/I as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	1	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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GEOSS ANALYSIS CAL-NAT5-NATURE RESERVE CALVINIA

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/07/20 2018/07/20 2018/07/20

OUR REF. : 2018/07/20/20641 REPORT NO.: 4995

	Sample Number	20641	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/I as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	<24	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	4	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	39	≤300 Operational
105	Total Organic Carbon (mg/l as C)	0.82	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.40	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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GEOSS ANALYSIS

CAL-NAT5-NATURE RESERVE CALVINIA

DATE SAMPLED : 2018/07/20 DATE RECEIVED : 2018/07/20 DATE ANALYSIS 2018/07/20 COMMENCED :

OUR REF. : 2018/07/20/20641 REPORT NO .: 4995

	Sample Number	20641	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	7	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	660	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	6.7	N/A
92	Magnesium (mg/l as Mg)	1.7	N/A
92	Potassium (mg/l as K)	0.68	N/A
94	Total Alkalinity (mg/l as CaCO3)	124	N/A

JOSE DA SILVA (Cert.Sci.Nat.) TECHNICAL MANAGER 26 July 2018

GEOSS Report No. 2018/10-18

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS

CAL-NET6-CALVINIA

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/07/20 2018/07/20 2018/07/20

OUR REF.: 2018/07/20/20642 REPORT NO .: 4995

	Sample Number	20642	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	60.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	381	≤1200 Aesthetic
27	Turbidity (NTU)	0.13	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	7.36	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/I as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	27.2	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	1.3	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/I as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	36.6	≤300 Aesthetic
92	Sodium (mg/l as Na)	53.5	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.003	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	5	≤700 Chronic Health
47	Boron (mg/I as B)	<0.10	≤2.4 Chronic Health

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS

CAL-NET6-CALVINIA

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/07/20 2018/07/20 2018/07/20

OUR REF.: 2018/07/20/20642 REPORT NO .: 4995

	Sample Number	20642	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	<24	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/I as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	67	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	4	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	<12	≤300 Operational
105	Total Organic Carbon (mg/l as C)	0.58	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.40	≤1.0
N/A	Total Microcystin (µg/I)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	4	Not Detected

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GEOSS ANALYSIS CAL-NET6-CALVINIA

DATE SAMPLED : 2018/07/20 DATE RECEIVED : 2018/07/20 DATE ANALYSIS 2018/07/20 COMMENCED :

OUR REF.: 2018/07/20/20642 REPORT NO .: 4995

	Sample Number	20642	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	6	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	41.6	N/A
92	Magnesium (mg/l as Mg)	18.9	N/A
92	Potassium (mg/l as K)	0.76	N/A
94	Total Alkalinity (mg/l as CaCO3)	222	N/A

JOSE DA SILVA (Cert.Sci.Nat.) TECHNICAL MANAGER 26 July 2018

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DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/07/20 2018/07/20 2018/07/20

OUR REF.: 2018/07/20/20643 REPORT NO.: 4995

	Sample Number	20643	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	127	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	823	≤1200 Aesthetic
27	Turbidity (NTU)	0.37	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	7.39	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/I as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	100	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	1.6	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	188	≤300 Aesthetic
92	Sodium (mg/l as Na)	108	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.003	≤5 Aesthetic
92	Antimony (µg/l as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/l as Ba)	3	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	<2.4 Chronic Health

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915



DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/07/20 2018/07/20 2018/07/20

OUR REF. : 2018/07/20/20643 REPORT NO . : 4995

	Sample Number	20643	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	<24	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	5	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/I as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	<12	≤300 Operational
105	Total Organic Carbon (mg/l as C)	0.52	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.40	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

Complex OUCTONED

Consulting Analytical & Industrial Chemists Specialists in Water & Waste Water Treatment Telephone (021)448 6340/1 After Hours (0833263887) Telefax (021)448 6342 e-Mail Address : info@alabbott.co.za Certificate of Analysis



Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915



DATE SAMPLED : 2018/07/20 DATE RECEIVED : 2018/07/20 DATE ANALYSIS 2018/07/20 COMMENCED :

OUR REF. : 2018/07/20/20643 REPORT NO .: 4995

	Sample Number	20643	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	<1	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	330	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	97.0	N/A
92	Magnesium (mg/l as Mg)	28.0	N/A
92	Potassium (mg/l as K)	2.9	N/A
94	Total Alkalinity (mg/l as CaCO3)	247	N/A

JOSE DA SILVA (Cert.Sci.Nat.) TECHNICAL MANAGER 26 July 2018

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS CAL PHASE-39 (KREITZBERG)

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/08/21 2018/08/21 2018/08/21

OUR REF.: 2018/08/21/22876 REPORT NO.: 5505

	Sample Number	22876	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	75.0	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	531	≤1200 Aesthetic
27	Turbidity (NTU)	0.90	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	7.66	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	<1.0	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	1.7	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	95.2	≤300 Aesthetic
92	Sodium (mg/l as Na)	71.0	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.004	≤5 Aesthetic
92	Antimony (µg/l as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	7	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

(Reg. No. 1982/004379/07)

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

GEOSS ANALYSIS

CAL PHASE-39 (KREITZBERG)

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/08/21 2018/08/21 2018/08/21

OUR REF. : 2018/08/21/22876 REPORT NO .: 5505

	Sample Number	22876	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/I as Cr)	25	≤50 Chronic Health
92	Copper (µg/l as Cu)	10	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	59	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<10	≤10 Chronic Health
92	Manganese (µg/l as Mn)	34	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	8	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	27	≤300 Operational
105	Total Organic Carbon (mg/I as C)	0.10	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	91.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	11.0	≤60 Chronic Health
N/A	Combined Trihalomethane	0.69	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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GEOSS ANALYSIS CAL PHASE-39 (KREITZBERG)

 DATE SAMPLED :
 2018/08/21

 DATE RECEIVED :
 2018/08/21

 DATE ANALYSIS
 2018/08/21

 COMMENCED :
 2018/08/21

OUR REF.: 2018/08/21/22876 REPORT NO.: 5505

	Sample Number	22876	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	687	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	36.5	N/A
92	Magnesium (mg/l as Mg)	17.8	N/A
92	Potassium (mg/l as K)	2.6	N/A
94	Total Alkalinity (mg/l as CaCO3)	207	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 24 August 2018

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CALVINIA CAL PHASE 3-4

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/08/24 2018/09/07 2018/09/07 TIME:07H50

OUR REF.: 2018/08/24/24444 REPORT NO .: 5871

	Sample Number	24444	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	173	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	1354	≤1200 Aesthetic
27	Turbidity (NTU)	82.0	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	7.45	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	616	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	1.5	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	96.9	≤300 Aesthetic
92	Sodium (mg/l as Na)	95.7	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.004	≤5 Aesthetic
92	Antimony (µg/l as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/I as As)	<3	≤10 Chronic Health
92	Barium (µg/l as Ba)	15	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

(Reg. No. 1982/004379/07)

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ANALYSIS

CALVINIA CAL PHASE 3-4

DATE SAMPLED :	2018/08/24
DATE RECEIVED :	2018/09/07
DATE ANALYSIS COMMENCED :	2018/09/07

OUR REF.: 2018/08/24/24444 REPORT NO .: 5871

	Sample Number	24444	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	22400	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/I as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	1005	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	10	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	<12	≤300 Operational
105	Total Organic Carbon (mg/l as C)	<0.10	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethanes (µg/I)	0.40	≤1.0
N/A	Total Microcystin (µg/I)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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CALVINIA CAL PHASE 3-4

 DATE SAMPLED :
 2018/08/24

 DATE RECEIVED :
 2018/09/07

 DATE ANALYSIS
 2018/09/07

 COMMENCED :
 2018/09/07

OUR REF.: 2018/08/24/24444 REPORT NO.: 5871

	Sample Number	24444	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	<1	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	176	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	130	N/A
92	Magnesium (mg/l as Mg)	92.7	N/A
92	Potassium (mg/I as K)	6.2	N/A
94	Total Alkalinity (mg/l as CaCO3)	96.4	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 17 September 2018

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CALVINIA CAL PHASE 3-6

TIME:01H20

DATE RECEIVED : DATE ANALYSIS COMMENCED :

DATE SAMPLED :

2018/08/29 2018/09/07 2018/09/07

OUR REF. : 2018/08/29/24445 REPORT NO.: 5871

	Sample Number	24445	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	5	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	48.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	377	≤1200 Aesthetic
27	Turbidity (NTU)	0.60	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	9.45	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	4.4	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	3.4	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	96.2	≤300 Aesthetic
92	Sodium (mg/l as Na)	77.1	≤200 Aesthetic
92	Zinc (mg/l as Zn)	<0.001	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/I as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	1	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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(Reg. No. 1982/004379/07)

Doc.No. 5.10/1 Rev.4

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CALVINIA CAL PHASE 3-6

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/08/29 2018/09/07 2018/09/07

OUR REF. : 2018/08/29/24445 REPORT NO. : 5871

	Sample Number	24445	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/I as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	27	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/I as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	<1	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	20	≤300 Operational
105	Total Organic Carbon (mg/l as C)	<0.10	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	14.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethanes (µg/I)	0.41	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

Sampler : CUSTOMER

Refer to attached Appendix 1 : Indicating * Tests marked *SANAS Accredited*, Tests Methods and Detection Limits.

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BVI CONSULTING ENGINEERS ANALYSIS

CALVINIA CAL PHASE 3-6

DATE SAMPLED :	2018/08/29
DATE RECEIVED :	2018/09/07
DATE ANALYSIS	2040/00/07
COMMENCED :	2018/09/07

OUR REF.: 2018/08/29/24445 REPORT NO .: 5871

	Sample Number	24445	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	2	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	264	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	5.7	N/A
92	Magnesium (mg/l as Mg)	<1.1	N/A
92	Potassium (mg/l as K)	0.63	N/A
94	Total Alkalinity (mg/l as CaCO3)	41.3	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 17 September 2018

Att: Gert Meiring <gertm@bvinc.co.za>

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Certificate of Analysis

CALVINIA KREITZBERG CAL PHASE 3-9

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/09/03 2018/09/07 2018/09/07

TIME:08H25

OUR REF.: 2018/09/03/24446 REPORT NO.: 5871

	Sample Number	24446	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	<4	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	75.5	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	553	≤1200 Aesthetic
27	Turbidity (NTU)	0.18	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	8.55	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/I as N)	<0.20	≤11 Acute Health
99	Nitrite Nitrogen (mg/l as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/l as N)	<0.20	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.22	≤1.0
102	Sulphate (mg/l as SO4)	18.0	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	1.8	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	98.1	≤300 Aesthetic
92	Sodium (mg/I as Na)	77.9	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.006	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/l as Ba)	8	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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BVI CONSULTING ENGINEERS ANALYSIS CALVINIA KREITZBERG CAL PHASE 3-9

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED :

2018/09/03 2018/09/07 2018/09/07

OUR REF. : 2018/09/03/24446 REPORT NO . : 5871

	Sample Number	24446	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/I as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/l as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	53	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/l as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/I as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	<1	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/l as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	141	≤300 Operational
105	Total Organic Carbon (mg/l as C)	<0.10	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/l)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/l)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethanes (µg/I)	0.40	≤1.0
N/A	Total Microcystin (µg/l)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS ANALYSIS CALVINIA KREITZBERG CAL PHASE 3-9

ATE SAMPLED :	2018/09/03
ATE RECEIVED :	2018/09/07
OMMENCED :	2018/09/07

OUR REF. : 2018/09/03/24446 REPORT NO.: 5871

Sample Number	24446	
Analyses	Results	SANS 241-1:2015
Total Coliform Bacteria (count per 100 ml)	7	≤10 Operational
Heterotrophic Plate Count (count per ml)	132	≤1000 Operational
Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
Calcium (mg/l as Ca)	31.8	N/A
Magnesium (mg/l as Mg)	20.1	N/A
Potassium (mg/l as K)	2.8	N/A
Total Alkalinity (mg/l as CaCO3)	201	N/A
	Analyses Total Coliform Bacteria (count per 100 ml) Heterotrophic Plate Count (count per ml) Somatic Coliphages (count per 10 ml) Calcium (mg/l as Ca) Magnesium (mg/l as Mg) Potassium (mg/l as K)	AnalysesResultsTotal Coliform Bacteria (count per 100 ml)7Heterotrophic Plate Count (count per ml)132Somatic Coliphages (count per 10 ml)<1

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 17 September 2018

Att: Gert Meiring <gertm@bvinc.co.za>

Consulting Analytical & Industrial Chemists Specialists in Water & Waste Water Treatment Telephone (021)448 6340/1 After Hours (0833263887) Telefax (021)448 6342 e-Mail Address : info@alabbott.co.za



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Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

Certificate of Analysis BVI CONSULTING ENGINEERS

ANALYSIS

SPITZHOP REDRILL 39602

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/08/19 2018/09/07 2018/09/07

TIME:15H15

OUR REF.: 2018/08/19/24447 REPORT NO.: 5871

	Sample Number	24447	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
97	Colour (mg/l as Pt)	5	≤15 Aesthetic
9	Conductivity (mS/m) (at 25 °C)	175	≤170 Aesthetic
7	Total Dissolved Solids (mg/l)	1381	≤1200 Aesthetic
27	Turbidity (NTU)	0.52	≤1 Operational : ≤5 Aesthetic
19	pH (at 25 °C)	8.09	≥5 - ≤9.7 Operational
66	Free Chlorine (mg/l)	<0.05	≤5 Chronic Health
N/A	Monochloramine (mg/l)	<0.05	≤3 Chronic Health
Calc	Nitrate Nitrogen (mg/l as N)	1.9	≤11 Acute Health
99	Nitrite Nitrogen (mg/I as N)	<0.20	≤0.9 Acute Health
100	Nitrate & Nitrite Nitrogen (mg/I as N)	2.1	≤12 Acute Health
N/A	Combined Nitrate plus Nitrite (mg/l as N)	0.39	≤1.0
102	Sulphate (mg/l as SO4)	118	≤250 Aesthetic ≤500 Acute Health
98	Fluoride (mg/l as F)	0.91	≤1.5 Chronic Health
95	Ammonia Nitrogen (mg/l as N)	<0.10	≤1.5 Aesthetic
96	Chloride (mg/l as Cl)	307	≤300 Aesthetic
92	Sodium (mg/l as Na)	160	≤200 Aesthetic
92	Zinc (mg/l as Zn)	0.003	≤5 Aesthetic
92	Antimony (µg/I as Sb)	<10	≤20 Chronic Health
92	Arsenic (µg/l as As)	<3	≤10 Chronic Health
92	Barium (µg/I as Ba)	19	≤700 Chronic Health
47	Boron (mg/l as B)	<0.10	≤2.4 Chronic Health

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No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS ANALYSIS

SPITZHOP REDRILL 39602

DATE SAMPLED : DATE RECEIVED : DATE ANALYSIS COMMENCED : 2018/08/19 2018/09/07 2018/09/07

OUR REF.: 2018/08/19/24447 REPORT NO.: 5871

	Sample Number	24447	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
92	Cadmium (µg/l as Cd)	<1	≤3 Chronic Health
92	Total Chromium (µg/l as Cr)	<7	≤50 Chronic Health
92	Copper (µg/l as Cu)	<6	≤2000 Chronic Health
51	Cyanide (µg/I as CN-)	<20	≤200 Acute Health
92	Iron (µg/I as Fe)	<24	≤300 Aesthetic ≤2000 Chronic Health
92	Lead (µg/I as Pb)	<7	≤10 Chronic Health
92	Manganese (µg/l as Mn)	<19	≤100 Aesthetic ≤400 Chronic Health
92	Mercury (µg/l as Hg)	<5	≤6 Chronic Health
92	Nickel (µg/l as Ni)	<1	≤70 Chronic Health
92	Selenium (µg/l as Se)	<10	≤40 Chronic Health
92	Uranium (µg/I as U)	<15	≤30 Chronic Health
92	Aluminium (µg/l as Al)	<12	≤300 Operational
105	Total Organic Carbon (mg/l as C)	40.0	≤10 Chronic Health
N/A	Trihalomethane (Chloroform) (µg/l)	<10.0	≤300 Chronic Health
N/A	Trihalomethane (Bromoform) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Dibromochloromethane) (µg/I)	<10.0	≤100 Chronic Health
N/A	Trihalomethane (Bromodichloromethane) (µg/I)	<10.0	≤60 Chronic Health
N/A	Combined Trihalomethanes (µg/I)	0.40	≤1.0
N/A	Total Microcystin (µg/I)	<0.15	≤1
45	Phenols (mg/l)	<0.01	≤0.01 Aesthetic
84	E.coli (count per 100 ml)	<1	Not Detected

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Certificate of Analysis

Doc.No. 5.10/1 Rev.4

No. 1, Vine Park Vine Road 7925 P.O. Box 483 WOODSTOCK, CAPE 7915

BVI CONSULTING ENGINEERS

ANALYSIS

SPITZHOP REDRILL 39602

DATE SAMPLED :	2018/08/19	
DATE RECEIVED :	2018/09/07	
DATE ANALYSIS	2018/09/07	
COMMENCED :	2010/03/07	

OUR REF.: 2018/08/19/24447 REPORT NO.: 5871

	Sample Number	24447	
Mthd ALA No.	Analyses	Results	SANS 241-1:2015
85	Total Coliform Bacteria (count per 100 ml)	<1	≤10 Operational
88	Heterotrophic Plate Count (count per ml)	>1000	≤1000 Operational
N/A	Somatic Coliphages (count per 10 ml)	<1	Not Detected Operational
92	Calcium (mg/l as Ca)	80.2	N/A
92	Magnesium (mg/l as Mg)	58.3	N/A
92	Potassium (mg/I as K)	2.3	N/A
94	Total Alkalinity (mg/l as CaCO3)	281	N/A

N. VAN BINSBERGEN (Pr.Sci.Nat.) DIRECTOR 17 September 2018

Att: Gert Meiring <gertm@bvinc.co.za>

17. APPENDIX D: - PUMPING TEST DATA SHEETS - AB PUMPS

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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
BOR	EHC	<u>DLE TEST RE</u>



								PR0JECT #	P1848
								BBR	CHIRTSOPHER
CONSULTANT:	GEOSS						_		
DISTRICT:	CALVINIA								
PROVINCE:	NC						-	PRODUCTION BONUS:	
FARM / VILLAGE NAME :	CALVINIA- CER	ES RD					-		
							-		
DATE TESTED:	12/09/2017						-	EC meter number	
							-		
MAP REFERENCE:									
CO-ORDINATES:									
FORMAT ON GPS	hddd	°mm '	SS.S			hddd	°mm.mmm		hddd.dddd
							•		
LATITUDE		• •			- OR		•	– OR	31.64347
LONGITUDE	:				-		-	- _	19.74949
BOREHOLE NO:	BH01 CALVI	NIA -CERES	RD		_				
TRANSMISSIVITY VALUE:					_				
TYPE INSTALLATION:	OPEN CASING				-				
BOREHOLE DEPTH: (mbgl)	51.90				_				
COMMENTS:									
SAMPLE INSTRUCTIONS :	N			T					
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
Date sample taken	14/09/20	017	If co	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken	17H30								
CONSULTANT GUIDELINES	1			1		-		1	
BOREHOLE DEPTH:	m	STE	P 1:		√s	WATER STRIKE 1:			m
BLOW YIELD:	m	STE	P 2:		Vs	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	STE	P 3:		Vs.	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	STE	P 4:		Vs.	COMMENTS:			
RECOVERY:		STE	P 5:		l∕s				
AFTER STEPS:	h	STE	P 6:		√s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h		JRATION:		min				
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T				M	51.90
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL /		(mbch)		M	14.53
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPE				YES/NO	0
SUPPLIED NEW STEEL BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				м	50
LOGGERS FOR WATERLEVEL MON	ITORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowledged that u	pon leaving the	site, all exist	ting equipm	nent is in an acceptable co	ndition.				
,			5 1. I.						
NAME:		_		SI	GNATURE:		_		
DESIGNATION:		-			DATE:				

				STERPER .				_						
	TEOTOCO	ים חםר		STEPPED [JSCHAR	E LEST &	RECO	VERY						
	TEST RECO									DD 01 #				
PROJ NO :		P1848		MAP REFER	ENCE:	0				PROVI		NC		
BOREHOLE	NO:		;ALVINIA	A-CERES RD						DISTRI		CALVIN	IIA	
ALT BH NO:		0								SITE N	AME:	CALVIN	IIA- CER	RESRD
ALT BH NO:		0										_		
BOREHOLE	. ,		51.90			EVEL ABOVE		lG (m):			NG PUMP:			
WATER LEVE			14.01			IEIGHT: (ma			0.20		RACTOR:	AB PUN	ИPS	
DEPTH OF P	UMP (m):		49.10			1P INLET (m			210.00	PUMP	TYPE:	BP50		
						DISCHARG	E TEST		OVERY					
DISCHARGE	RATE 1	1	RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATE	3	RPM	
DATE:	12/09/2017		12H25		DATE:	12/09/2011		13H25			12/09/201		14H25	
	DRAW	YIELD	TIME	RECOVERY		1	YIELD	TIME			DRAW	YIELD	TIME	
TIME (MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DRAW DOWN (M)		(MIN)	RECOVERY (M)	(MIN)	DOWN (M)		(MIN)	RECOVER
		(L/S)	(V N)	(IVI)	(IVIIIN)		(L/S)	(V N)	(IVI)	(IVIIIN)		(L/S)	(V N)	(M)
1	4.21		5		1	16.73		1		1	24.07		1	21.65
2	8.19		2		2	17.35		2		2	26.15		2	14.84
3	9.55		3	1	3	18.24		3		3	28.42	5.06	3	11.03
-					-				ł	-		5.06		
5	10.66	1.74	5		5	19.87	2.54	5		4	30.36		5	6.14
7	13.14		7		7	21.05		7		5	35.09	5.06	7	3.73
10	14.45	1.74	10		10	21.82	2.51	10		6	35.09	3.40	10	2.03
		1.74		┼─────			2.01		<u> </u>					2.03
15	14.62		15	↓	15	22.31		15	ļ	7	35.09	3.02	15	
20	14.74	1.73	20		20	22.53	2.51	20		7	35.09	2.88	20	
30	14.81		30		30	22.68		30					30	ſ
		4 70		1			0.50		1		1			
40	14.89	1.70	40		40	22.73	2.53	40			<u> </u>		40	
50	14.96		50		50	22.85		50					50	
60	15.02	1.72	60		60	22.94	2.51	60					60	
70		=	70	1	70			70					70	
80			80		80			80					80	
90			90		90			90					90	
100	1		100		100	1		100	1				100	
	+								1					
110			110		110			110					110	
120			120		120			120					120	
pН			150		pН			150		pН			150	
TEMP	21.40	°C	180		TEMP	20.80	°C	180		TEMP		°C	180	
EC	365.00	µS/cm	210		EC	376.00	µS/cm	210		EC		µS/cm	210	
DISCHARGE	RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	Ξ6	RPM	
DATE:		TIME:			DATE:		TIME:			DATE:		TIME:		
	T		T			1			r		1			1
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
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3			3		3			3		3			3	
3 5			3 5		3 5			3 5		3 5			3 5	
3 5 7			3 5 7		3 5 7			3 5 7		3 5 7			3 5 7	
3 5			3 5		3 5			3 5		3 5			3 5	
3 5 7 10			3 5 7 10		3 5 7 10			3 5 7 10		3 5 7 10			3 5 7 10	
3 5 7 10 15			3 5 7 10 15		3 5 7 10 15			3 5 7 10 15		3 5 7 10 15			3 5 7 10 15	
3 5 7 10 15 20			3 5 7 10 15 20		3 5 7 10 15 20			3 5 7 10 15 20		3 5 7 10 15 20			3 5 7 10 15 20	
3 5 7 10 15 20			3 5 7 10 15		3 5 7 10 15			3 5 7 10 15		3 5 7 10 15			3 5 7 10 15	
3 5 7 10 15			3 5 7 10 15 20		3 5 7 10 15 20			3 5 7 10 15 20		3 5 7 10 15 20			3 5 7 10 15 20	
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3 5 7 10 15 20 30 40 50 60 70 30 90 110 120			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110		3 5 7 10 15 20 30 40 50 60 70 80 90 100 110			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110		3 5 7 10 15 20 30 40 50 60 70 80 90 100 110			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	
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				FORM 5	F		-					
DODE				IT DISCHAR	GE TES	Γ & RECOV	'ERY					
PROJIN	HOLE TEST R	P1848		MAP REFER	ENCE	31.64347			PROVINCE		NC	
	IOLE NO:		ALVINIA -CE	-	LINCE.	19.74949			DISTRICT:		CALVIN	IIA
ALT BH		0							SITE NAME	:	CALVIN	IIA- CERES RD
ALT BH		0						0.00				
	IOLE DEPTH: LEVEL (mbdl):	51.90 : 14.52		DATUM LEVE CASING HE			n):	0.23 0.20	EXISTING F		0 AB PUN	/IPS
DEPTH	OF PUMP (m):	49.10		DIAM PUMP				210	PUMP TYP		BP50	
	ANT DISCHARC	E TEST 8	RECOVERY		ETED							
15313		Г		TEST COMPI								
DATE:	12/09/2017	TIME:	17H40		DATE:		TIME:		TYPE OF P	-	000000	BP50
					OBSER	VATION HOL	_E 1	NR:	ATION HOLI	= 2	NR:	VATION HOLE 3
	DISCHARGE B	OREHOLE			Distance	e(m);		Distance	(m);		Distanc	ce(m);
TIME	DRAW	YIELD	TIME	RECOVERY		Drawdown			Drawdown	Recovery		Drawdown
(MIN)	DOWN (M)	(L/S)	MIN 1	(M)	(min) 1	m	(m)	(min) 1	(m)		(min) 1	(m)
1 2	2.52 4.07	1	1	10.51 7.44	1 2			1			2	
3	6.89	2.05	3	5.92	3			3			3	
5	8.82		5	4.11	5			5			5	
7 10	10.76 12.29	2.06	7 10	3.27 2.61	7 10			7 10			7 10	
15	13.01	2.04	15	2.01	15			15			15	
20	14.16		20	2.07	20			20			20	
30	14.41	2.04	30	1.92	30		<u> </u>	30			30	
40 60	14.55 14.63	2.01	40 60	1.83 1.75	40 60			40 60			40 60	
90 90	14.63	2.01	90	1.75	90			90			90	
120	14.82	2.02	120		120			120			120	
150	14.87	0.00	150		150			150			150	
180 210	14.91 14.94	2.02	180 210		180 210			180 210			180 210	
240	14.94	2.02	240	+	240			210			240	
300	15.00		300		300			300			300	
360	15.04	2.05	360		360			360			360	
420 480	15.07 15.11	2.02	420 480		420 480			420 480			420 480	
400 540	15.13	2.02	540		480 540			480 540			400 540	
600	15.16	2.04	600		600			600			600	
720	15.19	0.04	720		720			720			720	
840 960	15.36 15.48	2.01	840 960		840 960			840 960			840 960	
1080	15.64	2.01	1080		1080			1080			1080	
1200	15.82		1200		1200			1200			1200	
1320	16.05	2.03	1320		1320 1440			1320 1440			1320 1440	
1440 1560	16.23 16.49	2.00	1440 1560		1440 1560			1440			1440	
1680	16.57		1680		1680			1680			1680	
1800	16.70	2.04	1800		1800			1800			1800	
1920 2040	16.79 16.91	2.04	1920 2040		1920 2040			1920 2040			1920 2040	
2040	17.16	2.04	2040		2040 2160		1	2040			2040	1
2280	17.27	2.06	2280		2280			2280			2280	
2400	17.41		2400		2400			2400			2400	
2520 2640	17.55 17.63	2.02	2520 2640		2520 2640			2520 2640			2520 2640	
2760	17.63	2.02	2760		2040			2760			2760	
2880	17.94		2880		2880			2880			2880	
3000			3000		3000		<u> </u>	3000			3000	
3120 3240			3120 3240		3120 3240			3120 3240			3120 3240	
3360		1	3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600			3600		3600			3600			3600	
3720 3840			3720 3840		3720 3840			3720 3840			3720 3840	
3840 3960		+	3960		3840 3960			3960			3960	
4080			4080		4080			4080			4080	
4200			4200		4200			4200			4200	
4320 Total tir	ne pumped(mi	n).	4320	2880	4320	W/L		4320	W/L		4320	W/L
	e yield (l/s):			2.02								
5				-	-							

Telephone: 043-732	1211		Abbreviations	1			
Fax no: 043-732 1422	2	EC	Electrical conductivity]			
Fax to e-mail: 0866 7		mbgl	Meters below ground level				
E mail: office@abpum	ps.co.za	mbch	Meters below casing height				
		mbdl	Meters below datum level				AR
		magl	Meters above ground level				
		L/S	Litres per second	_		1	PUMPS
		RPM	Rates per minute	_			
		s/w/L	Static water level	-			
		μ\$/cm	Microsiemens per centimeter	_			
	BO	REHC	DLE TEST RE	CORD		Ground water solution	ons t/a AB Pumps CC
						PR0JECT #	P1848
						BBR	
CONSULTANT:	GEOSS				_		
DISTRICT:	HANTAM				_		
PROVINCE:	NC				_	PRODUCTION BONUS:	
FARM / VILLAGE NAME :	SANDGAT/CALVINIA				_		
					_		
DATE TESTED:	15/09/2017				_	EC meter number	
MAP REFERENCE:							
CO-ORDINATES:							
FORMAT ON GPS	hddd °mm	ˈss.s	n	hddd	°mm.mmm	•	hddd.ddddd
	o				0		31 /070

					-				
TRANSMISSIVITY VALUE:					-				
TYPE INSTALLATION:	SUBMERSIBLE				-				
BOREHOLE DEPTH: (mbgl)	15.12	2			_				
COMMENTS:									
SAMPLE INSTRUCTIONS :			1			1 1			
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
Date sample taken	18/07/2	017	If co	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken	08h00								
CONSULTANT GUIDELINES	•		-						
BOREHOLE DEPTH:	m	ST	EP 1:		l/s	WATER STRIKE 1:			m
BLOW YIELD:	m	ST	EP 2:		l/s	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	ST	EP 3:		l∕s	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	ST	EP 4:		l/s	COMMENTS:			
RECOVERY:			EP 5:		l∕s				
AFTER STEPS:	h	ST	EP 6:		l∕s	TELEPHONE NUMBE	ERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h		URATION:		min			2	
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	15.12
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	9.41
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPEI		.		YES/NO	0
SUPPLIED NEW STEEL BOREH		NO	0	DATA REPORTING AND REC				NO	1
	IULE COVER:				UNDING				·
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0

OR

NO t is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NO

NAME: DESIGNATION:

LOGGERS FOR WATERLEVEL MONITORING

SITE CLEANING & FINISHING

LATITUDE:

LONGITUDE:

SANDGAT 3 BH04

BOREHOLE NO:

SIGNATURE: DATE:

LAYFLAT (M):

1

LOGGERS FOR pH AND EC:

100

0

NO

OF

•

31.49796

19.87455

							RM 5	_						
				STEPPED I	DISCHARC	GE TEST &	RECO	VERY						
	TEST RECO		HEET		FNOF							NO		
PROJ NO : BOREHOLE I	NO	P1848	GAT 3 BH	MAP REFER	ENCE:	0				PROVII DISTRI		NC HANTA	м	
ALT BH NO:	NO.	0								SITE N				
ALT BH NO:		0										SANDO	GAT / CA	LVINIA
BOREHOLE	. ,		15.12			EVEL ABOVE		IG (m):	0.26		NG PUMP:			
			8.41 13.20			IEIGHT: (ma 1P INLET (m			0.00 200.00	CONTF PUMP		AB PUN BP50	ИPS	
DEPTH OF P	UMP (III).		13.20	S				& REC		PUIVIP	ITPE.	PP30		
DISCHARGE	RATE 1		RPM			GE RATE 2	- 1201	RPM		DISCH	ARGE RATE	3	RPM	
DATE:	15/09/2017		121120			15/00/201		141120			15/09/201		10000	
TIME	DRAW	YIELD	13H20 TIME	RECOVERY	DATE:	15/09/2011 DRAW	YIELD	14H20 TIME	RECOVERY		DRAW	YIELD	13H20 TIME	RECOVER
MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)
, I	0.15	. /	1		1	0.37	. /	1		1	0.61	. /	1	. /
2	0.17		2		2	0.38		2		2	0.63		2	
3	0.19		3		3	0.39		3		3	0.60	1.71	3	
5	0.13	0.59	5		5	0.33	1.10	5		5	0.69	1.71	5	
,		0.59	7		3 7		1.10	7		3 7		4 70	3 7	
/	0.23		-		-	0.42		-	ł	•	0.71	1.72		
10	0.24	0.57	10		10	0.44	1.10	10		10	0.73		10	
15	0.25		15		15	0.46		15		15	0.75	1.70	15	
20	0.26	0.58	20		20	0.48	1.11	20		20	0.77		20	
30	0.28		30		30	0.50		30	ļ	30	0.80	1.73	30	ļ
40	0.30	0.29	40		40	0.52	1.10	40		40	0.84		40	
50	0.32		50		50	0.54		50		50	0.87	1.70	50	
50	0.34	0.57	60		60	0.57	1.12	60		60			60	
70			70		70			70		70			70	
30			80		80			80		80			80	
90			90		90			90		90			90	
100			100		100			100		100			100	
100			110		110			110		110			110	
120			120		120			120		120			120	
pН			150		рН			150		рН			150	
TEMP	19.50	°C	180		TEMP	19.10	°C	180		TEMP	19.20	°C	180	
EC	810.00	µS/cm	210		EC	820.00	µS/cm	210		EC	831.00	µS/cm	210	
DISCHARGE			RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	6	RPM	
DATE:	15/09/2017	TIME:	16H20	-	DATE:	15/109/20	TIME:	17H20		DATE:	r	TIME:		r
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
			1		1	2.38		1	1.17	1			1	
1	0.94						4.20	_	0.92	2				
12	0.94		2		1	3.16	4.20	2		4			2	
			2		1 2	3.16 4.79	4.20		0.84				2 3	
3	0.97 1.01	2.66	2 3			4.79		3	0.84	3			3	
3 5	0.97 1.01 1.03	2.66	2 3 5		2	4.79 4.79	2.94	3 5	0.84 0.79	3 5			3 5	
3 5 7	0.97 1.01 1.03 1.05		2 3 5 7		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7	0.84 0.79 0.74	3 5 7			3 5 7	
3 5 7 10	0.97 1.01 1.03 1.05 1.09	2.66	2 3 5 7 10		2	4.79 4.79	2.94	3 5 7 10	0.84 0.79 0.74 0.69	3 5 7 10			3 5 7 10	
3 5 7 10 15	0.97 1.01 1.03 1.05 1.09 1.12	2.63	2 3 5 7 10 15		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15	0.84 0.79 0.74 0.69 0.63	3 5 7 10 15			3 5 7 10 15	
3 5 7 10 15 20	0.97 1.01 1.03 1.05 1.09 1.12 1.14		2 3 5 7 10 15 20		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20	0.84 0.79 0.74 0.69 0.63 0.59	3 5 7 10 15 20			3 5 7 10 15 20	
3 5 7 10 15 20 30	0.97 1.01 1.03 1.05 1.09 1.12	2.63 2.65	2 3 5 7 10 15 20 30		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30	0.84 0.79 0.74 0.69 0.63 0.59 0.57	3 5 7 10 15 20 30			3 5 7 10 15 20 30	
3 5 7 10 15 20 30	0.97 1.01 1.03 1.05 1.09 1.12 1.14	2.63	2 3 5 7 10 15 20		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20	0.84 0.79 0.74 0.69 0.63 0.59	3 5 7 10 15 20			3 5 7 10 15 20	
3 5 7 10 15 20 30 40	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17	2.63 2.65	2 3 5 7 10 15 20 30		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30	0.84 0.79 0.74 0.69 0.63 0.59 0.57	3 5 7 10 15 20 30			3 5 7 10 15 20 30	
3 5 7 10 15 20 30 40 50	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20	2.63 2.65	2 3 5 7 10 15 20 30 40		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54	3 5 7 10 15 20 30 40			3 5 7 10 15 20 30 40	
3 5 7 7 10 15 20 30 40 50 50 60	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50			3 5 7 10 15 20 30 40 50	
3 5 7 7 10 15 50 50 50 50 50 50 50 50 50 50 50 50 50	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70			3 5 7 10 15 20 30 40 50 60	
3 5 7 7 10 15 20 20 30 40 50 50 50 50 70 30	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80			3 5 7 10 15 20 30 40 50 60 70 80	
3 5 7 7 10 15 50 20 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80 90		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80 90	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90			3 5 7 10 15 20 30 40 50 60 70 80 90	
3 5 7 10 15 20 20 30 40 50 50 50 50 70 30 30 90 90	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80 90 100	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100			3 5 7 10 15 20 30 40 50 60 70 80 90 100	
3 5 7 10 15 20 30 30 50 50 50 50 50 50 50 50 50 50 50 50 50	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110		2 3	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	
3 5 7 10 15 20 30 50 50 31 32 33 34 35 36 37 38 39 30 30 30 30 30 30 30	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120		2 3 3 	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 110 120			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	
3 5 7 10 15 20 30 40 50 50 50 50 60 60 60 60 60 60 60 60 60 60 60 60 60	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22 1.25	2.63 2.65 2.64 2.67	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150		2 3 3 	4.79 4.79 4.79	2.94 2.75 2.51	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH			3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	
3 5 7 10 15 20 30 40 50 50 50 50 60 60 60 60 60 60 60 60 60 60 60 60 60	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22	2.63 2.65 2.64	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120		2 3 3 	4.79 4.79 4.79	2.94 2.75	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 110 120			3 5 7 10 15 20 30 40 50 60 70 80 90 1100 1100 1100 1100 1100 1100 1100 180	
3 5 7 10 15 20 30 40 50 50 50 60 60 60 60 60 60 60 60 60 60 60 60 60	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22 1.25	2.63 2.65 2.64 2.67	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150		2 3 3 	4.79 4.79 4.79	2.94 2.75 2.51	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH		°C μS/cm	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	
3 5 7 10 15 20 30 30 40 50 50 60 60 70 80 90 100 110 120 pH TEMP	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22 1.25	2.63 2.65 2.64 2.67	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180		2 3 3 	4.79 4.79 4.79	2.94 2.75 2.51	3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 150 180	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 PH TEMP			3 5 7 10 15 20 30 40 50 60 70 80 90 1100 1100 1100 1100 1100 1100 1100 180	
3	0.97 1.01 1.03 1.05 1.09 1.12 1.14 1.17 1.20 1.22 1.25	2.63 2.65 2.64 2.67	2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210		2 3 3 	4.79 4.79 4.79	2.94 2.75 2.51	3 5 7 10 15 20 30 40 50 60 70 80 90 1100 120 150 180 210	0.84 0.79 0.74 0.69 0.63 0.59 0.57 0.54 0.48	3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 PH TEMP			3 5 7 10 15 20 30 40 50 60 70 80 90 1100 1100 120 150 180 210	

7 0.64 7 1.55 7 7 7 7 10 0.62 2.28 10 1.53 10 10 10 10 15 0.68 15 1.49 15 15 15 15 20 0.73 2.25 20 1.44 20 0.00 20 20 30 0.79 30 1.41 30 0.00 40 40 60 0.93 60 1.38 40 0.00 40 40 90 1.01 2.25 90 1.25 90 0.00 150 150 120 1.07 120 1.12 150 0.00 180 180 120 1.21 2.26 210 1.06 100 0.00 240 240 240 121 1.21 2.26 1.00 90 360 360 360 360 360 360 360					FORM 5	F								
PRQUND: PI44 SANDGAT 3 BHOL AT BH NO: PRCPUNCE: 0 NC NC NC NC NC BOREHOLE NO: 0 0 18.87465 DSTRUC:: NC NAME: SANDGAT / CALIWIA SANDGAT / CALIWIA							T & RECOV	ERY						
BORE-RLA INC: SANDGAT 3 BMO 19.87455 DISTRUT: HATTA MA SANDGAT (A.UNUA AT BM NO: DISTRUT: HATTA MA SANDGAT (A.UNUA AT BM NO: SUBMERSIGE AT BM NO: 0 DATUM LEVEL ABOVE CASING (m): 200 EXISTING PUMP: SUBMERSIGE DORTIAT USP (RE TEXT AT BEOLYEE) TEST COMPLETE TEST COMPLETE 000 PUMP TYPE BPS0 DATUM INVEX TIME 08410 FEST COMPLETE TYPE OF PUMP: BPS0 DATE 10002017 TIME 08410 TIME NUMP TYPE DEVENTION HOLE 1 DISTRUTION HOLE 1 DISTR				SHEET		ENGE	04 40700					NO		
ALT BH NO: 0 STEE NAME: SANDGAT/CALUNIA BOREHOLE DEFTH: 15.12 DATUMLEVELABOVE CASING (m): 0.28 EXISTING PUMP: SUBBENSILE OCRENOLE DEFTH: 15.12 DATUMLEVELABOVE CASING (m): 0.20 EXISTING PUMP: SUBBENSILE ODERTING PUMP (m): 13.20 THE CASING HICK (Trims): 0.00 EXISTING PUMP: SUBBENSILE DEFTH 6092017 THE: THE THE THE THYPE OF PUMP: BPG0 DISTET 16092017 THE THE THE THYPE OF PUMP: BPG0 DISTET 16092017 THE THE THE THYPE OF PUMP: BPG0 DISTET 16092017 THE THE THYPE OF PUMP: DISTANCENTRO-HICLE 2 OBSERVITICH HICLE 1 DISTANCENTRO-HICLE 2 DISTANCENTRO-HICLE				AT 3 BH04	MAP REFER	ENCE:					:		м	
AL BH NO2 0 D DATUM LEVEL ABOVE CASING (m): CARING HEIGHT: (mag): 0.00 EXISTING PUMP: EXISTING PUMP: SUBMERSIBLE ABPUMPS DORTSATU DEGRAGE TEST & RECOVERY TEST STATTED TEST COMPLETED EXISTING PUMP: BPS0 DATUE. INC. DATUE. INC. DATUE. INC. TWE: DVPE OF PUMP: BPS0 DATE: IGARGE DORBHOLE DATE. DATE. IGARGE TEST & RECOVERY INC. TWE: MICE. PUMP TYPE: DEstance/m): DISCLARGE BORBHOLE							10.07 100				:			
WATER CASING HEIGHT: 0.00 CONTRACT: AB PUMPS CONSTANCT DISCHARGE TEST & RECOVERY TEST STATE 200 PUMP SECONSTANCE AB PUMPS DATE ISGAILAGE TEST & RECOVERY TEST STATE TEST STATE PUMP SECONSTANCE PPAD DATE ISGAILAGE TEST XECOVERY TEST STATE TEST STATE PUMP SECONSTANCE PPAD DATE ISGAILAGE TEST XECOVERY TEST STATE DESERVATION HOLE 1			-									-		
DEPTH OF UNE (m): 12.02 DUMP TYPE: BPS0 DATE: TEST COMPLETE TEST COMPLETE <td c<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>,</td><td>n):</td><td></td><td></td><td></td><td></td><td></td></td>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>,</td> <td>n):</td> <td></td> <td></td> <td></td> <td></td> <td></td>							,	n):					
CONSTANT DISCHARGE TEST & RECOVERY TEST COMPLETED TABLE TABLE Description Date Description Date Description Description <thdescription< th=""> Description Descri</thdescription<>		· · ·											MPS	
DATE INME TYPE OF PUMP BPS0 DSCHAGE BORHOLE DBSERVATION HOLE 1 OBSERVATION HOLE 2 OBSERVATION HOLE 2 OBSERVATION HOLE 3 OBSERVATION HOLE 2 OBSERVATION HOLE 3 NR ITME DRAMOR RECOVER TIME TOTAL OR CONCERT TIME Tot									200			DI 30		
Discriation Hole 1 Observation Hole 2 Observation Hole 3 Observation Hole 3 Discriation Hole 1 NR: 3962 NR:	TEST S	TARTED			TEST COMP	Leted								
Discriation Hole 1 Observation Hole 2 Observation Hole 3 Observation Hole 3 Discriation Hole 1 NR: 3962 NR:	DATE	16/09/2017	TIME	08H10		DATE		TIME		TYPE OF P	UMP∙		BP50	
DischarGe BORENCE Distance(m): Distance	DATE.	10/00/2011		001110			VATION HOL		OBSERV	_	-	OBSEF		
THE DRAW YEAU THE Drawdown Recovery						NR:	39632		-					
MNN DOWN (M) L(S) MN MM (min) m (min) (min) <td></td> <td></td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td> <td></td> <td>(),</td>			1	1				-			-		(),	
1 0.25 1 1.76 1<			_				-	,	+		Recovery			
2 0.36 2 1.61 2 2 2 2 5 0.47 2.26 5 1.58 5 5 5 5 5 7 0.54 7 7 5.5 7	(IVIII N) 1		(Ľ/3)		()	· /		(111)	· · /	(111)		<u> </u>	(111)	
3 0.41 3 1.59 3 7 3 5 5 7 7 0.54 7 1.55 7 7 7 7 7 7 10 0.62 2.28 10 1.53 10 1.5 10 7 7 7 7 7 20 7.3 2.52 20 1.45 20 0.00 20 20 7 30 0.79 30 1.41 30 0.00 40 40 50 40 0.85 2.27 40 1.38 40 0.00 40 40 50 90 1.01 2.25 90 0.00 90 50 120 120 1.07 120 1.19 120 0.00 150 150 120 121 1.22 100 1.24 2.06 1.00 210 120 120 120 1.2 2.26 100 1.38 0.00 360 500 500 160 12	2					2								
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Total time pumped(min): 2880 W/L 9.06 W/L W/L W/L														
Average yield (I/s): 2.25		ne pumped(mir	n):				W/L	9.06		W/L			W/L	
	Average	e yield (l/s):			2.25									

Telephone: 043-732 Fax no: 043-732 1422 Fax to e-mail: 0866 7 E mail: office@abpum	2 17 732		EC mbgl mbch magl L/S RPM S/W/L µS/cm	Abbreviations Electrical conductivit Meters below groun Meters below datum Meters above groun Uitres per second Rates per minute Static water level Micrositemens per ce	l level level level					AB
		BO	REHC	DLE TES	T RECO	RD			Ground water soluti	ons t/a AB Pumps CC
									PR0JECT #	P1848
									BBR	MORGAN
CONSULTANT:	GEOSS							_		
DISTRICT:	CALVINIA									
PROVINCE:	PC								PRODUCTION BONUS:	
FARM / VILLAGE NAME :	NC									
	SANDGAT									
DATE TESTED:	27/09/2017							_	EC meter number	
DATE TESTED.	21/03/2011								LO Melei Humber	
MAP REFERENCE:										
CO-ORDINATES:										
FORMAT ON GPS	hddd	°mm	'ss.s				hddd	°mm.mmm		hddd.ddddd
LATITUDE		° 0	•					•	•	31.50302
LONGITUDE		0		n		OR		0	- OR	19.87588
BOREHOLE NO:	SANDGAT	4 BH05								
TRANSMISSIVITY VALUE:										
TYPE INSTALLATION:	SUBMERSIB	BLE PUMP								
BOREHOLE DEPTH: (mbgl)	59	.00								
COMMENTS:										

Vater sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
Date sample taken	29/09/2	2017	If co	nsultant took sample, give i	name:			DATA CHECKED BY:	AVN
Time sample taken	18H20							LL	
CONSULTANT GUIDELINES									
BOREHOLE DEPTH:	m	STE	P 1:		l/s	WATER STRIKE 1:			m
BLOW YIELD:	m	STE	EP 2:		l∕s	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	STE	P 3:		l/s	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	STE	P 4:		l/s	COMMENTS:			
RECOVERY:		STE	EP 5:		l∕s				
AFTER STEPS:	h	STE	P 6:		l/s	TELEPHONE NUMBE	ERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DI	JRATION:		min				
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	59.00
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A	FTER TEST:	(mbch)		м	8.33
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPER	0?			YES/NO	0
SUPPLIED NEW STEEL BOREHOL	E COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				м	100
OGGERS FOR WATERLEVEL MO	NITORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowledged that	upon leaving th	e site, all exis	ting equipr	nent is in an acceptable co	ndition.				
NAME:		_		SI	GNATURE		_		
DESIGNATION:					DATE				

> 31.50302 19.87588

						-	RM 5							
	TEOTOFO	ים חםר	лест	STEPPED I	DISCHARO	GE TEST &	RECO	/ERY						
PROJ NO :	TEST REC	P1848	1EE I	MAP REFER	ENCE	0				PROVI		PC		
BOREHOLE	NO:		GAT 4 BH		LIVOL.	0				DISTRI		CALVIN	IIA	
ALT BH NO:		0								SITE N	AME:	NC		
ALT BH NO:		0										-		
	()		59.00 8.59					G (m):	0.12 0.13		NG PUMP: RACTOR:	BP50 AB PUN	IDC	
WATER LEVE DEPTH OF P			6.59 55.10			IEIGHT: (ma 1P INLET (m			170.00	PUMP		BP50	VIP3	
	0.112 ().		00110	S		DISCHARG		& REC				5.00		
DISCHARGE	RATE 1		RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATE	3	RPM	
DATE:	27/09/2017	TIME	13H15		DATE:	27/09/201	TIME	14H15		DATE	27/09/201	TIME	15H15	
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW		TIME	RECOVER
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)
1	1.81		1		1	15.53		1		1	25.47		1	40.89
2	2.14		2		2	15.84		2		2	26.71	1.67	2	37.76
3	2.42	0.67	3		3	16.01	1.04	3		3	28.12		3	35.33
5	3.67		5		5	16.77		5		5	30.07	2.03	5	31.96
7	4.01	0.65	7		° 7	17.25	1.04	7		7	35.16	2.00	7	26.30
10	4.80	0.00	, 10		, 10	18.27	1.04	, 10		, 10	40.81	2.00	, 10	20.30
		0.67	15	1	10		1.00	15	1	15		2.00	15	
15	6.75	0.67	-			20.09	1.03	-			46.51	1 00	-	12.86
20	8.41	0.00	20	ł	20	21.46	4.00	20	ł	20	46.51	1.22	20	3.81
30	11.45	0.68	30	-	30	23.05	1.00	30		30	46.51	1.03	30	
40	13.51		40	<u> </u>	40	23.94		40		40	46.51	0.76	40	
50	14.54	0.67	50		50	24.61	1.02	50					50	
60	15.17		60		60	24.90		60					60	
70			70		70			70					70	
B0			80		80			80					80	
9 0			90		90			90					90	
100			100		100			100					100	
110			110		110			110					110	
120			120		120			120					120	
pH			150		pH			150		pН	1		150	
	22.50	°C	180			22.60	°C	180		•		°C	180	
TEMP EC	23.50	-	210		TEMP EC	22.60	-	210		TEMP EC		-	210	
-	6.24	µS/cm	-		-	6.40	µS/cm	-		-		µS/cm	-	
	RAIE 4	TIME	RPM			GE RATE 5	T10 45	RPM			ARGE RATE	1	RPM	
DATE:		TIME:			DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW		TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	_		1		1			1		1			1	
2			2		2			2		2			2	
3			3		3			3		3			3	
5			5		5			5		5			5	
7			7		7			7		7			7	
10			10		10			10		10			10	
15	1		15	1	15		1	15		15	1		15	
20	1		20	1	20	t		20	1	20	t		20	1
30	1		30	1	30	t		30	1	20 30	1		30	ł
				-	30 40									
40	1		40 50			<u> </u>		40 50		40 50	<u> </u>		40 50	
50	-		50	-	50			50		50	<u> </u>		50	
60	+		60	ł	60	ł		60	ł	60	<u> </u>		60	
70			70		70			70		70			70	
80	1		80	ļ	80	ļ		80	ļ	80	ļ		80	ļ
90		ļ	90		90	L		90		90	L		90	L
			100		100			100		100			100	
100			110		110			110		110			110	
			120		120			120		120			120	
110			150	1	pН	Γ		150		pН	Γ		150	
110 120			180	1	ТЕМР	1	°C	180	1	ТЕМР	1	°C	180	
110 120 оН		°C		1		1		210	1	EC				
110 120 он ГЕМР		°C			FC									
110 120 pH TEMP		°C µS/cm	210		EC		µS/cm					µS/cm	210	
100 110 120 pH TEMP EC			210 240		EC		µS/cm	240		20		µS/cm	240	
110 120 pH TEMP			210		EC		µS/cm					µ5/cm		

				FORM 5 F								
DODE				IT DISCHAR		Γ & RECOV	ERY					
PROJN	HOLE TEST RE	P1848	SHEET	MAP REFER	ENCE	31.50302			PROVINCE		PC	
	IOLE NO:		AT 4 BH05		LITOL.	19.87588			DISTRICT:	•	CALVIN	IIA
ALT BH		0							SITE NAME	:	NC	
ALT BH		0					-) -	0.40			-	
	IOLE DEPTH: LEVEL (mbdl):	59.00 8.59		DATUM LEVE		•	n):	0.12 0.13	EXISTING F		BP50 AB PUN	IPS
	OF PUMP (m):	55.10		DIAM PUMP				170	PUMP TYP		BP50	
	ANT DISCHARG	E TEST 8	RECOVERY									
TEST S	TARTED	1		TEST COMPI	ETED							
DATE:	27/09/2017	TIME:	18H30		DATE:		TIME:		TYPE OF P	UMP:		BP50
						VATION HOL	.E 1		ATION HOLE	Ξ2		VATION HOLE 3
	DISCHARGE BO				NR: Distanc	ə(m):		NR: Distance	(m):		NR: Distand	co(m):
	DRAW		TIME	RECOVERY	TIME:	Drawdown	Recoverv	TIME:	Drawdown	Recoverv	TIME:	Drawdown
	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1	1.66		1	16.06	1			1			1	
2	2.05	0.75	2	13.20	2			2 3			2 3	
3 5	2.65 3.40	0.75	3 5	11.36 7.82	3 5			3 5			3 5	
7	4.65	5.50	7	4.38	5 7			7			7	
10	5.52	0.83	10	0.15	10			10			10	
15	7.08	0.04	15	0.13	15 20			15			15 20	
20 30	8.23 9.85	0.84	20 30	0.12	20 30			20 30			20 30	
40	11.04	0.84	40		40			40			40	
60	14.45		60		60			60			60	
90	14.60	0.82	90		90			90			90 120	
120 150	14.73 14.86	0.00	120 150		120 150			120 150			120	
180	14.98	0.00	180		180			180			180	
210	15.05	0.85	210		210			210			210	
240	15.12	0.00	240		240			240			240	
300 360	15.27 15.37	0.83	300 360		300 360			300 360			300 360	
420	15.49	0.84	420		420			420			420	
480	15.56		480		480			480			480	
540	15.62	0.82	540		540			540			540	
600 720	15.68 15.83	0.80	600 720		600 720			600 720			600 720	
840	15.91	0.00	840		840			840			840	
960	16.12	0.83	960		960			960			960	
1080	16.45	0.05	1080		1080			1080			1080	
1200 1320	16.67 16.89	0.85	1200 1320		1200 1320			1200 1320			1200 1320	
1440	17.05	0.82	1440		1440		L	1440			1440	
1560	17.22		1560		1560			1560			1560	
1680	17.47	0.81	1680		1680			1680			1680	
1800 1920	17.70 17.96	0.85	1800 1920		1800 1920			1800 1920			1800 1920	
2040	18.21	5.50	2040		2040			2040			2040	
2160	18.48	0.83	2160		2160			2160			2160	
2280	18.68	0.05	2280		2280			2280			2280	
2400 2520	18.81 19.03	0.85	2400 2520		2400 2520			2400 2520			2400 2520	
2640	19.25	0.83	2640		2640			2640			2640	
2760	19.54		2760		2760			2760			2760	
2880	19.78	0.84	2880		2880			2880			2880	
3000 3120			3000 3120		3000 3120			3000 3120			3000 3120	
3240		L	3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600 3720			3600 3720		3600 3720			3600 3720			3600 3720	
3720			3720		3720 3840			3720			3720	
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
4200 4320			4200 4320		4200 4320			4200 4320			4200 4320	
	ne pumped(mir	n):	7320	2880	4320	W/L		7320	W/L		+320	W/L
	e yield (l/s):			0.80								

BOREHOLE TEST RECORD

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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 Т

P1848

PR0JECT #

									BBR	ISAAC
CONSULTANT:		GEOSS						_		CHRISTOPHER
DISTRICT:		CALVINIA						_		AMOS
PROVINCE:		NORTHERN CAR	PE					_	PRODUCTION BONUS:	PIETER
FARM / VILLAGE NAM	I <u>E :</u>	CALVINIA SAND	GAT					-		SIYABULELA
								-		AYANDA
DATE TESTED:		19/09/2017						-	EC meter number	
MAP REFERENCE:										
CO-ORDINATES:										
FOR	MAT ON GPS:	hddd	°mm	ss.s	•		hddd	°mm.mmm		hddd.dddd
	LATITUDE:		o	•	"	OR		•	- OR	S31.50953
	LONGITUDE:		0	•	"	UK		0	ÜR	E019.85025
BOREHOLE NO:		SANDGAT 5	- BH 06							
TRANSMISSIVITY VA						-				
TYPE INSTALLATION	<u>:</u>	SUBMERSIBLE								
BOREHOLE DEPTH:	(mbgl)	197.80								
COMMENTS:	FIRST TE	ST WE INSTALLE		WEWERES	UPPOSED TO MONITOR SAND	CAT 5 BUT T		PV (18M - NO WATER)		
<u>commento.</u>	TINGTIE	OT WE INDIALLE	<u>02.010</u> m,	WE WERE C		JOAT 3 DOT 1	THE BOILEHOLE ID D	RECTORE NO WATER		
SAMPLE INSTRUCTION	<u> </u>	Yes			Test for:		macro	bacterio-logical	DATA CAPTURED BY:	KVN
Date sample taken		23/09/20	17	lf co	nsultant took sample, give r	ame:	madio	buotono logicul	DATA CHECKED BY:	AVN
				11 00	risultant took sample, give i	ane.			DATA CHECKED BT.	AVN
Time sample taken		22H30								
CONSULTANT GUIDE	LINES	1						1	1	
BOREHOLE DEPTH:		m	ST	EP 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m	ST	EP 2:		√s	WATER STRIKE 2:			m
STATIC WATER LEVE	L:	m	ST	EP 3:		√s	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	ST	EP 4:		Vs	COMMENTS:			
RECOVERY:			ST	EP 5:		√s				
AFTER STEPS:		h	ST	EP 6:		√s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP D	URATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST	:		NO	NO	BOREHOLE DEPTH AFTER T	EST:			м	197.80
VERTICALLY TEST:			NO	NO	BOREHOLE WATER LEVEL A		(mbch)		м	26.27
CASING DETECTION:			NO	YES	SAND/GRAVEL/SILT PUMPED				YES/NO	NO
SUPPLIED NEW STEE	BOREHOLE	COVER:	NO	NO	DATA REPORTING AND REC				NO	YES
BOREHOLE MARKING		OUVEN.	NO	NO	SLUG TEST:	0.10110			NO	NO
SITE CLEANING & FIN			NO	YES	LAYFLAT (M):				M	100
		TODING								
LOGGERS FOR WATE	KLEVEL MONI	IUKING	NO	NO	LOGGERS FOR pH AND EC:				NO	NO
It is hereby acknow	edged that u	pon leaving the	site, all exis	ting equipr	nent is in an acceptable cor	ndition.				
					SIG					
DESIGNATI	ON:					DATE:		_		

							RM 5	_						
				STEPPED I	DISCHARO	GE TEST &	RECO	VERY						
	E TEST REC													
PROJ NO :		P1848		MAP REFER		S31.50953				PROVIN			IERN C	APE
SOREHOLE		SANDG	GAT 5 - B	H 06		E019.8502	2			DISTRI SITE N		CALVIN	IIA	
ALT BH NO		0								SHEN	AIVIE.	CALVIN	IIA SANI	DGAT
	E DEPTH (m)	0	197.80		DATUMLE		E CASIN	IG (m):	0.75	EXISTI	NG PUMP:	SUBME	RSIBLE	
	/EL (mbdl):		20.91			IEIGHT: (ma		- ()	GROUND LE			AB PUN		
	PUMP (m):		189.20			1P INLET (m			170.00	PUMP -	TYPE:	GW130	2	
				S		DISCHARG	E TEST		OVERY	-				
DISCHARG	E RATE 1	1	RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATE	3	RPM	
DATE:	21/09/2017	TIME:	07H55		DATE:	21/09/201	TIME:	08H55		DATE:	21/09/201	TIME:	09H55	
LIME	DRAW		TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)
	0.22		1		1	3.95		1		1	6.11		1	
)	0.76		2		2	4.28	7.91	2		2	7.18		2	
<u>.</u>		5.05										40.50		
3	1.03	5.05	3		3	4.40	8.05	3		3	7.72	10.50	3	
ō	1.36		5	-	5	4.54		5	-	5	9.13		5	
,	1.74	5.07	7	L	7	4.58	8.04	7	L	7	9.91	12.09	7	L
0	1.90		10		10	4.61		10		10	10.55		10	
5	2.06	5.04	15		15	4.70	8.08	15		15	11.64	12.04	15	
20	2.13		20		20	4.87		20		20	11.89		20	Γ
30	2.19	5.08	30	1	30	5.34	8.09	30	Ì	30	12.21	12.07	30	
		0.00	40		40		0.00	40		40		12.01	40	
40 - 0	2.23	F 07	-		-	5.66	0.07				12.56	40.11		
50	2.29	5.07	50		50	5.78	8.05	50		50	12.93	12.11	50	
50	2.34		60		60	5.86		60		60	13.05		60	
70			70		70			70		70			70	
30			80		80			80		80			80	
0			90		90			90		90			90	
00			100		100			100		100			100	
10			110		110			110	ł	110			110	
			-										-	
120			120		120			120		120	-		120	
рH			150		рН			150		рН			150	
TEMP	20.20	°C	180		TEMP	22.80	°C	180		TEMP	24.00	°C	180	
EC	2340.00	µS/cm	210		EC	2576.00	µS/cm	210		EC	2743.00	µS/cm	210	
DISCHARG	E RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	Ξ6	RPM	
DATE:	21/09/2017	TIME:	10H55		DATE:		TIME:			DATE:		TIME:		
ΓIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)
(IVIIIN)		(L/3)) /		` /		(L/S)	r` /	(1VI)	· /		(L/S)	` <i>`</i>	(111)
1	15.15		1	7.14	1			1	-	1			1	
2	16.81		2	5.04	2			2		2			2	
3	17.76	16.50	3	4.32	3			3		3			3	
5	18.03	18.02	5	3.88	5			5		5			5	
7	18.48		7	2.92	7	Γ		7	ľ	7	ſ		7	Γ
10	19.96	18.08	-	2.81	, 10			, 10		, 10			, 10	
		10.00			15	1				15	<u> </u>		15	1
15	23.34	40.0	15	2.67				15	<u> </u>		 			
20	24.14	18.04	20	2.48	20			20		20			20	
30	24.44		30		30	ļ		30		30			30	ļ
10	25.02	18.09	40		40			40		40			40	
50	25.39		50		50			50		50			50	
50	25.74	18.07			60			60		60			60	
70		. 3.31	70		70			70		70			70	
											1			
30			80		80			80		80			80	
90			90		90			90		90			90	
00			100		100			100		100			100	
10			110		110			110		110			110	
20			120	ľ	120	Γ		120	ľ	120	ſ		120	ſ
ы			150		pH			150		pН			150	
	24.40	°C					°C				<u> </u>	°C		
FEMP	24.40	°C	180		TEMP		°C	180		TEMP	 	°C	180	
EC	2754.00	µS/cm	210		EC	ļ	µS/cm	210	ļ	EC		µS/cm	210	ļ
			240					240					240	
			300					300					300	
					e						1		1	1
			360					360					360	

				FORM 5 F	=							
חסטבי				T DISCHAR	GE TES	T & RECOV	ERY					
PROJIN	HOLE TEST R	P1848	SHEET	MAP REFER		\$31 50053			PROVINCE			IERN CAPE
	IOLE NO:		AT 5 - BH 06		LINCL.	E019.8502	5		DISTRICT:	•	CALVIN	
ALT BH		0							SITE NAME	:		IIA SANDGAT
ALT BH		0									-	
	IOLE DEPTH:	197.80				,	n):	0.75	EXISTING F			RSIBLE
	LEVEL (mbdl): OF PUMP (m):			CASING HE		• •		GROUNL	CONTRAC [®] PUMP TYPI		AB PUN GW130	
	ANT DISCHARC							110			011100	2
TEST S	TARTED			TEST COMPI	Leted							
DATE	22/09/2017	TIME:	06H40		DATE:	21/09/2017	TIME	18H30	TYPE OF P	IMP		GW1302
DATE.	22/03/2011	1 IIVIE.	001140			VATION HOL			ATION HOLE		OBSER	VATION HOLE 3
					NR:			NR:			NR:	
	DISCHARGE B				Distanc		1	Distance			Distand	
	DRAW	YIELD	TIME	RECOVERY	TIME:	Drawdown	,	1	Drawdown	Recovery	TIME:	Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min) 1	m	(m)	(min)	(m)		(min) 1	(m)
2	0.12 0.28		1	6.23 6.04	1 2			1 2			1 2	
3	0.44		3	5.75	3			3			3	
5	1.08	5.09	5	5.49	5			5			5	
7	1.26	\perp	7	5.36	7			7			7	
10	1.53	5.06	10	5.12	10			10			10	
15 20	1.64 1.83	5.04	15 20	4.98 4.89	15 20			15 20		-	15 20	
20 30	1.03	5.04	30	4.89	30			30			30	
40	2.04	5.03	40	4.69	40			40			40	<u> </u>
60	2.15		60	4.61	60			60			60	
90	2.38	5.08	90	4.56	90			90			90 100	ļ
120	2.50	5.00	120	4.49	120			120			120 150	
150 180	2.62 2.71	5.06	150 180	4.42 4.36	150 180			150 180			150	
210	2.71	5.08	210	4.30	210			210		-	210	
240	2.86		240	4.23	240			240			240	
300	2.94	5.03	300	4.14	300			300			300	
360	3.09		360	4.07	360			360			360	ļ
420 480	3.21 3.32	5.09	420 480	3.99 3.91	420 480			420 480			420 480	
480 540	3.46	5.06	540	3.91	480 540			540			480 540	
600	3.53	0.00	600		600			600			600	
720	3.89	5.02	720		720			720			720	
840	4.03		840		840			840			840	
960	4.28	5.01	960		960			960			960	
1080 1200	4.51 4.76	5.04	1080 1200		1080 1200			1080 1200			1080 1200	
1320	5.02	0.04	1320		1320			1320			1320	
1440	5.37	5.02	1440		1440			1440			1440	
1560	5.56		1560		1560			1560			1560	
1680	5.82	5.07	1680		1680			1680			1680	
1800 1920	6.08 6.33	5.08	1800 1920		1800 1920			1800 1920			1800 1920	
2040	6.58	5.00	2040		2040			2040		L	2040	
2160	6.84	5.06	2160		2160			2160			2160	<u> </u>
2280	7.14		2280		2280			2280			2280	
2400	7.39	5.08	2400		2400			2400			2400	
2520			2520 2640		2520 2640			2520			2520 2640	
2640 2760			2640		2640 2760			2640 2760			2640	
2880		1	2880		2880			2880			2880	1
3000			3000		3000			3000			3000	
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360 3480			3360 3480		3360 3480			3360 3480			3360 3480	
3480 3600		-	3480		3480 3600			3480			3480	
3720		1	3720		3720			3720			3720	1
3840			3840		3840			3840			3840	
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
4200 4320			4200 4320		4200 4320			4200 4320			4200 4320	
	ne pumped(mi	n):	7320	2400	4520	W/L		4520	W/L		4520	W/L
	e yield (l/s):			5.08								-
5												

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	mbch	Meters below casing height
	mbdi	Meters below datum level
	magi	Meters above ground level
	L/S	Litres per second
	RPM	Rates per minute
	S/W/L	Static water level
	μS/cm	Microsiemens per centimeter
B	<u> 30REHO</u>	OLE TEST RE



									PR0JECT #	P1848
									BBR	
CONSULTANT:		GEOSS						_		AMOS
DISTRICT:		CALVINIA						_		FRANS
PROVINCE:		NC						_	PRODUCTION BONUS:	
FARM / VILLAGE NAM	E :	DEON VLOK						_		
								-		
DATE TESTED:		26/09/2017						-	EC meter number	
								-		
MAP REFERENCE:										
CO-ORDINATES:			• •					0		
FOR	MAT ON GPS:	hddd	°mm '	SS.S			hddd	°mm.mmm		hddd.dddd
			• •		"			0		31.48128
	LATITUDE:		• •		"	OR		0	OR	19.96844
	LONGITUDE:					-			-	13.30044
BOREHOLE NO:		G-39972				-				
TRANSMISSIVITY VA	UE:					-				
TYPE INSTALLATION	<u>.</u>	SUBMERSIBLE				-				
BOREHOLE DEPTH:	mbgl)	249.37				-				
COMMENTS										
COMMENTS:										
SAMPLE INSTRUCTION Water sample taken	DNS :	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
				16			macio	bacterio-logical	DATA CHECKED BY:	
Date sample taken		29/09/20	17	11 CO	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken		17H30								
CONSULTANT GUIDE	LINES							1	1	
BOREHOLE DEPTH:		m	STE	P 1:		√s	WATER STRIKE 1:			m
BLOW YIELD:		m	STE	P 2:		Vs	WATER STRIKE 2:			m
STATIC WATER LEVE	:	m	STE	P 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	STE	P 4:		Vs	COMMENTS:			
RECOVERY:			STE	P 5:		l∕s				
AFTER STEPS:		h	STE	P 6:		Vs	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP DU	JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST			NO	0	BOREHOLE DEPTH AFTER T	EST:			M	249.37
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	28.39
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPEI		(mbony		YES/NO	0
SUPPLIED NEW STEE			NO	0	DATA REPORTING AND REC				NO	1
		JOVER.	NO		SLUG TEST:	OKDING				0
BOREHOLE MARKING			NO	0	LAYFLAT (M):				NO M	100
LOGGERS FOR WATE			NO	2	LOGGERS FOR pH AND EC:				NO	0
									UP:	
It is hereby acknow	edged that up	oon leaving the	site, all exist	ting equipn	nent is in an acceptable co	ndition.				
NAI					SI	GNATURE:				
DESIGNATI	DN:					DATE:		_		

				ATE			RM 5	_						
				STEPPED I	DISCHARO	GE TEST &	RECO	VERY						
BOREHOLI	E TEST RECO		HEET	-						-				
PROJ NO :		P1848		MAP REFER	ENCE:	0				PROVI		NC		
BOREHOLE		G-3997	2							DISTRI		CALVIN	IIA	
ALT BH NO:		0								SITE N	AME:	DEON	VLOK	
ALT BH NO:		0										-	-	
	DEPTH (m)		249.37					IG (m):		-	NG PUMP:			
WATER LEV			22.60			IEIGHT: (ma			0.10		RACTOR:	AB PUN		
DEPTH OF I	PUMP (m):		150.00	-		/IP INLET (m			210.00	PUMP .	TYPE:	GW900	12	
			-			DISCHARG	E TEST						-	
DISCHARG	E RATE 1		RPM	380	DISCHAR	GE RATE 2		RPM	669	DISCH	ARGE RATI	Ξ3	RPM	795
DATE:	26/09/2017		10H40		DATE:	26/09/201		11H40			26/09/201		12H40	
	DRAW		TIME	RECOVERY		DRAW		TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER
MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M		(MIN)	(M)
		(L/3)	` <i>'</i>	(101)			· · ·	r /	(101)	(101114)			` <i>'</i>	(101)
	0.03		1		1	0.77	4.89	1		1	3.01	12.06	1	
2	0.05	2.09	2		2	0.84	5.74	2		2	3.12		2	
3	0.08	2.86	3		3	0.87	8.02	3		3	3.14		3	
5	0.09		5		5	0.89		5		5	3.19		5	
)					5					5			-	
7	0.10		7		7	0.91		7		7	3.24	L	7	L
0	0.16		10		10	0.95	8.05	10		10	3.27	12.08	10	
5	0.21	2.81	15		15	1.09		15	Γ	15	3.41	Γ	15	ſ
				1					1			10.40		1
20	0.29		20		20	1.21		20		20	3.52	12.12	20	
30	0.35	2.84	30		30	1.52	8.01	30	1	30	3.64		30	
10	0.40		40		40	1.81		40		40	3.79	12.02	40	
50	0.43	2.80	50	1	50	2.12	8.00	50	1	50	3.90		50	
		2.00					0.00		1			40.51		
60	0.47		60		60	2.24		60		60	3.99	12.01	60	
70			70		70			70		70			70	
30			80		80			80		80			80	
0			90		90			90		90			90	
									-					
00			100		100			100		100			100	
10			110		110			110		110			110	
120			120		120			120		120			120	
			450					450					450	
ъН			150		рН			150		рН			150	
TEMP	17.90	°C	180		TEMP	19.70	°C	180		TEMP	21.60	°C	180	
EC	1168.00	µS/cm	210		EC	1142.00	µS/cm	210		EC	1124.00	µS/cm	210	
DISCHARG	E RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATI	Ξ6	RPM	
DATE:	26/09/2017	TIME:	13H40		DATE:		TIME:			DATE:		TIME:		
	1		1	1		1		1	1				1	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	4.97	15.31	1	3.37	1			1		1			1	
2	5.34	18.11	2	3.29	2			2		2			2	
3	5.78		3	3.23	3			3		3			3	
5	6.03		5	3.10	5			5		5	_	_	5	_
7	6.28		7	3.05	7	1		7	1	7	1	1	7	
		10.00				1			1					
0	6.40	18.20		2.90	10			10	ł	10	ļ	<u> </u>	10	<u> </u>
5	6.67		15	2.73	15			15		15			15	
20	6.80	18.24	20	2.47	20			20		20			20	
30	7.10		30	2.15	30	1		30	1	30	İ — — — — — — — — — — — — — — — — — — —		30	
10	7.36	18.16	40	1.89	40			40	ļ	40	ļ	ļ	40	ļ
50	7.63		50	1.68	50			50		50			50	
50	7.89	18.21	60	1.56	60			60		60			60	
	1.00	10.21				1			1		1			1
70			70	1.36	70	l		70	<u>↓</u>	70	<u> </u>		70	
80			80	1.17	80			80	1	80			80	
0			90	1.10	90			90		90			90	
00			100	1.06	100	1		100	1	100	1		100	
						1			1					
10			110	1.02	110			110	ł	110	ļ	<u> </u>	110	<u> </u>
20			120	0.95	120			120		120			120	
эΗ			150	0.78	pН			150		pН			150	
	20.40	°C	180	00	ТЕМР	1	°C	180	1		1	°C	180	1
EMP	20.40	-							ł	TEMP				
C	1137.00	µS/cm	210		EC		µS/cm	210	ļ	EC		µS/cm	210	
			240					240			_	_	240	
	1			1		1		300	1		1	1	300	
			300 360					360					360	

				FORM 5	-							
חטטבי				NT DISCHAR	RGE TES	T & RECO\	/ERY					
PROJN	HOLE TEST R	P1848	SHEET	MAP REFER	RENCE	31.48128			PROVINCE		NC	
	IOLE NO:	G-3997	2			19.96844			DISTRICT:		CALVIN	NIA
ALT BH		0							SITE NAME	:	DEON	VLOK
	NO: IOLE DEPTH:	0 249.37		DATUMLE			<i>m</i>).	0.42	EXISTING		SUDM	ERSIBLE
	LEVEL (mbdl)			CASING HE		,		0.42	CONTRAC		AB PUI	
DEPTH	OF PUMP (m)	: 150.00		DIAM PUMP				210	PUMP TYP	E:	GW900)2
	ANT DISCHAR	GE TEST 8	RECOVER	TEST COMF					1			
IESIS	IARIED	T	ľ	TEST COMP			I					
DATE:	26/09/2017	TIME:	18h00		DATE:		TIME:		TYPE OF P	-		GW9002
					OBSER	VATION HO G39594	_E 1	NR:	ATION HOL	E 2	NR:	RVATION HOLE
	DISCHARGE B	OREHOLE			Distanc		23.5	Distance		16.8	Distan	ce(m);
	DRAW	YIELD	TIME	RECOVERY		Drawdown			Drawdown	Recovery	· · · · · · · · · · · · · · · · · · ·	Drawdown
(MIN)	DOWN (M) 0.86	(L/S)	MIN 1	(M) 9.07	(min) 1	m	(m) 8.84	(min) 1	(m)		(min) 1	(m)
2	0.86	14.62	1	9.07	1 2		8.84	1		DRY	2	
3	2.45	16.04	3	8.94	3		8.80	3			3	
5	2.77		5	8.86	5		8.74	5			5	
7 10	3.01	+	7 10	8.82	7 10		8.67	7 10	+	<u> </u>	7 10	-
10 15	3.14 3.25	-	10 15	8.74 8.62	10 15		8.57 8.45	10			10	
20	3.38	16.05	20	8.49	20	2.04	8.31	20			20	
30	3.74		30	8.32	30		8.14	30		DRY	30	
40 20	4.01	16.05	40	8.14	40	0.04	8.01	40	0.00		40	
60 90	4.69 5.10	16.02	60 90	8.01 7.84	60 90	2.04	7.87	60 90	0.00	<u> </u>	60 90	+
120	5.41	10.02	120	7.73	120	2.65	7.58	120	0.00		120	
150	5.79	16.00	150	7.52	150		7.32	150			150	
180	5.92	10.00	180	7.35	180	2.94	7.16	180	0.79	DRY	180	
210 240	6.04 6.18	16.09	210 240	7.19 6.99	210 240	3.27	7.03 6.69	210 240	1.12		210 240	
300	6.39	16.12	300	6.71	300	3.59	6.55	300	1.30		300	
360	6.82		360	6.59	360	3.87	6.48	360	1.57		360	
420	6.98	16.07	420	6.45	420	4.09	6.35	420	1.72		420	
480 540	7.23 7.54	16.02	480 540	6.33	480 540	4.55 4.89	6.12	480 540	2.11	DRY	480 540	
600	7.75	10.02	600		600	5.02		600	2.21		600	
720	7.97	16.05	720		720	5.23		720	2.51		720	
840	8.20		840		840	5.48		840	2.59		840	
960 1080	8.41 8.60	16.03	960 1080		960 1080	5.72 5.90		960 1080	2.67 2.81		960 1080	
1200	8.79	16.05	1200		1200	6.10		1200	2.97		1200	
1320	8.94		1320		1320	6.24		1320	3.50		1320	
1440	9.15	16.02	1440		1440	6.36		1440	3.88		1440	
1560 1680	9.39 9.62	16.05	1560 1680		1560 1680	6.59 6.71		1560 1680	4.12 4.49		1560 1680	
1800	9.83	16.03	1800		1800	6.88		1800	4.49		1800	
1920	9.91		1920		1920	6.95		1920	5.01		1920	
2040	9.96	16.08	2040		2040	7.11		2040	5.43	<u> </u>	2040	
2160 2280	10.02 10.08	16.01	2160 2280		2160 2280	7.35 7.50		2160 2280	5.87 5.93	<u> </u>	2160 2280	
2400	10.08	10.01	2400		2400	7.60		2400	6.24	1	2400	
2520	10.36	16.06	2520		2520	7.69	1	2520	6.54		2520	
2640	10.53	40.00	2640		2640	7.80		2640	6.65	<u> </u>	2640	
2760 2880	10.68 10.79	16.03	2760 2880		2760 2880	7.94 8.09		2760 2880	DRY	<u> </u>	2760 2880	
3000	10.79	16.02	3000		3000	8.16		3000		1	3000	
3120	11.08		3120		3120	8.33		3120			3120	
3240	11.24	16.08	3240		3240	8.48		3240			3240	
3360 3480	11.31 11.36	16.04	3360 3480		3360 3480	8.54 8.69		3360 3480			3360 3480	
3600	11.36	10.04	3480		3600	8.78		3480	-		3600	
3720	11.50	16.06	3720		3720	8.80		3720			3720	
3840	11.54		3840		3840	8.89		3840			3840	
3960	11.56	16.01	3960		3960	8.95		3960			3960	
4080	11.59	10.05	4080 4200	+	4080 4200	8.96 8.97		4080 4200		<u> </u>	4080 4200	
	11 61											
4200 4320	11.61 11.62 ne pumped(mi	16.05	4320		4320	8.98		4320	W/L		4320	

BOREHOLE TEST RECORD

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	mbch	Meters below casing height
	mbdl	Meters below datum level
	magi	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

P1848

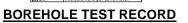
PR0JECT #

									BBR	PIETER MUNYAI
CONSULTANT:		GEOSS						_		AMOS
DISTRICT:		CALVINIA						_		CHRISTOPHER
PROVINCE:		NORTHERN CAP	PE					_	PRODUCTION BONUS:	SIYA
FARM / VILLAGE NAME	<u>.</u>	CALVINIA						_		AYANDA
								_		ISAAC
DATE TESTED:		21/09/2017						-	EC meter number	
MAP REFERENCE:										
CO-ORDINATES:										
FORMA	T ON GPS:	hddd	°mm '	SS.S	n		hddd	°mm.mmm		hddd.ddddd
	LATITUDE:		• •		"	OR		•	- OR	S31.48297
	ONGITUDE:		• •		n	OIC		0		E10.76389
BOREHOLE NO:		GOLD COUR	SE							
TRANSMISSIVITY VALU										
TYPE INSTALLATION:		SUBMESIBLE P	UMP							
BOREHOLE DEPTH: (ml	<u>(lpc</u>	225.90								
COMMENTS:	ROD STRI	IPPED AT THE 41	TH STEP SO W	/E HAD TO F	REMOVE IT TO FIX IT, SO WE DI	D OTHER ST	EPS ON HIGH RATE			
SAMPLE INSTRUCTION	ę .									
Water sample taken	<u>.</u>	Yes			Test for:		macro	bacterio-logical	DATA CAPTURED BY:	KVN
Date sample taken		25/09/20	17	If co	nsultant took sample, give r	name:			DATA CHECKED BY:	AVN
Time sample taken		08H20							L	
CONSULTANT GUIDELI	NES									
BOREHOLE DEPTH:		m	STE	P 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m		P 2:		l∕s	WATER STRIKE 2:			m
STATIC WATER LEVEL:		m		P 3:		l∕s	WATER STRIKE 3:			m
PUMP INSTALLATION DE	PTH:	m		P 4:		l∕s	COMMENTS:			
RECOVERY:				P 5:		√ s				
AFTER STEPS:		h		P 6:		Vs	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h		JRATION:		min		• · · · ·		
DESCRIPTION:			UNIT	QTY		-07			UNIT	
STRAIGHTNESS TEST:			NO	NO	BOREHOLE DEPTH AFTER T		(M	225.90
VERTICALLY TEST:			NO	NO	BOREHOLE WATER LEVEL A		(mpch)		M	58.08
CASING DETECTION:			NO	YES	SAND/GRAVEL/SILT PUMPED				YES/NO	NO
SUPPLIED NEW STEEL B	BOREHOLE (COVER:	NO	NO	DATA REPORTING AND REC	ORDING			NO	YES
BOREHOLE MARKING			NO	NO	SLUG TEST:				NO	NO
SITE CLEANING & FINISH			NO	YES	LAYFLAT (M):				м	50
LOGGERS FOR WATERL	EVEL MON	TORING	NO	NO	LOGGERS FOR pH AND EC:				NO	NO
It is hereby acknowled	ged that up	pon leaving the	site, all exis	ting equipr	nent is in an acceptable cor	ndition.				
NAME					SIG	SNATURE:		_		
DESIGNATION	:					DATE:		_		

							RM 5	_						
				STEPPED I	DISCHAR	GE TEST &	RECO	VERY						
BOREHOLE	TEST RECO					004 40007				DD 01 #		NORT		
PROJ NO : BOREHOLE I		P1848	COURS	MAP REFER	ENCE:	S31.48297 E10.76389				PROVII DISTRI		CALVIN	IERN C	APE
ALT BH NO:	NO.	0	COURS	l		E10.70309				SITE N				
ALT BH NO:		0								ONLIN		CALVIN	IIA	
BOREHOLE I	DEPTH (m)		225.90		DATUML	EVEL ABOVE	E CASIN	IG (m):	0.52	EXISTI	NG PUMP:	SUBME	RSIBLE	
WATER LEVE	()		36.39			IEIGHT: (ma	0,		0.03		RACTOR:	AB PUI	//PS	
DEPTH OF P	UMP(m):		100.00	-		IP INLET (m			210.00	PUMP .	TYPE:	BP50		
			DDM	S		DISCHARG	E TEST		OVERY	DICCU		- 0	DDM	
DISCHARGE	RAIE 1		RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATI	= 3	RPM	
DATE:	22/09/2017	TIME:	10H20		DATE:	22/09/201	TIME:	11H20		DATE:	22/09/201	TIME:	12H20	
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER
MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M) (L/S)	(MIN)	(M)
	1.47		1		1	12.79	6.89	1		1	23.41		1	29.42
2	1.81		2		2	13.46		2		2	23.62	11.63	2	29.24
3	2.20	5.03	3		3	13.64	7.04	3		3	24.19		3	29.05
5	2.76		5		5	14.00		5		5	25.11	12.03	5	28.79
7	3.14		7		7	14.45		7		7	25.63		7	28.59
10	3.53	5.00	10		10	15.48	7.02	10		10	26.06		10	28.40
15	4.90	5.00	15	1	15	17.02		15	1	15	27.21	12.05	15	28.00
					15 20							12.05		
20	5.90	F A '	20		-	18.04	7.00	20	ł	20	28.44		20	27.60
30	8.29	5.04	30		30	18.72	7.06	30		30	30.41		30	27.15
40	9.62		40		40	20.01		40		40	31.53	12.04	40	27.00
50	10.65		50		50	21.64		50	ļ	50	32.64	L	50	26.75
50	12.00		60		60	22.37		60		60	33.07		60	25.60
70			70		70			70		70			70	25.36
30			80		80			80		80			80	25.10
90			90		90			90		90			90	25.00
100			100		100			100		100			100	24.90
			110		110			110		110			110	
110														24.75
120			120		120			120		120	-		120	24.32
рН			150		рН			150		рН			150	23.40
TEMP	23.20	°C	180		TEMP	22.50	°C	180		TEMP		°C	180	23.13
EC	80.00	µS/cm	210		EC	80.00	µS/cm	210		EC		µS/cm	210	22.53
DISCHARGE	RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATI	Ξ6	240	22.04
DATE:	21/09/2017	TIME:	21H00		DATE:		TIME:			DATE:		TIME:	420	20.30
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	600	18.58
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	800	16.29
1	13.85	× /	1	12.40	1	. ,		1	Ň,	1		, í	960	14.86
2	14.02		2	12.39	2			2		2			1140	12.75
													1140	12.75
3	14.39		3	12.33	3			3		3	1			
5			5		5			5		5				
7			7	12.18	7			7		7				
10			10	12.12	10			10		10				
-			15	11.95	15			15		15				
				11.70	20	1		20		20				
15			20	11.70	20							1	1	
15 20										30				+
15 20 30			30	11.43	30			30		30 40				
15 20 30 40			30 40	11.43 11.27	30 40			30 40		40				
15 20 30 40 50			30 40 50	11.43 11.27 11.12	30 40 50			30 40 50		40 50				
15 20 30 40 50 60			30 40 50 60	11.43 11.27 11.12 10.97	30 40 50 60			30 40 50 60		40 50 60				
15 20 30 40 50 60 70			30 40 50 60 70	11.43 11.27 11.12 10.97 10.76	30 40 50 60 70			30 40 50 60 70		40 50 60 70				
5 20 30 40 50 50 70			30 40 50 60	11.43 11.27 11.12 10.97	30 40 50 60			30 40 50 60		40 50 60				
15 20 30 40 50 50 70 30			30 40 50 60 70	11.43 11.27 11.12 10.97 10.76	30 40 50 60 70			30 40 50 60 70		40 50 60 70				
15 20 30 50 50 70 30 90			30 40 50 60 70 80	11.43 11.27 11.12 10.97 10.76 10.55	30 40 50 60 70 80			30 40 50 60 70 80		40 50 60 70 80				
15 20 30 50 50 70 30 30 90 100			30 40 50 60 70 80 90	11.43 11.27 11.12 10.97 10.76 10.55 10.30	30 40 50 60 70 80 90			30 40 50 60 70 80 90		40 50 60 70 80 90				
15 20 30 50 50 50 70 30 30 90 100			30 40 50 60 70 80 90 100	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59	30 40 50 60 70 80 90 100 110			30 40 50 60 70 80 90 100		40 50 60 70 80 90 100 110				
15 20 30 50 50 60 70 80 90 100 110 120			30 40 50 60 70 80 90 100 110 120	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03	30 40 50 60 70 80 90 100 110 120			30 40 50 60 70 80 90 100 110 120		40 50 60 70 80 90 100 110 120				
15 20 30 40 50 50 50 50 50 30 30 90 90 110 120 50 Н			30 40 50 60 70 80 90 100 110 120 150	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03 8.67	30 40 50 60 70 80 90 100 110 120 pH			30 40 50 60 70 80 90 100 110 120 150		40 50 60 70 80 90 100 110 120 pH				
15 20 30 40 50 60 70 80 80 90 100 110 120 pH TEMP		°C	30 40 50 60 70 80 90 100 110 120 150 180	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03	30 40 50 60 70 80 90 100 110 120 pH TEMP		°C	30 40 50 60 70 80 90 100 110 120 150 180		40 50 60 70 80 90 100 110 120 pH TEMP		°C		
15 20 30 40 50 50 50 70 30 30 90 100 110 120 5H FEMP		°C µS/cm	30 40 50 60 70 80 90 100 110 120 150 180 210	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03 8.67	30 40 50 60 70 80 90 100 110 120 pH		°C µS/cm	30 40 50 60 70 80 90 100 110 120 150 180 210		40 50 60 70 80 90 100 110 120 pH		°C µS/cm		
15 20 20 30 50 50 60 70 80 90 100 110		-	30 40 50 60 70 80 90 100 110 120 150 180 210 240	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03 8.67	30 40 50 60 70 80 90 100 110 120 pH TEMP			30 40 50 60 70 80 90 100 110 120 150 180 210 240		40 50 60 70 80 90 100 110 120 pH TEMP				
15 20 30 40 50 50 50 70 30 30 90 100 110 120 5H FEMP		-	30 40 50 60 70 80 90 100 110 120 150 180 210	11.43 11.27 11.12 10.97 10.76 10.55 10.30 10.12 9.59 9.03 8.67	30 40 50 60 70 80 90 100 110 120 pH TEMP			30 40 50 60 70 80 90 100 110 120 150 180 210		40 50 60 70 80 90 100 110 120 pH TEMP				

				FORM 5	F	-						
				T DISCHAR	GE TES	T & RECOV	'ERY					
	HOLE TEST R		SHEET									
	NO : IOLE NO:	P1848	COURSE	MAP REFER	ENCE:	S31.48297 E10.76389			PROVINCE DISTRICT:		CALVIN	IERN CAPE
ALT BH		0	JOURGE			E10.70309			SITE NAME			
ALT BH		0									CALVIN	IIA
BOREH	IOLE DEPTH:	225.90)	DATUMLEV	EL ABOV	E CASING (r	n):	0.52	EXISTING F	PUMP:	SUBME	RSIBLE
	LEVEL (mbdl)			CASING HE		U /		0.03	CONTRAC		AB PU	/IPS
	I OF PUMP (m): ANT DISCHARC			DIAM PUMP	INLET(m	m):		210	PUMP TYP	E:	BP50	
	TARTED		X RECOVER I	TEST COMP	LETED							
DATE:	23/09/2017	TIME:	08H30		DATE:	25/09/2017		16H30	TYPE OF P	-		BP50
					NR:	VATION HOL	_E I	NR:		= 2	NR:	VATION HOLE 3
	DISCHARGE B	OREHOLE			Distanc	e(m);		Distance	(m);		Distan	ce(m);
TIME	DRAW	YIELD	TIME	RECOVERY	TIME:	Drawdown	Recover	ry TIME:	Drawdown	Recovery	TIME:	Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1	0.46		1	29.83	1			1			1	
2 3	0.61	207	2	29.80	2 3			2			2 3	
3 5	0.71	2.87	3 5	29.77 29.74	3 5			3 5			3 5	
7	1.25	3.03	7	29.74	3 7		1	7			7	
10	1.55		10	29.69	10			10			10	
15	2.00		15	29.63	15			15			15	
20	2.40	3.02	20	29.59	20			20			20	
30 40	3.53		30 40	29.53	30 40			30 40			30 40	
40 60	4.79 5.60	3.00	40 60	29.47 29.34	40 60			40 60			40 60	
90	7.05	0.00	90	29.19	90			90			90	
120	8.70		120	29.04	120			120			120	
150	9.97	3.04	150	28.92	150			150			150	
180	11.00		180	28.85	180			180			180	
210 240	12.08 12.77	3.03	210 240	28.71 28.63	210 240			210 240			210 240	
300	14.70	3.03	300	28.44	240 300			300			300	
360	15.79		360	28.22	360			360			360	
420	17.00	3.05	420	28.06	420			420			420	
480	17.81		480	27.03	480			480			480	
540	18.72	3.05	540		540			540			540	
600 720	19.67 20.84	3.03	600 720		600 720			600 720			600 720	
840	21.46	0.00	840		840			840			840	
960	22.55	3.04	960		960			960			960	
1080	23.73		1080		1080			1080			1080	
1200	24.19	3.04	1200		1200			1200			1200	
1320 1440	25.33 25.91	3.02	1320 1440	1	1320 1440			1320 1440			1320 1440	
1560	26.37	3.02	1560	1	1560			1560			1560	
1680	26.83	3.00	1680	<u>t</u>	1680	L_		1680		1	1680	
1800	27.22		1800		1800			1800			1800	
1920	27.74	3.05	1920		1920			1920			1920	
2040	28.13 28.62	2.02	2040		2040 2160			2040 2160			2040 2160	
2160 2280	28.62	3.03	2160 2280		2160			2160			2160	
2400	29.48	3.01	2400	1	2400			2400			2400	
2520	29.71		2520		2520			2520			2520	
2640	30.04	3.04	2640		2640			2640			2640	
2760	30.36	0.00	2760		2760			2760			2760	
2880 3000	30.67	3.02	2880 3000		2880 3000			2880 3000			2880 3000	
3120			3120		3000 3120			3120			3120	
3240		1	3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600			3600		3600			3600			3600	
3720			3720		3720 3840			3720			3720	
3840 3960		-	3840 3960	+	3840 3960			3840 3960			3840 3960	
4080			4080		4080		1	4080			4080	
4200			4200		4200			4200			4200	
4320			4320		4320			4320			4320	
	me pumped(mi	n):		2880	 	W/L			W/L			W/L
Average	e yield (l/s):			3.02		1	1					

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	mbch	Meters below casing height
	mbdl	Meters below datum level
	magi	Meters above ground level
	L/S	Litres per second
	RPM	Rates per minute
	S/W/L	Static water level
	uS/cm	Microsiemens per centimeter





Ground water solutions t/a AB Pumps CC T

								PR0JECT #	P1848
								BBR	CHRISTOPHER
CONSULTANT:	GEOSS						_		ISAAC
DISTRICT:	HANTAM						_		AYANDA
PROVINCE:	NC						_	PRODUCTION BONUS:	
FARM / VILLAGE NAME :	WITVAL/CALVI	NIA					_		
							_		
DATE TESTED:	26/09/2017						_	EC meter number	
MAP REFERENCE:									
CO-ORDINATES:		°				ال ما ما ما	°		
FORMAT ON GPS	a nada	°mm '	55.5			hddd	°mm.mmm		hddd.ddddd
		• •					•		31.45243
LATITUDE		• •		"	OR		•	OR	19.81140
LONGITUDE	i:				-			_	
BOREHOLE NO:	WITWAL BH0	3			-				
TRANSMISSIVITY VALUE:					-				
TYPE INSTALLATION:	SUBMERSIBLE				-				
BOREHOLE DEPTH: (mbgl)	193.80				-				
COMMENTS:									
<u>oommerro.</u>									
SAMPLE INSTRUCTIONS :									
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
Date sample taken	29/09/20	17	If co	nsultant took sample, give i	name:			DATA CHECKED BY:	AVN
Time sample taken	07H20								
	011120								
CONSULTANT GUIDELINES									
BOREHOLE DEPTH:	m		P 1:		Vs	WATER STRIKE 1:			m
BLOW YIELD:	m		P 2:		Vs	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m		P 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m		P 4:		Vs.	COMMENTS:			
RECOVERY:			P 5:		Vs				
AFTER STEPS:	h		P 6:		l∕s.	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DU	JRATION:		min			1	1
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	198.80
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A	FTER TEST:	(mbch)		м	34.4
CASING DETECTION:		NO	RUST	SAND/GRAVEL/SILT PUMPER	D?			YES/NO	0
SUPPLIED NEW STEEL BOREHOLD	COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	YES	LAYFLAT (M):				м	100
LOGGERS FOR WATERLEVEL MOR	NITORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowledged that		site all evic			ndition				
n is nereby acknowledged that	upon leaving the	site, all exis	ung equipri	iencia in an acceptable col					
NAME:				SI	GNATURE:				
DESIGNATION:									

				• 			RM 5	_									
				STEPPED I	DISCHAR	GE TEST &	RECO	VERY									
BOREHOLE	TEST RECO		HEET														
PROJ NO : BOREHOLE N		P1848	L BH03	MAP REFER	ENCE:	0				PROVII DISTRI		NC HANTA	м				
ALT BH NO:	NU.	0								SITE N							
ALT BH NO:		0								ONER		WITVAL	WITVAL / CALVINIA				
BOREHOLE D	DEPTH (m)		193.80		DATUML	EVEL ABOVE	E CASIN	IG (m):	0.50	EXISTI	NG PUMP:	SUBME	SUBMERSIBLE				
WATER LEVE	``		22.90			IEIGHT: (ma	0,		0.00		RACTOR:	AB PUI	MPS				
DEPTH OF PL	JMP (m):		91.10			/IP INLET (m			170.00	PUMP .	TYPE:	BP50					
DISCHARGE I			DDM	S			E TEST		OVERY	DICCU		- 0	DDM				
DISCHARGE	RAIET		RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATI	= 3	RPM				
DATE:	26/09/2017		16H30		DATE:	26/09/201	TIME:	17H30			26/09/201	TIME:	18H30				
ΓIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER			
MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)			
	0.09		1		1	0.73		1		1	3.02		1				
2	0.13		2		2	0.79		2		2	3.78		2				
3	0.16		3		3	0.86		3		3	4.06		3				
5	0.18	0.68	5		5	0.95	3.01	5		5	4.42	10.12	5				
7	0.19		7		7	1.02		7		7	4.73	-	7				
0	0.13	0.68	, 10		, 10	1.02	3.01	, 10		, 10	4.91	10.10	-				
		0.00					3.01		1			10.10		1			
15	0.25	0.07	15		15	1.15	0.00	15		15	5.23	40.00	15				
20	0.29	0.67	20		20	1.20	3.03	20		20	5.45	10.09	20				
30	0.34		30		30	1.32		30		30	5.82		30	-			
40	0.38	0.69	40		40	1.39	3.02	40		40	5.94	10.13	40				
50	0.40		50		50	1.45		50		50	6.09		50				
60	0.42	0.67	60		60	1.52	3.02	60		60	6.35	10.11	60				
70			70		70			70		70			70				
30			80		80			80		80			80				
90			90		90			90		90			90				
00			100		100			100		100	1		100				
110			110		110			110		110			110				
120			120		120			120		120	-		120				
эΗ			150		рН			150		рН			150				
TEMP	22.00	°C	180		TEMP	21.80	°C	180		TEMP	20.10	°C	180				
EC	550.00	µS/cm	210		EC	543.00	µS/cm	210		EC	545.00	µS/cm	210				
DISCHARGE I	RATE 4		RPM		DISCHAR	GE RATE 5		RPM	•	DISCH	ARGE RATI	Ξ6	RPM				
DATE:	26/09/2017	TIME:	19H30		DATE:		TIME:			DATE:		TIME:					
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER			
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M		(MIN)	(M)			
		(L/S)	È /	. /			(L/S)	(IVIIN)	(171)	(101111)		(L/S)	È é	(111)			
1	7.06		1	5.24	1			1		1			1				
2	7.12		2	4.53	2			2		2			2				
3	7.44		3	4.28	3			3		3			3				
5	7.53	12.26	5	4.06	5			5		5			5				
7	7.62		7	3.81	7			7		7			7				
10	7.73	12.24	10	3.40	10			10		10			10				
15	7.89		15	3.23	15			15		15			15				
		12.26	20		20			20		20			20				
20	8.04	12.26		3.05							<u> </u>						
30	8.29	<u> </u>	30	2.93	30		<u> </u>	30		30		<u> </u>	30				
40	8.49	12.26	40	2.86	40			40		40	ļ		40				
50	8.71		50	2.75	50		<u> </u>	50	ļ	50		L	50	ļ			
60	8.89	12.25	60	2.66	60			60		60			60				
70			70	2.52	70			70		70			70				
30			80	2.40	80			80		80			80				
90	1		90	2.34	90		1	90		90			90	1			
100	1		100	2.21	100	1	1	100	1	100	1		100	1			
	+		110		110	1		110		110			110	+			
10	1			2.13							<u> </u>						
120	<u> </u>		120	1.90	120		<u> </u>	120	+	120	I		120	+			
рΗ			150	1.63	рН			150		рН			150				
	19.10	°C	180	1.40	TEMP		°C	180		TEMP		°C	180				
TEMP	550.00	µS/cm	210	1.25	EC		µS/cm	210		EC		µS/cm	210				
	550.00							1	1			1	1	1			
	550.00		240	1.08				240					240				
EC	550.00		240 300	1.08				240 300					240 300				

				FORM 5									
חטטבי				NT DISCHAR	GE TES	T & RECOV	/ERY						
PROJ N	HOLE TEST R	P1848	SHEET	MAP REFER	FNCE.	31.45243			PROVINCE		NC		
	OLE NO:	WITWAL	BH03			19.8114			DISTRICT:		HANTA	M	
ALT BH		0							SITE NAME: WITVAL / CALVINIA				
ALT BH		0						0.50					
	OLE DEPTH: LEVEL (mbdl)	193.80 : 23.80		DATUM LEV CASING HE		•	n):	0.50 0.00	EXISTING PUMP: SUBMERSIBLE CONTRACTOR: AB PUMPS				
	OF PUMP (m):			DIAM PUMP		170			BP50	VIFO			
	ANT DISCHAR	GE TEST 8	RECOVER	Ý									
TEST S	TARTED		1	TEST COMP	LETED								
DATE:	27/09/2017	TIME:	07H30		DATE:		TIME:		TYPE OF P	UMP:		BP50	
					OBSER	VATION HOI	E 1	OBSERV	ATION HOLE	Ξ2	OBSEF	VATION HOLE	
					NR:	WITWAL B		NR:			NR:		
	DISCHARGE B	_			Distanc	. ,,	51.3	Distance		5	Distan		
	DRAW DOWN (M)	YIELD (L/S)	TIME	RECOVERY (M)	TIME: (min)	Drawdown m	(m)	TIME: (min)	Drawdown (m)	Recovery	TIME: (min)	Drawdown (m)	
1	1.98	(L/3)	1	16.56	(1111)	pm 	14.10	(mm) 1	(11)		(⁽¹¹¹¹¹) 1		
2	2.17		2	16.40	2		14.05	2			2	1	
3	2.79		3	16.28	3		13.96	3			3		
5	3.32	10.03	5	16.02	5		13.87	5			5		
7	3.60	40.00	7	15.84	7	0.01	13.74	7			7		
10 15	3.93 4.30	10.03	10 15	15.61 15.24	10 15	0.21	13.61 13.40	10 15			10 15		
20	4.30	10.02	20	15.24	15 20	0.44	13.40	20			20		
30	4.97		30	14.80	30	0.94	13.04	30			30		
40	5.28	10.01	40	14.58	40	1.26	12.83	40			40		
60	5.87		60	14.26	60	1.70	12.50	60			60		
90	6.36	10.03	90	13.92	90	2.17	12.27	90			90		
120 150	6.82 7.17	10.05	120 150	13.65 13.30	120 150	2.60 2.93	11.97 11.73	120 150			120 150		
180	7.17	10.05	150	13.30	150	2.93	11.73	150			150		
210	7.80	10.02	210	12.84	210	3.54	11.38	210			210		
240	8.12		240	12.72	240	3.86	11.21	240			240		
300	8.59	10.04	300	12.34	300	4.30	10.97	300			300		
360	9.02	40.01	360	12.06	360	4.60	10.72	360			360		
420 480	9.50 9.90	10.01	420 480	11.89 11.42	420 480	5.11 5.50	10.55 10.30	420 480			420 480		
480 540	10.26	10.03	540	11.42	480 540	5.77	10.30	480 540			480 540		
600	10.60		600		600	6.09		600			600		
720	11.30	10.04	720		720	6.70		720			720		
840	11.85		840		840	7.27		840			840		
960	12.30	10.02	960		960	7.70		960			960		
1080 1200	12.89 13.34	10.04	1080 1200		1080 1200	8.29 8.60		1080 1200			1080 1200		
1320	13.78	10.04	1320		1320	8.98		1320			1320		
1440	14.35	10.03	1440		1440	9.62		1440			1440		
1560	14.86		1560		1560	10.09		1560			1560		
1680	15.24	10.01	1680		1680	10.45		1680			1680		
1800 1920	15.79 16.17	10.04	1800 1920		1800 1920	10.97 11.28		1800 1920			1800 1920		
2040	16.17	10.04	1920 2040	+	1920 2040	11.28	<u> </u>	1920 2040			1920 2040	+	
2040	17.00	10.02	2040	1	2040	12.13	1	2040		-	2040	1	
2280	17.46		2280		2280	12.45		2280			2280		
2400	17.95	10.03	2400		2400	12.81		2400			2400		
2520	18.78	40.01	2520		2520	13.26		2520			2520		
2640 2760	18.64 18.97	10.01	2640 2760		2640 2760	13.69 13.85		2640 2760			2640 2760		
2760 2880	18.97	10.04	2880		2760	13.85		2760		ļ	2760		
3000			3000		3000		1	3000	1		3000		
3120			3120		3120			3120			3120		
3240			3240		3240			3240			3240		
3360			3360		3360			3360			3360		
3480 3600			3480		3480 3600			3480 3600			3480 3600		
3600 3720			3600 3720		3600 3720			3600			3600		
3840			3840		3840		1	3840			3840		
3960			3960		3960			3960			3960		
4080			4080		4080			4080			4080		
4200			4200		4200			4200			4200	<u> </u>	
4320 Total tim	ne pumped(mi	n):	4320	2880	4320	W/L	23.39	4320	W/L		4320	W/L	
	re bambea(mi	11) .		2000	1	VV/L	∠ა.ა9	1	VV/L	1	1		

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	mbch	Meters below casing height
	mbdl	Meters below datum level
	magi	Meters above ground level
	L/S	Litres per second
	RPM	Rates per minute
	S/W/L	Static water level
	μS/cm	Microsiemens per centimeter
BO	REHO	DLE TEST RE



Ground water solutions t/a AB Pumps CC

									PR0JECT #	P2009
									BBR	JOHAN
CONSULTANT:		GEOSS								
DISTRICT:		CALVINIA						_		
PROVINCE:		WC						-	PRODUCTION BONUS:	
FARM / VILLAGE NAME								-		
								-		
DATE TESTED:		12/05/2018						-	EC meter number	
	-							-		
MAP REFERENCE:										
CO-ORDINATES:			• •					•		
FORM	MAT ON GPS:	hddd	°mm '	SS.S			hddd	°mm.mmm		hddd.ddddd
			• •					•		24 45520
	LATITUDE:		•			OR		•	OR	31.45530
I	LONGITUDE:					-			-	19.77305
BOREHOLE NO:		CAL-DV01				-				
TRANSMISSIVITY VAL	UE:					-				
TYPE INSTALLATION:	-	NEW BOREHOL	E			_				
BOREHOLE DEPTH: (n	nbgl)	151.26				_				
COMMENTS:	WE DID TV	WO CONSTANT E	DISCHARGE TI	ESTS						
SAMPLE INSTRUCTION	NS :				T					
Water sample taken		Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	AVN
Date sample taken				If co	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken										
CONSULTANT GUIDEL	INES				1		1			
BOREHOLE DEPTH:		m	STE	P 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m	STE	P 2:		l∕s	WATER STRIKE 2:			m
STATIC WATER LEVEL:		m	STE	P 3:		√s	WATER STRIKE 3:			m
PUMP INSTALLATION D	EPTH:	m	STE	P 4:		l∕s	COMMENTS:			
RECOVERY:			STE	P 5:		l∕s				
AFTER STEPS:		h	STE			√s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP DU			min			·	
						•	•			
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:			NO	0	BOREHOLE DEPTH AFTER T				м	151.26
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	87.9
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPER				YES/NO	0
SUPPLIED NEW STEEL	BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING			NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINIS			NO	1	LAYFLAT (M):				м	100
LOGGERS FOR WATER	RLEVEL MONIT	ORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowle	edged that up	oon leaving the	site, all exist	ing equipm	nent is in an acceptable co	ndition.				
		U								
NAM	E:				SI	GNATURE:		_		
DESIGNATIO	N:					DATE:		_		

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			FORM 5 E			125
1		STEPPED DISCHARG	E IEST & RECOVERT			2019
BOREHOLE TEST RE	CORD SHEET					2018
PROJ NO :	P2009	MAP REFERENCE:	0	PROVINCE:	WC	
BOREHOLE NO:	CAL-DV01			DISTRICT:	CALVINIA	
ALT BH NO:	0			SITE NAME:	0	
ALT BH NO:	0				U	
	454.00			EVICTING DUM		

				FORM 5	F								
D005-				NT DISCHAR	GE TES	T & RECOV	ERY						
	HOLE TEST R		SHEET		ENIOE	04.4550					14/0		
	IO : IOLE NO:	P2009 CAL-DV	01	MAP REFER	ENCE:	31.4553 19.77385			PROVINCE DISTRICT:		WC CALVIN	шл	
ALT BH		0	01			19.77305			SITE NAME:				
ALTBH		0								•	0		
	IOLE DEPTH:	151.26		DATUMLEV	EL ABOV	E CASING (r	n):	0.71	EXISTING PUMP: 0				
	LEVEL (mbdl)			CASING HE	,	0.15	CONTRAC		AB PU	MPS			
	OF PUMP (m)			DIAM PUMP	INLET(m	m):		221	PUMP TYP	E:	WA110	-2	
	ANT DISCHAR	GE TEST 8	RECOVER										
TEST S	TARTED			TEST COMP	LETED							1	
DATE	12/05/2018	TIME:	10H00		DATE:		TIME:		TYPE OF P	UMP∙		WA110-2	
<i></i>	12/00/2010					VATION HOL		OBSERV	ATION HOLE	-	OBSEF	RVATION HOLE	
					NR:			NR:			NR:		
	DISCHARGE B	OREHOLE			Distanc	e(m);		Distance	(m);		Distand	ce(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	1.39		1	31.47	1			1			1	_	
2	1.59		2	31.12	2			2			2	ļ	
3	1.72	9.10	3	30.10	3	L		3			3	+	
5	1.96	11.49	5	28.97	5			5			5		
7	3.97	13.29	7	28.47	7			7			7		
10 15	4.77 5.97	15.06 15.06	10 15	27.94 27.30	10 15			10 15			10 15	<u> </u>	
20	6.89	15.06	15 20	27.30	15 20			15 20			15 20	<u> </u>	
20 30	8.57	15.06	30	25.62	20 30			30			20 30	1	
40	9.72	15.05	40	25.27	30 40			40			40		
60	11.80	15.06	60	24.60	60			60			60	1	
90	14.19	15.07	90	23.49	90	1	1	90	1		90		
120	16.76	15.04	120	22.43	120			120			120		
150	16.42	15.06	150	21.78	150			150			150		
180	20.18	15.00	180	21.12	180			180			180		
210	21.78	15.04	210	20.80	210			210			210		
240	23.20	15.05	240	19.47	240			240			240		
300	24.80	15.06	300	18.67	300			300			300		
360	28.03	15.01	360	17.10	360			360			360		
420	30.33	15.03	420	16.35	420			420			420		
480	32.45	15.05	480	15.77	480			480			480		
540	34.81	1151	540	14.87	540 600			540			540 600		
	34.81 34.81	14.54 14.08	600 720	14.16 13.21	800 720			600 720			720		
	34.81	13.99	840	11.55	840			840			840		
	01.01	10.00	960	10.35	960			960			960		
			1080	9.25	1080			1080			1080		
			1200	8.10	1200			1200			1200		
			1320	7.18	1320			1320			1320		
			1440	6.32	1440			1440			1440		
			1560	5.97	1560			1560			1560		
			1680	5.32	1680			1680			1680	_	
			1800	4.53	1800	ļ		1800			1800	ļ	
			1920	3.90	1920	ļ		1920			1920	ļ	
			2040	2.22	2040			2040			2040		
			2160	1.38	2160			2160			2160	 	
	<u> </u>		2280 2400		2280 2400			2280			2280		
			2400	-	2400 2520	<u> </u>		2400 2520			2400 2520	<u> </u>	
			2520		2520 2640			2520			2640	1	
	L		2640	1	2040			2640			2760		
			2880	1	2880			2880			2880	ł	
			3000	1	3000			3000			3000	1	
		1	3120		3120			3120	1		3120		
			3240		3240			3240			3240		
			3360		3360			3360			3360		
			3480		3480			3480			3480		
			3600		3600			3600			3600		
			3720		3720			3720			3720	L	
			3840	1	3840	ļ		3840			3840	ļ	
			3960		3960			3960			3960		
			4080		4080			4080			4080	 	
			4200		4200 4320			4200			4200	<u> </u>	
	ne pumped(mi	n):	4320	540	4320	W/L		4320	W/L		4320	W/L	
Fotal +i~													

Microsiemens per centimeter

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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



								PR0JECT #	P2009
								BBR	JOHAN
CONSULTANT:	GEOSS								ABEL
DISTRICT:	CALVINIA						_		ERNEST
PROVINCE:	NORTHERN CAR	PE					-	PRODUCTION BONUS:	SIMON
FARM / VILLAGE NAME :							-		BRIGHT
							-		HENRY
DATE TESTED:	19/05/2018						-	EC meter number	#51
							-		
MAP REFERENCE:									
CO-ORDINATES:		•					•		
FORMAT ON GPS:	hddd	°mm	SS.S			hddd	°mm.mmm		hddd.ddddd
		•					•		24 44462
LATITUDE:		•			OR		•	OR	31.41163
LONGITUDE:								_	19.77509
BOREHOLE NO:	CAL-DV 4								
TRANSMISSIVITY VALUE:									
TYPE INSTALLATION:	NEW BOREHOL	E							
BOREHOLE DEPTH: (mbgl)	205.00								
COMMENTS:									
SAMPLE INSTRUCTIONS :	Yee			Testfer			II		14.01
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	NAOMI
Date sample taken	21/05/20	18	If co	nsultant took sample, give r	name:			DATA CHECKED BY:	AILENE
Time sample taken	08H00								
CONSULTANT GUIDELINES				1		1		1	
BOREHOLE DEPTH:	m	STE	EP 1:		l/s	WATER STRIKE 1:			m
BLOW YIELD:	m	STE	P 2:		l/s	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	STE	EP 3:		l∕s	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	STE	EP 4:		l∕s	COMMENTS:			
RECOVERY:		STE	EP 5:		l∕s				
AFTER STEPS:	h	STE	P 6:		l∕s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DI	JRATION:		min				
									07%
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T				M	205.00
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A		(mbch)		M	14.51
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPED				YES/NO	0
SUPPLIED NEW STEEL BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				M	30
LOGGERS FOR WATERLEVEL MON	TORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowledged that u	pon leaving the	site, all exis	ting equipn	nent is in an acceptable cor	ndition.				
NAME:				SIG	SNATURE:		_		
DESIGNATION:					DATE:		_		

							RM 5	_						
				STEPPED I	DISCHARC	GE TEST &	RECO	VERY						
	E TEST RECO		IEET											
PROJ NO :		P2009		MAP REFER	ENCE:	31.41163				PROVI			IERN C	APE
BOREHOLE		CAL-D	/4			19.77509				DISTRI		CALVIN	IA	
ALT BH NO		0								SITE N	AME:	0		
		0	205.00		DATUM			0 ()	0.50			0		
	E DEPTH (m)		205.00					IG (m):	0.56		NG PUMP:			
WATER LE			10.25			EIGHT: (ma			0.34		RACTOR:	AB PUN		
DEPTH OF	PUMP (m):		99.15			IP INLET (m	,		117.00	PUMP	I YPE:	DW240	2	
			DDM			DISCHARG	E TEST			DIOOLI			DDM	500
DISCHARG	E RAIE 1		RPM	139	DISCHAR	GE RATE 2		RPM	347	DISCH	ARGE RATI	- 3	RPM	529
DATE:	19/05/2018	TIME:	07H30		DATE:	19/05/2018	TIME:	09H10		DATE:	19/05/201	TIME:	10H50	
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M		(MIN)	(M)
4	0.90	(/	4	. ,	4	9.30	(/	4		4	21.41	2.70	1	(<i>'</i>
1			1					1	ł	1			·	
2	1.67	0.96	2		2	9.78	1.58	2		2	23.18	2.83	2	
3	2.27	1.06	3		3	10.90	1.90	3		3	23.86	2.96	3	
5	3.40	1.05	5		5	12.23	1.00	5		5	25.52	2.98	5	
- 7				1	7			7	1					1
1	3.78	1.06	7		<u>′</u>	13.06	2.00	'		7	27.03	3.07	7	
10	4.48	1.07	10		10	13.76	2.02	10	L	10	28.74	3.06	10	
15	5.39	1.05	15		15	15.06	2.01	15		15	29.72	3.03	15	
20	5.94	1.06	20		20	15.76	2.03	20		20	30.70	3.05	20	
								-		-				
30	6.65	1.04	30		30	17.36	2.02	30		30	32.23	3.03	30	
40	7.24	1.07	40		40	18.12	2.03	40		40	33.15	3.02	40	
50	7.61	1.05	50		50	18.71	2.05	50		50	33.98	3.03	50	
60	7.93	1.06	60		60	19.17	2.04	60		60	34.58		60	
														1
70	8.22	1.01	70		70	19.58	2.05	70		70	35.10	3.05	70	
80	8.40	1.04	80		80	20.10	2.05	80		80	35.60	3.05	80	
90	8.58	1.07	90		90	20.48	2.03	90		90	36.30	3.03	90	
100	8.72		100		100	20.87		100		100	36.74		100	
	0.72					20.07					30.74			
110			110		110			110		110			110	
120			120		120			120		120			120	
pН			150		pН			150		pН			150	
		•										•		
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	378.00	µS/cm	210		EC	405.00	µS/cm	210		EC	413.00	µS/cm	210	
DISCHARG	E RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATI	Ξ6	RPM	
DATE:	19/05/2018	TIME:	12H30		DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	37.15		1	87.94	1			1		1			1	
2	37.63		2	76.60	2			2		2			2	
3	38.03		3	62.96	3			3		3			3	
5	38.66	4.70	5	51.61	5			5	ļ	5			5	
7	38.98		7	33.17	7			7		7			7	
10	39.47	5.10	10	29.20	10			10		10			10	
						1							15	
15	45.55	5.80	15	22.69	15			15		15				
20	65.83	5.82	20	20.29	20			20		20			20	
30	88.05		30	17.46	30		_	30		30			30	
	88.05	4.75	40	11.93	40			40		40			40	
						1								
	88.05	4.30	50	10.73	50			50	ļ	50			50	
	88.05	4.18	60	9.53	60			60		60			60	
			70	8.39	70			70		70			70	
			80	7.75	80	1	Ì	80		80			80	
	-					1								
			90	7.29	90		ļ	90		90			90	
			100	6.74	100			100		100			100	
			110	6.44	110			110		110			110	
			120	6.20	120	1	<u> </u>	120		120			120	
				0.20		1					1	1		
pН			150		рН	ļ	ļ	150	ļ	рН			150	
TEMP		°C	180	4.85	TEMP	1	°C	180	1	TEMP		°C	180	
EC		µS/cm	210		EC		µS/cm	210		EC			210	
		µ0/UII				1	µ0/UII					µ0/UII		
			240	4.16	l		I	240		I			240	
			300	3.63				300					300	
			360			1	1	360	1				260	
			300					300					360	

				FORM 5		-								
			CONSTAN			T & RECOV	ERY							
BORE	HOLE TEST RE	ECORD												
PROJ N		P2009		MAP REFER	ENCE:	31.41163			PROVINCE			IERN CAPE		
-	IOLE NO:	CAL-DV	4			19.77509			DISTRICT:		CALVIN	IIA		
ALT BH ALT BH		0 0							SITE NAME: 0					
	IOLE DEPTH:	205.00		DATUMLEV	EL ABOV	VE CASING (m): 0.56 EXISTING PUMP: 0								
	LEVEL (mbdl):			CASING HE			,	0.34	CONTRAC		AB PUN	/IPS		
	OF PUMP (m):			DIAM PUMP	INLET(m	m):		117	PUMP TYP	E:	DW240	2		
	ANT DISCHARG	ELESI	RECOVERY	TEST COMP	ETED									
12313		1	1	TEST COMIT										
DATE:	20/05/2018	TIME:	08H00		DATE:	22/05/2018		08H00	TYPE OF P	-	00000	DW2402		
					OBSER	VATION HOL	.E 1	NR:	ATION HOLI	= 2	NR:	VATION HOLE 3		
	DISCHARGE BO	OREHOLE			Distanc	e(m);		Distance	(m);		Distand	ce(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	1.28	0.70	1	52.05	1			1			1			
2 3	2.78 7.21	2.70 2.80	2	47.91 43.81	2 3			2 3			2 3			
5 5	10.66	2.00	5	39.39	5 5			5			5 5			
7	12.61	2.80	7	36.89	7			7			7			
10	14.29	2.85	10	33.90	10			10			10			
15	17.45	2.84	15	30.70	15			15			15			
20 30	19.48 21.17	2.82	20 30	28.13 24.33	20 30			20 30			20 30			
30 40	24.94	2.80	40	24.33	30 40			40			40			
60	25.03	2.81	60	19.55	60			60			60			
90	27.07	2.84	90	16.30	90			90			90			
120	28.40	2.82	120	14.61	120			120			120			
150 180	30.78 32.17	2.81 2.80	150 180	13.12 12.02	150 180			150 180			150 180			
210	33.10	2.85	210	11.10	210			210			210			
240	33.91	2.83	240	10.54	240			240			240			
300	34.97	2.82	300	9.45	300			300			300			
360 420	35.84 36.75	2.82 2.83	360 420	8.73 8.07	360 420			360 420			360 420			
420 480	37.85	2.83	420	7.47	420 480			420			420			
540	38.88	2.83	540	7.02	540			540			540			
600	39.92	2.84	600	6.58	600			600			600			
720	41.68	2.83	720	6.12	720			720			720			
840 960	43.77 46.12	2.80 2.82	840 960	5.67 5.20	840 960			840 960			840 960			
1080	48.24	2.83	1080	4.74	1080			1080			1080			
1200	50.44	2.84	1200	4.29	1200			1200			1200			
1320	52.02	2.85	1320	3.33	1320			1320			1320			
1440 1560	54.30	-	1440 1560	3.11	1440 1560			1440 1560			1440 1560			
1680			1680		1680			1680			1680			
1800			1800		1800			1800			1800			
1920			1920		1920			1920			1920			
2040			2040		2040			2040			2040			
2160 2280			2160 2280		2160 2280			2160 2280			2160 2280			
2400			2400		2400			2400			2400			
2520			2520		2520			2520			2520			
2640			2640		2640			2640			2640			
2760			2760		2760			2760			2760			
2880 3000		-	2880 3000		2880 3000			2880 3000			2880 3000			
3120		1	3120		3120			3120			3120			
3240			3240		3240			3240			3240			
3360			3360		3360			3360			3360			
3480			3480		3480 3600			3480			3480			
3600 3720			3600 3720		3600 3720			3600 3720			3600 3720			
3840		1	3840		3840			3840			3840			
3960			3960		3960			3960			3960			
4080			4080		4080			4080			4080			
4200 4320			4200 4320		4200 4320			4200 4320			4200 4320			
	ne pumped(mir	ו ו):	1020	1440	4020	W/L		-1020	W/L		4020	W/L		
	e yield (l/s):	·		2.83										

Microsiemens per centimeter

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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



									PR0JECT #	P2009
									BBR	JOHAN
CONSULTANT:		GEOSS								ABEL
DISTRICT:		CALVINIA								ERNEST
PROVINCE:		NORTHERN CA	PE					_	PRODUCTION BONUS:	HENRY
FARM / VILLAGE NAM	E:							-		REX
										BRIGHT
DATE TESTED:		15/05/2018						•	EC meter number	#51
MAP REFERENCE:										
CO-ORDINATES:			•					0		
FOR	MAT ON GPS:	hddd	°mm	SS.S			hddd	°mm.mmm		hddd.ddddd
			•					0		31.43108
	LATITUDE:		•		"	OR		0	OR	19.78912
	LONGITUDE:					-			-	19./0912
BOREHOLE NO:		CAL-DV3								
TRANSMISSIVITY VAL	UE:					-				
TYPE INSTALLATION	<u>.</u>	NEW BOREHOL	E			<u>-</u> .				
BOREHOLE DEPTH:	mbgl)	205.86				-				
COMMENTS										
COMMENTS:										
SAMPLE INSTRUCTION	DNS :	Yes	No	1	Test for:		macro	bacterio-logical	DATA CAPTURED BY:	NAOMI
				16			macio	bacterio-logical	DATA CHECKED BY:	
Date sample taken		17/05/20	J18	11 CO	nsultant took sample, give	lame:			DATA CHECKED BY:	AILENE
Time sample taken		10H43]						
CONSULTANT GUIDE	LINES		1						T	1
BOREHOLE DEPTH:		m	ST	EP 1:		Vs	WATER STRIKE 1:			m
BLOW YIELD:		m	ST	EP 2:		Vs	WATER STRIKE 2:			m
STATIC WATER LEVE	:	m	ST	EP 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	ST	EP 4:		l∕s	COMMENTS:			
RECOVERY:			ST	EP 5:		√s				
AFTER STEPS:		h	ST	EP 6:		Vs	TELEPHONE NUME	ERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP D	URATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST			NO	0	BOREHOLE DEPTH AFTER T	EST			м	205.86
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	41.62
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPER		(YES/NO	0
SUPPLIED NEW STEE		COVER	NO	0	DATA REPORTING AND REC				NO	1
BOREHOLE MARKING		OUVEN.	NO	0	SLUG TEST:	0.10110			NO	0
SITE CLEANING & FIN			NO	1	LAYFLAT (M):				M	100
LOGGERS FOR WATE			NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowl	edged that u	pon leaving the	e site, all exis	ting equipn	nent is in an acceptable co	ndition.				
					SI	GNATURE:				
DESIGNATIO	DN:		-			DATE:		_		

				• 			RM 5	_							
	TEOTOEO			STEPPED I	DISCHARC	GE TEST &	RECO	VERY							
PROJ NO :	TEST REC	DRD SF P2009	IEEI	MAP REFER		31.43108				PROVI			IERN C		
BOREHOLE I	NO.	CAL-D	/3		ENCE.	19.78912				DISTRI		CALVIN			
ALT BH NO:	10.	0				10.70012				SITE N					
ALT BH NO:		0								_		0			
BOREHOLE	DEPTH (m)		205.86		DATUMLE	EVEL ABOVE	E CASIN	IG (m):	0.74	EXISTI	NG PUMP:	0			
WATER LEVE			41.11			IEIGHT: (ma			0.20		RACTOR:	AB PUN			
DEPTH OF P	UMP (m):		147.15	6		IP INLET (m		• D EC	117.00	PUMP	TYPE:	DW 240)2		
DISCHARGE			RPM	5		GE RATE 2	E IESI	RPM	OVERT		ARGE RAT	= 3	RPM		
DIOONAROL					DIOOTIAN	OL NAIL 2									
DATE:	15/05/2018		16H00		DATE:	15/05/2018		17H40			15/05/201		19H20	r	
	DRAW	YIELD	TIME			DRAW		TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER	
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)	
	1.73		1		1	37.59		1		1	102.40		1	101.11	
2	2.54		2		2	37.68	1.25	2		2	102.53		2	97.20	
3	3.56		3		3	37.90	1.84	3		3	103.12	2.38	3	82.40	
5	6.94	0.48	5		5	41.48	1.73	5		5	104.76		5	78.38	
7	5.97	0.52	7		7	45.34	1.85	7		7	104.76	1.77	7	72.11	
10	9.41	0.83	10		10	49.42	1.96	10		10	104.76	1.61	10	66.24	
15	15.21	1.01	15		15	55.84	2.02	15		15	104.76	1.45	15	58.11	
20	18.94	1.01	20	1	20	59.88	2.01	20	1				20	43.70	
30	23.46	1.00	30	1	30	65.24	2.01	30	1		t		30	37.16	
40			30 40		30 40			30 40	1		<u> </u>		30 40		
	27.03	1.03				69.44	2.05						-	25.94	
50	30.45	1.06	50		50	76.78	2.05	50					50	22.01	
50	32.50	1.03	60		60	79.33	2.03	60			<u> </u>		60	18.45	
70	34.12	1.00	70		70	80.96	2.02	70					70	15.97	
30	35.28	1.02	80		80	89.90	2.00	80					80	13.27	
90	36.48	1.01	90		90	95.64	2.01	90					90	11.78	
100	37.34		100		100	101.54		100					100	10.29	
110			110		110			110					110	8.98	
120			120		120			120					120	7.98	
рH			150		pН			150		pН			150	5.67	
ТЕМР		°C	180		TEMP		°C	180		TEMP		°C	180	3.96	
EC	327.00	µS/cm	210		EC	335.00	μS/cm	210		EC		µS/cm	210	2.93	
DISCHARGE		μ0/cm	RPM		-	GE RATE 5	μ 0 /cm	RPM		-	ARGE RAT		RPM	2.00	
DATE:		TIME:			DATE:	OL NAIL J	TIME:			DATE:		TIME:	IXE IVI		
						DD 414/					00000		T10 4F		
	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER	
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)	
1			1		1			1		1			1		
2			2		2			2		2			2		
3			3		3			3		3			3		
5			5		5			5		5			5		
7			7		7			7		7			7		
10	1		10		10			10	Γ	10			10	Γ	
15			15		15	1		15		15			15		
20	1		20	1	20	1		20		20	t		20		
30	1		30	1	30	1		30	1	30	t		30		
	1					1			1		<u> </u>				
40	+		40 50		40	+		40 50	+	40 50	<u> </u>		40 50	ł	
50	-		50		50			50		50			50		
60	+		60		60	ł		60	ł	60	<u> </u>		60		
70			70		70			70		70			70		
30			80		80			80		80			80		
90			90		90			90		90			90		
100			100		100			100		100			100		
	T		110		110	Γ		110	Γ	110	ſ	[110	Γ	
110	1		120	1	120	1		120		120	t		120		
			150	1	pH	1		150	1	pH	İ		150		
120			180		рн ТЕМР	1	°C	180	1	рп ТЕМР	<u> </u>	°C	180	1	
120 pH		°C	1100	1		ł				EC					
120 оН ГЕМР		°C			50										
110 120 pH TEMP EC		°C µS/cm	210		EC		µS/cm	210		10		µS/cm	210		
120 pH TEMP		-	210 240		EC		µS/cm	240				µS/cm	240		
120 pH TEMP		-	210		EC		µS/cm					µS/cm			

				FORM 5 I	=							
			CONSTAN	IT DISCHAR		F & RECOV	ERY					
_	HOLE TEST RI		SHEET									
	NO : HOLE NO:	P2009 CAL-DV	0	MAP REFER	ENCE:	31.43108 19.78912			PROVINCE DISTRICT:	-	NORTH	IERN CAPE
ALT BH		0	3			19.70912			SITE NAME	:		IIA
ALT BH	I NO:	0								-	0	
	IOLE DEPTH:	205.86		DATUMLEVE		•	n):	0.74	EXISTING F		0	
	LEVEL (mbdl): OF PUMP (m):			CASING HE				0.20 117			ABPUN	
	ANT DISCHARG			DIAM PUMP		m).		117	PUMP TYP		DW 240	J2
TEST S	TARTED			TEST COMP	Leted							
DATE:	16/05/2018	TIME:	11:30		DATE:		TIME:		TYPE OF P	I IMP·		DW 2402
DATE.	10/03/2010	TIVIE.	11.00			VATION HOL		OBSERV	ATION HOLE		OBSER	VATION HOLE 3
					NR:			NR:			NR:	
	DISCHARGE BO		1		Distanc			Distance		-	Distand	1 <i>I</i> ·
TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME	RECOVERY (M)	TIME: (min)	Drawdown m	Recovery (m)	TIME: (min)	Drawdown (m)	Recovery	(min)	Drawdown (m)
1	2.34	(1/0)	1	45.82	(mm) 1		(···)	(((()))) 1			(mm) 1	
2	3.98		2	41.48	2			2			2	
3	4.78	0.75	3	36.33	3			3			3	
5 7	6.39 8.59	0.78	5 7	33.31 30.57	5 7			5 7			5 7	
7 10	8.59	0.78	7 10	28.11	7 10			7 10			7 10	
15	14.30	0.81	15	26.57	15			15			15	
20	16.50	0.82	20	23.66	20			20			20	
30	21.10	0.80	30	19.76	30			30			30	
40 60	24.29 26.81	0.83	40 60	17.07 12.11	40 60			40 60			40 60	
90	30.88	0.80	90	9.18	90			90			90	
120	34.71	0.82	120	6.59	120			120			120	
150	36.85	0.80	150	5.10	150			150			150	
180 210	38.21 39.02	0.83	180 210	4.08 3.38	180 210			180 210			180 210	
210	41.38	0.84	240	2.85	240			240			240	
300	43.48	0.81	300	2.15	300			300			300	
360	44.53	0.80	360	1.84	360			360			360	
420 480	44.88 45.18	0.80	420 480		420 480			420 480			420 480	
480 540	45.38	0.83	540		480 540			480 540			480 540	
600	45.59	0.82	600		600			600			600	
720	45.78	0.80	720		720			720			720	
840 960	46.01 46.19	0.81	840 960		840 960			840 960			840 960	
1080	46.19	0.80	1080		900 1080			1080			1080	
1200	46.45	0.84	1200		1200			1200			1200	
1320	47.00	0.81	1320		1320			1320			1320	
1440	48.55		1440		1440			1440			1440	
1560 1680			1560 1680		1560 1680			1560 1680			1560 1680	
1800			1800		1800			1800			1800	
1920			1920		1920			1920			1920	
2040			2040		2040			2040			2040	
2160 2280			2160 2280		2160 2280			2160 2280			2160 2280	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640			2640		2640			2640			2640	
2760 2880			2760 2880	-	2760 2880			2760 2880			2760 2880	
3000			3000		3000			3000			3000	
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360 3480			3360 3480		3360 3480			3360 3480			3360 3480	
3480 3600		-	3480		3480 3600			3480			3480	
3720			3720		3720			3720			3720	
3840			3840		3840			3840			3840	
3960			3960		3960			3960			3960	
4080 4200			4080 4200		4080 4200			4080 4200			4080 4200	
4200			4320		4200 4320			4200			4200	
Total tir	ne pumped(mir	ו):	· · · · · · · · · · · · · · · · · · ·	1440		W/L			W/L			W/L
Average	e yield (l/s):			0.80								

Telephone: 043-73 Fax no: 043-732 1 Fax to e-mail: 0866 E mail: office@abp	422 6 717 7	732		EC mbgl mbch magl L/S RPM S/W/L µS/cm	Abbreviations Electrical conductivity Meters below ground level Meters below datum level Meters below datum level Meters abve ground level Litres per second Rates per minute Static water level Microsiemens per centimeter					AB
			BOR		LE TEST REC	CORD)		Ground water solution	ons t/a AB Pumps CC
									PR0JECT #	P2009
									BBR	MICHAEL
CONSULTANT:	GEO	DSS - KES MI	JRRAY							ABEL
DISTRICT:	CAL	VINIA								ERNEST
PROVINCE:	NOF	RTHEN CAPE							PRODUCTION BONUS:	PHINEAS
FARM / VILLAGE NAME :	NAT	URE RESER	VE							SIMON
										HENRY
DATE TESTED:	06/0	07/2018							EC meter number	51
MAP REFERENCE:										
CO-ORDINATES:										
FORMAT ON	GPS: hd	ldd [°]	°mm '	SS.S	"		hddd	°mm.mmm '		hddd.dddd
LATIT			•		"			• •		S 31.43522
LONGIT			•		n	OR		•	- OR	E 19.78445
									-	
BOREHOLE NO: TRANSMISSIVITY VALUE:		L-NAT 5				•				
TYPE INSTALLATION:	NEV	N BOREHOLE	-			-				
BOREHOLE DEPTH: (mbgl)		199.80	-							
BOREHOLE DEPTH. (IIIbgi)		199.80								
COMMENTS: ROE	STRIPPE	D ON THE 1S	T DATA SHE	ET. BOREHO	LE BOOMED AT 860 MIN .CON	ISTANT RATE	WAS 6 HOURS.			
WE	RESTART	ED AGAIN FO	R 5 HOURS F	OR 24HOUR	S					
SAMPLE INSTRUCTIONS : Water sample taken		Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	EM
				If cou		amo:	madio	buotono logical	-	
			10	11 COI	isultant took sample, give i	lame.			DATA CHECKED BT.	AVIN
		10H25								
		m								m
										m
		m					COMMENTS:			
							TELEPHONE NUMB	ERS PHONE : (NAME &	IEL)	
		n	STEP DU	JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:			NO	0	BOREHOLE DEPTH AFTER T				м	199.70
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	30.68
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPED				YES/NO	NO
SUPPLIED NEW STEEL BOREH	IOLE COV	ER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING			NO	0	SLUG TEST:				NO	0
SITE GLEANING & FINISHING			NO	1	LATELAT (M):				M	100
Date sample taken Time sample taken CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL:		07/07/201 10H25 m m m	STE	If con P 1: P 2: P 3:	nsultant took sample, give n	lys Vs Vs	WATER STRIKE 1: WATER STRIKE 2: WATER STRIKE 3:		DATA CHECKED BY:	AVN m m m
STATIC WATER LEVEL:		m	STE	P 3:		l∕s	WATER STRIKE 3:		<u> </u>	m
PUMP INSTALLATION DEPTH:		m	STE	P 4:		Vs	COMMENTS:			
RECOVERY:			STE	P 5:		l∕s				
AFTER STEPS:		h	STE	P 6:		Vs	TELEPHONE NUMB	ERS PHONE : (NAME &	FEL)	
AFTER CONSTANT:		h	STEP DU	JRATION:		min				
DESCRIPTION:									UNIT	
	0 5 00 0	FD .		<u> </u>				-		
	ULE COV	EK:				UKDING				
SITE CLEANING & FINISHING			NO	1	LAYFLAT (M):				м	100
LOGGERS FOR WATERLEVEL	MONITOR		NO	0	LOGGERS FOR pH AND EC:				NO	0

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

NAME:

DESIGNATION:

> SIGNATURE: DATE:

GEOSS Report No. 2018/10-18

				etennen ·			RM 5	_								
				STEPPED I	DISCHARO	GE TEST &	RECO	VERY								
	E TEST REC		IEEI							DD O /		NODT		-		
PROJ NO :		P2009	• T =	MAP REFER	ENCE:	0				PROVIN				Ϋ́Ε		
BOREHOLE		CAL-N/	415							DISTRI		CALVIN	CALVINIA			
		0 0								SITE N	AME:	NATUR	NATURE RESERVE			
	E DEPTH (m)	0	199.80				CARIN	(m);	0.72		NG PUMP:					
	VEL (mbdl):		25.32			EVEL ABOVE		IG (III).	0.72			ABPUN				
DEPTH OF			25.32 154.04			1P INLET (ma			178.00	PUMP		DW 40				
			134.04	9		DISCHARG		& PEC			I I I L.	D 11 40	52			
DISCHARG	E RATE 1		RPM	154		GE RATE 2		RPM	210.5	DISCH	ARGE RATE	- 3	RPM	517		
				10-1	DIOOTINAR				210.0	Dioorn				011		
DATE:	04/07/2018	TIME:	08H30		DATE:	04/07/2018	TIME:	09H30		DATE:	04/07/201	TIME:	10H30			
ΓIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER		
MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)		
I	2.96		1		1	16.92		1		1	23.32		1			
)	5.22		2		2	18.84	1.79	2		2	24.30	2.86	2			
<u>.</u>																
3	8.09		3		3	19.77	2.22	3		3	25.23	3.02	3			
5	11.60		5		5	20.94	2.23	5	ļ	5	27.62	3.02	5			
,	13.02	1.50	7		7	21.54	2.23	7		7	28.87	3.03	7			
10	14.12	1.51	10		10	22.09	2.22	10		10	29.47	3.02	10			
15	14.64	1.50	15		15			15		15	29.68	3.02	15			
						22.31	2.21	-								
20	14.87	1.51	20		20	22.36	2.21	20		20	29.80	3.01	20	<u> </u>		
30	14.99	1.51	30		30	22.38	2.23	30		30	29.77	3.03	30	L		
40	15.09	1.50	40		40	22.41	2.22	40		40	29.77	3.03	40			
50	15.21	1.51	50		50	22.43	2.22	50	1	50	29.77		50			
									1			0.02				
60	15.23	1.50	60		60	22.44	2.20	60		60	30.21		60			
70			70		70			70		70			70			
30			80		80			80		80			80			
90			90		90			90		90			90			
00			100		100			100		100			100			
110			110		110			110		110			110			
120			120		120			120		120			120			
рH			150		pН			150		pН			150			
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180			
EC	409	-			EC	508	-	210		EC	450	-	210			
-	498	µS/cm			-		µS/cm			-	452					
DISCHARG	E RATE 4		RPM	789		GE RATE 5		RPM			ARGE RATE	6	RPM			
DATE:	04/07/2018	TIME:	11H30		DATE:	04/07/2018	TIME:	12H30		DATE:		TIME:				
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER		
(MIN)	DOWN (M)	(1/S)	(MIN)	(M)	(MIN)	DOWN (M)	(1/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)		
	- (/	(2,0)	È é	()	` /		(2,0)	Ň,	~ ~	· /	201111(11)	(2/0)	Ň,	(,		
1	32.57		1		1	86.73		1	58.34	1			1			
2	39.20	4.46	2		2	89.33	5.89	2	42.30	2			2			
3	44.68	4.79	3		3	89.41		3	30.61	3			3			
5	58.25		5		5			5	13.54	5			5			
					3 7			3 7	1	5 7			3 7			
7	63.70	5.05	7						6.60	-						
10	70.69	5.04	10		10			10	4.29	10			10			
15	75.65	5.03	15		15			15	3.77	15			15			
20	78.27	5.02	20		20			20	1.47	20			20			
30	83.37	5.02	30		30			30	3.27	30			30			
40	84.27	5.00	40		40			40	3.09	40			40			
50	84.48	5.03	50		50			50	3.00	50			50			
50	84.66		60		60			60	2.92	60			60			
70			70		70			70	2.85	70	İ		70			
									1							
30			80		80			80	2.81	80			80			
90			90		90			90	2.79	90			90			
00			100		100			100	2.76	100			100			
10			110		110			110	2.74	110	İ		110			
										120	1			1		
20		l	120		120			120	2.72		1		120			
эΗ			150		рН			150	2.69	рН			150			
TEMP		°C	180		TEMP		°C	180	2.66	TEMP		°C	180			
EC	483	µS/cm			EC		µS/cm	210	2.56	EC			210			
							p O/OIII		1			р 0 /011				
			240					240	2.53				240			
			300	1		1		243	2.49		1		300	1		
			300													
			360					244					360			

				FORM 5	-							
				NT DISCHAR	GE TES	T & RECOV	'ERY					
	OLE TEST R		SHEET			0.04.40500	<u>, </u>					
	O : OLE NO:	P2009 CAL-NA	T 5	MAP REFER	ENCE:	S 31.43522 E 19.78445			PROVINCE DISTRICT:	:	CALVIN	HEN CAPE
		0				L 13./0440	,		SITE NAME	:		
ALT BH		0							0		NATUF	RESERVE
BOREH	OLE DEPTH:	199.80		DATUMLEV	EL ABOV	E CASING (r	n):	0.72	EXISTING F	PUMP:	NEW B	OREBOLE
NATER	LEVEL (mbdl)	: 30.03	5	CASING HE	IGHT: (n	nagl):		0.11	CONTRAC	TOR:	AB PUI	MPS
	OF PUMP (m)			DIAM PUMP	INLET(m	ım):		178	PUMP TYPI	=:	DW 40	02
	ANT DISCHAR	GE TEST &	& RECOVER									
1231 31	FARTED	1	1	TEST COMP		1		1				1
DATE:	05/07/2108	TIME:	08H00		DATE:	06/07/2108	TIME:		TYPE OF P	UMP:		DW 4002
						VATION HOL	_E 1		ATION HOLE	E 2		RVATION HOLE
					NR:			NR:			NR:	
	DISCHARGE B	-			Distanc		-	Distance		-	Distan	
	DRAW DOWN (M)	YIELD (L/S)	TIME	RECOVERY		Drawdown			Drawdown	Recovery		Drawdown (m)
IVIIIN)		(L/S)		(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
2	4.95 13.97	+	1	64.08 49.01	1 2		ł	1			1 2	
2 3	23.29	4.91	3	34.45	2 3			3		<u> </u>	2	
, ;	40.64	4.95	5	15.33	5			5			5	
,	49.59		7	7.51	7			7			7	1
0	57.27	5.03	10	6.02	10		l –	10			10	
5	64.82	5.05	15	5.45	15			15			15	
20	70.63	5.03	20	5.16	20			20			20	
0	72.89	5.02	30	4.86	30			30			30	
0	73.85	5.01	40	4.63	40		<u> </u>	40			40	
60	77.03	5.03	60	4.39	60			60			60	
0	77.54	5.02	90	4.05	90			90			90	
20	77.76	5.01	120	3.84	120			120			120	
50	78.03	5.01	150	3.65	150 180			150			150 180	
80 210	78.14 78.40	5.00 5.03	180 210	3.48 3.35	180 210		<u> </u>	180 210			210	
240	78.40	5.03	210	3.35	210			210			240	
300	79.25	5.02	300	3.02	300			300			300	
360	79.27	5.00	360	2.77	360			360			360	
420	79.46	5.00	420	2.58	420			420			420	
180	80.08	5.03	480	2.43	480			480			480	
540	80.33	5.02	540	2.27	540			540			540	
600	80.52	5.03	600	2.10	600			600			600	
720	80.94	5.05	720	1.81	720			720			720	
340	81.04	5.02	840		840			840			840	
960	81.11	5.03	960		960			960			960	
1080	81.36	5.01	1080		1080			1080			1080	
200	81.63 82.12	5.02 5.01	1200		1200			1200 1320			1200 1320	
320 440	82.12	5.00	1320 1440		1320 1440			1440			1440	
440	02.12	5.00	1560		1560			1560			1560	
			1680		1680			1680			1680	
			1800		1800	1	İ	1800			1800	1
		1	1920	1	1920	1	1	1920	1		1920	1
			2040		2040			2040	İ		2040	
			2160		2160			2160			2160	
			2280		2280			2280			2280	
			2400		2400			2400			2400	
			2520	ļ	2520		ļ	2520			2520	ļ
			2640		2640			2640			2640	
			2760	+	2760	ł	 	2760			2760	
			2880 3000		2880 3000			2880 3000			2880 3000	
		+	3000	+	3000	1	ł	3000		-	3000	+
		+	3120		3120			3120			3120	
-+			3360	+	3360			3360			3360	
		1	3480	1	3480	1	1	3480			3480	1
			3600	1	3600			3600			3600	1
			3720		3720	1	İ	3720			3720	1
			3840		3840	1		3840			3840	
			3960		3960			3960			3960	
			4080		4080			4080			4080	
		1	1000		4200			4200			4200	
			4200		4200							
	ne pumped(mi		4200 4320	860	4200 4320	W/L		4320	W/L		4320	W/L

Telephone: 043-732 1 Fax no: 043-732 1422 Fax to e-mail: 0866 71 E mail: office@abpump	7 732		EC mbgl mbch magl L/S RPM S/W/L L/S/cm	Abbreviations Electrical conductivity Meters below ground level Meters below casing height Meters below datum level Meters above ground level Utres per second Retes per minute Static water level Microsiemens per centimeter LE TESST RECO	CORD				ons t/a AB Pumps CC
								PR0JECT # BBR	P2009 MICHAEL
CONSULTANT:	GEOSS- KES M	URRAY					_		ABEL
DISTRICT:	CALVINIA						_		ERNEST
PROVINCE:	NORTHERN CAL	PE					-	PRODUCTION BONUS:	PHINIAS/SIMON
FARM / VILLAGE NAME :	NATURE RESER	RVE CALVINIA					-		SIMON
							_		HENRY
DATE TESTED:	08/07/2018						_	EC meter number	51
MAP REFERENCE: CO-ORDINATES: FORMAT ON GPS:		°mm ' 。 ,				hddd	°mm.mmm		hddd.ddddd S 31.45129
LATITUDE:		• •		"	OR		0	OR	E 19.77058
								_	
	CAL-NAT-6								
TRANSMISSIVITY VALUE:	NEW BOREHOL	F							
	200M	-							
<u>Bonenoce Bernni (mbyi)</u>	2001								
SAMPLE INSTRUCTIONS : Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	ELZAAN
Date sample taken	10/07/20		If co	nsultant took sample, give r	name:		· · ·	DATA CHECKED BY:	
Time sample taken	06H25	-		1.13		l			
CONSULTANT GUIDELINES									
BOREHOLE DEPTH:	m	STE	P 1:		√s	WATER STRIKE 1:			m
BLOW YIELD:	m		P 1: P 2:		Vs Vs	WATER STRIKE 1: WATER STRIKE 2:		1	m m
STATIC WATER LEVEL:	m		P 3:		Vs	WATER STRIKE 3:		1	m
PUMP INSTALLATION DEPTH:	m		P 4:			COMMENTS:	•		
RECOVERY:			P 5:		√s				
AFTER STEPS:	h	STE	P 6:		√s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DU	JRATION:		min				
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	200.00
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A	FTER TEST:	(mbch)		м	12.57
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPED)?			YES/NO	0
SUPPLIED NEW STEEL BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				м	50
LOGGERS FOR WATERLEVEL MONF	TORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowledged that u NAME: DESIGNATION:	-		ting equipm		GNATURE:		_		

				STEPPED I			RM 5	_						
BOREHOLE	TEST REC		HEET	STEFFEDI	JISCHAR	JE IESI Q	RECO							
PROJ NO :	ILSI KLU	P2009		MAP REFER	ENICE	0				PROVI			IERN C	ADE.
BOREHOLE	NO	CAL-N/	\T_6	MAF KEFEK	ENCE.	0				DISTRI		CALVIN		
ALT BH NO:	NO.	0	-11-0							SITE N		NATURE RESERVE		
ALT BH NO:		0									~uviL.	CALVIN		
BOREHOLE	DEPTH (m)	0	200M		DATUMI		E CASIN	lG (m) [.]	0.69	FXISTI	NG PUMP:			IF
WATER LEVE	. ,		11.75			IEIGHT: (ma		(11).	0.13		RACTOR:	AB PUN		
DEPTH OF P			100.04			/IP INLET (m			178.00	PUMP		DW 400		
	0.112 ().					DISCHARG		& REC				511 10		
DISCHARGE	RATE 1		RPM	99.1		GE RATE 2	- 1201	RPM	174.9	DISCH	ARGE RAT	- 3	RPM	308
0.001.0102				0011	5.001.00	0210122				5.001				000
DATE:	08/07/2018	TIME:	15H00		DATE:	0/07/2018	TIME:	16H00		DATE:	08/07/201	TIME:	17H00	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	0.70		1		1	1.51	1.69	1		1	3.66	3.02	1	
2	0.72	1.00	2		2	1.81	1.81	2		2	4.72		2	
-														
3	0.74	1.03	3		3	2.01	2.07	3		3	5.22	3.21	3	
5	0.76	1.05	5		5	2.27	2.05	5		5	5.68	3.55	5	
7	0.77	1.04	7		7	2.34	2.04	7		7	5.79	4.02	7	
10	0.80	1.05	10		10	2.37	2.03	10	1	10	6.63		10	1
				<u> </u>				-						
15	0.81	1.05	15		15	2.41	2.03	15		15	6.89	4.02	15	
20	0.83	1.04	20		20	2.43	2.02	20		20	6.92	4.00	20	
30	0.85	1.04	30		30	2.47	2.01	30		30	6.96	4.00	30	
40	0.86	1.04	40	1	40	2.49	2.04	40	t i	40	7.03	4.02	40	1
				<u> </u>						-				
50	0.87	1.03	50		50	2.52	2.03	50		50	7.09	4.01	50	
60	0.88	1.02	60		60	2.53	2.03	60		60	7.20		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	
				-					ł					
pН			150		рН			150		рН			150	
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	291	µS/cm	210		EC	393	µS/cm	210		EC	397	µS/cm	210	
DISCHARGE	RATE 4		RPM	678	DISCHAR	GE RATE 5		RPM	•	DISCH	ARGE RATI	- 6	RPM	
				010		OL NAIL 3								
DATE:	08/07/2018	TIME:	18H00	T	DATE:	1	TIME:	1	r	DATE:		TIME:	1	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	8.85		1	75.48	1			1		1			1	
<u> </u>		5.00	-		- -			-		-				
2	11.98	5.30	2	59.72	2			2		2			2	
3	20.43	6.18	3	43.97	3			3		3			3	
5	43.31	7.53	5	15.36	5			5		5			5	
7	87.53	-	7	0.71	7	1	1	7		7	1		7	
		0.00				1								
8	87.53	3.60	10	0.60	10		L	10		10	<u> </u>		10	
9	87.53	3.43	15	0.49	15			15		15			15	
10	87.53	3.40	20	0.45	20			20		20			20	
30			30	0.38	30	1		30		30			30	
	+					+	<u> </u>		<u> </u>		<u> </u>			
40	-		40	0.35	40			40		40			40	
50			50	0.33	50			50		50			50	
60			60	0.31	60			60		60			60	
	1		70		70	1		70	<u> </u>	70	İ		70	
70				0.28										
			80	0.27	80			80	ļ	80			80	
80			90	0.26	90			90		90			90	
80			100	0.25	100			100		100			100	
80 90						1					t			
80 90 100			110	0.24	110			110		110			110	
70 80 90 100 110					120	1	<u> </u>	120	L	120	<u> </u>		120	
80 90 100			120	0.23			1	150	1	pН	1		150	
80 90 100 110 120			120 150	0.23	рН									
80 90 100 110 120 pH		°C	150	0.20	рН		°C	180		TEMP		°C		
80 90 100 110 120 pH TEMP		°C	150 180	0.20 0.19	pH TEMP		°C	180		TEMP		°C	180	
80 90 100 110 120 pH TEMP		°C µS/cm	150 180 187	0.20	рН		°C µS/cm	210		temp Ec			180 210	
80 90 100 110 120 pH TEMP			150 180	0.20 0.19	pH TEMP								180	
80 90 100 110 120 pH TEMP			150 180 187 240	0.20 0.19	pH TEMP			210 240					180 210 240	
80 90 100 110			150 180 187	0.20 0.19	pH TEMP			210					180 210	

				FORM 5	F							
				T DISCHAR		T & RECOV	/ERY					
	IOLE TEST R		SHEET									
PROJN		P2009	Тс	MAP REFER	ENCE:				PROVINCE			
ALT BH	OLE NO:	CAL-NA 0	0-11			E 19.77058	5		DISTRICT: SITE NAME			RE RESERVE
ALTBH		0								•	CALVIN	
	OLE DEPTH:	200N	1	DATUMLEV	EL ABOV	E CASING (r	m):	0.69	EXISTING F	PUMP:	-	OREHOLE
WATER	LEVEL (mbdl)	: 11.80		CASING HE	IGHT: (n	nagl):		0.13	CONTRAC	TOR:	AB PUI	MPS
	OF PUMP (m)			DIAM PUMP	INLET(m	ım):		178	PUMP TYP	E:	DW 40	02
CONST/ TEST ST	ANT DISCHAR	GE TEST &	RECOVER									
IESI SI	TARTED	1	1	TEST COMP			r					I
DATE:	09/07/2018	TIME:		08H00	DATE:	01/07/2018	TIME:	11H30	TYPE OF P	UMP:		DW 4002
						VATION HOL	_E 1		ATION HOLI	Ξ2		VATION HOLE
			_		NR:	e (me) :		NR: Distance	(NR: Distan	a a (ma) :
	DISCHARGE B	YIELD	TIME	RECOVERY	Distanc TIME:	Drawdown	Pocovo		(m); Drawdown	Pacovon	_	Drawdown
	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)	Recovery	(min)	(m)
1	2.60	(_, _, _)	1	79.72	1		<i>,</i>	1	<i>/</i>		1	<u>\</u>
2	4.46		2	74.32	2			2			2	
3	5.03	2.89	3	53.30	3			3			3	
5	5.20		5	30.18	5			5			5	
7	5.21	3.52	7	4.66	7	ļ	 	7			7	
10	5.26	3.55	10	1.98	10			10			10	
15 20	5.36 5.41	3.52 3.51	15 20	1.85 1.82	15 20		1	15 20			15 20	+
20 30	5.41	3.51	30	1.82	20 30	-	-	30			30	
40	5.54	3.52	40	1.73	40			40			40	1
60	5.62	3.51	60	1.69	60		İ	60			60	_
90	5.71	3.53	90	1.62	90			90			90	
120	5.80	3.52	120	1.59	120			120			120	
150	5.85	3.50	150	1.54	150			150			150	
180	5.87	3.53	180	1.49	180			180			180	
210 240	5.94 5.98	3.52 3.53	210 240	ł	210 240	+	1	210 240			210 240	+
300	6.09	3.52	300		300			300			300	
360	6.16	3.53	360		360			360			360	
420	6.28	3.52	420		420			420			420	
480	6.34	3.51	480		480			480			480	
540	6.43	3.53	540		540			540			540	
600	6.44	3.53	600		600			600			600 720	
720 840	6.56 6.66	3.52 3.51	720 840		720 840			720 840			840	
960	6.77	3.53	960		960			960			960	
1080	6.87	3.52	1080		1080			1080			1080	
1200	6.98	3.51	1200		1200			1200			1200	
1320	7.41	3.53	1320		1320			1320			1320	
1440	8.01	3.52	1440		1440			1440			1440	
1470	87.07	4.32	1560		1560			1560			1560	
1471 1472	87.07 87.07	4.11 3.80	1680 1800		1680 1800			1680 1800			1680 1800	
1472	87.07	3.80	1920		1920	-		1920			1920	+
2040	51.01	0.01	2040		2040			2040			2040	†
2160		1	2160	1	2160			2160			2160	
2280			2280		2280			2280			2280	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640			2640		2640			2640			2640	
2760 2880			2760 2880	ł	2760 2880	-	1	2760 2880			2760 2880	+
2880			3000	1	2880	-	1	3000			3000	
3120			3120		3120			3120			3120	1
3240			3240	1	3240		İ	3240			3240	
3360			3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600			3600	ļ	3600	ļ	 	3600			3600	
3720			3720		3720			3720			3720	
3840 3960			3840 3960		3840 3960			3840 3960			3840 3960	
4080		+	4080		3960 4080			4080			4080	
4080		1	4080	1	4080	ł	1	4080		-	4080	+
		+		1		1	1		1	1	_	1
4320			4320		4320			4320			4320	

Telephone: 043-732 1211		Abbreviations		
Fax no: 043-732 1422	EC	Electrical conductivity		
Fax to e-mail: 0866 717 732	mbgi	Meters below ground level		
E mail: office@abpumps.co.za	mbch	Meters below casing height		
	mbdi	Meters below datum level		
	magi	Meters above ground level		
	L/S	Litres per second		
	RPM	Rates per minute		
	S/W/L	Static water level		
	μS/cm	Microsiemens per centimeter	l	
	BOREH	<u>OLE TEST REC</u>	<u>CORD</u>	C P
CONSULTANT: GEOSS				_ [
DISTRICT: CALVINIA				
	PE .			P



Ground water solutions t/a AB Pumps CC

									PR0JECT #	P2009
									BBR	MICHAEL
CONSULTANT:		GEOSS						_		ABEL
DISTRICT:		CALVINIA						_		ERNEST
PROVINCE:		NORTHERN CA	PE					_	PRODUCTION BONUS:	PHINEAS
FARM / VILLAGE NAME								_		SIMON
		21/08/2018								
DATE TESTED:								_	EC meter number	51
MAP REFERENCE:										
CO-ORDINATES:	IAT ON GPS:	ام ام ام	°mm	~~ ~			hddd	°mm.mmm		hddd.ddddd
FORM	IAT ON GPS:	nuuu		33.5			nuuu			nada.adada
			•		"			•		S 31.40048
	LATITUDE:		•		"	- OR		•	OR	E 19.55587
	ONGITUDE:					-			-	
BOREHOLE NO:		CAL-PHASE	3.4A			-				
TRANSMISSIVITY VALU						-				
TYPE INSTALLATION:		NEW BOREHO				-				
BOREHOLE DEPTH: (n	nbgl)	77.20				-				
COMMENTS:										
SAMPLE INSTRUCTION	NS :	-	-				r			
Water sample taken		Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	ELZAAN
Date sample taken		24/08/2	018	If co	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken		07H50								
CONSULTANT GUIDEL	INES			_						
BOREHOLE DEPTH:		m	STE	P 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m		P 2:		l∕s	WATER STRIKE 2:			m
STATIC WATER LEVEL:		m		P 3:		l/s	WATER STRIKE 3:			m
PUMP INSTALLATION D		m		P 4:		l∕s	COMMENTS:	-		
RECOVERY:				P 5:		l∕s				
AFTER STEPS:		h		P 6:		l/s	TELEPHONE NUM	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h		JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
						TOT:				
STRAIGHTNESS TEST: VERTICALLY TEST:			NO	0	BOREHOLE DEPTH AFTER 1 BOREHOLE WATER LEVEL		(mbab)		м	22.1
							(mbcn)			
CASING DETECTION:		00/50	NO	1	SAND/GRAVEL/SILT PUMPE				YES/NO	0
SUPPLIED NEW STEEL	DUKEHULE	GOVER:	NO	0	DATA REPORTING AND REC	URDING			NO	0
BOREHOLE MARKING	HING		NO	0	SLUG TEST:				M	100
LOGGERS FOR WATER			NO	0	LAYFLAT (M): LOGGERS FOR pH AND EC:				NO	0
									UP:	
It is hereby acknowle	dged that u	pon leaving the	e site, all exis	ting equipn	nent is in an acceptable co	ndition.				
	_									
NAM			-		SI	GNATURE:				
DESIGNATIO	IN:		-			DATE:				

				STEPPED I	DISCHARG	-	RM 5 RECO							
DOILEHOLE	TEST RECO	ORD SH	IEET	-										
PROJ NO :		P2009		MAP REFER	ENCE:	0				PROVI		NORTHERN CAPE		
BOREHOLE N	IO:		ASE 3.4A							DISTRI		CALVIN	IIA	
ALT BH NO: ALT BH NO:		0 0								SITE N	AME:	0		
BOREHOLE D		0	77.20			EVEL ABOV		G (m).	0.40	FXISTI	NG PUMP:	NEW B	OREHO	IE
WATER LEVE			20.16			EIGHT: (ma		O (III).	0.38		RACTOR:	ABPUN		
DEPTH OF PU			70.25			IP INLET (m			310.00	PUMP *		GW 960		
				ST	EPPED DIS	SCHARGE	TEST &	& RECO	VERY					
DISCHARGE F	RATE 1		RPM	531	DISCHAR	GE RATE 2		RPM	1138	DISCH	ARGE RATE	3	RPM	1719
DATE:	21/08/2018	TIME:	12H20		DATE:	21/08/201	TIME	40H00		DATE	21/08/201	TIME	15H40	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)
1	0.09		1		1	0.52		1		1	1.48		1	
)	0.13		2		2	0.56	11.25	2		2	1.52		2	
	0.17	5.08	3		3	0.63	13.25			3	1.64	24.97		
,	0.20	5.10	5		5	0.75	15.10			5	1.75	20.05	-	
) -			-							-			-	
,	0.21	5.07	7		7	0.80	15.07	7		7	1.77	25.07		ł
0	0.22	5.10	10		10	0.84	15.05			10	1.84	25.05		L
5	0.25	5.05	15		15	0.89	15.08	15		15	1.86	25.03	15	
20	0.26	5.09	20		20	0.93	15.10	20		20	1.91	25.00	20	
30	0.29	5.10	30		30	1.01	15.10	30		30	2.06	25.05	30	
10	0.32	5.08	40		40	1.05	15.11	40		40	2.17	25.07	40	
50	0.34	5.08	50		50	1.11	15.09	-	İ	50	2.24	25.03		1
50 50	0.37	5.04	60		50 60	1.17	15.10			60	2.34	25.05		
50 70			60 70		60 70		15.10			60 70		25.05		
	0.38	5.06			-	1.23			ł		2.41			
30	0.40	5.08	80		80	1.26	15.08			80	2.49	25.04		
0	0.41	5.09	90		90	1.30	15.10	90		90	2.56	25.06	90	
00	0.42		100		100	1.35		100		100	2.65		100	
10			110		110			110		110			110	
20			120		120			120		120			120	
эΗ			150		pН			150		рН			150	
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	1519	µS/cm	210		EC	1569		210		EC	1531	µS/cm		
-		poron		2127	-		µS/cm			-				
DISCHARGE F	RATE 4		RPM	2127	DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	6	RPM	
DISCHARGE F DATE:	RATE 4 21/08/2018	TIME:	RPM 17H20		DISCHAR DATE:	GE RATE 5	TIME:	RPM		DISCH DATE:	ARGE RATE	E 6 TIME:	RPM	2500/50
DISCHARGE F DATE: TIME	RATE 4 21/08/2018 DRAW	TIME: YIELD	RPM 17H20 TIME	RECOVERY	DISCHAR DATE: TIME	GE RATE 5 DRAW	TIME: YIELD	RPM TIME	RECOVERY	DISCH, DATE: TIME	ARGE RATE	: E 6 TIME: YIELD	RPM TIME	
DISCHARGE F DATE: TIME (MIN)	RATE 4 21/08/2018 DRAW DOWN (M)	TIME:	RPM 17H20	RECOVERY (M)	DISCHAR DATE:	GE RATE 5	TIME: YIELD	RPM TIME (MIN)	RECOVERY (M)	DISCH DATE:	ARGE RATE	: E 6 TIME: YIELD	RPM	RECOVER (M)
DISCHARGE F DATE: TIME	RATE 4 21/08/2018 DRAW	TIME: YIELD	RPM 17H20 TIME	RECOVERY	DISCHAR DATE: TIME (MIN) 1	GE RATE 5 DRAW	TIME: YIELD	RPM TIME		DISCH, DATE: TIME	ARGE RATE	: E 6 TIME: YIELD	RPM TIME	
DISCHARGE F DATE: TIME	RATE 4 21/08/2018 DRAW DOWN (M)	TIME: YIELD	RPM 17H20 TIME	RECOVERY (M)	DISCHAR DATE: TIME	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN)		DISCH, DATE: TIME	ARGE RATE	: E 6 TIME: YIELD	RPM TIME	
DISCHARGE F DATE: TIME MIN)	RATE 4 21/08/2018 DRAW DOWN (M) 5.00	TIME: YIELD	RPM 17H20 TIME (MIN) 1	RECOVERY (M) 3.12	DISCHAR DATE: TIME (MIN) 1	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1		DISCH, DATE: TIME (MIN) 1	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1	
DISCHARGE F DATE: FIME MIN) I 2	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75	TIME: YIELD (L/S)	RPM 17H20 TIME (MIN) 1 2	RECOVERY (M) 3.12 2.76	DISCHAR DATE: TIME (MIN) 1 2	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1 2		DISCH, DATE: TIME (MIN) 1 2	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2	
DISCHARGE F DATE: FIME MIN) L 2 3	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89	TIME: YIELD (L/S) 29.44 29.91	RPM 17H20 TIME (MIN) 1 2 3 5	RECOVERY (M) 3.12 2.76 2.61 2.41	DISCHAR DATE: TIME (MIN) 1 2 3	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1 2 3 5		DISCH, DATE: TIME (MIN) 1 2 3	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3	
DISCHARGE F DATE: IIME MIN) 2 3 5 7	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90	TIME: YIELD (L/S) 29.44 29.91 30.15	RPM 17H20 TIME (MIN) 1 2 3 5 5 7	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27	DISCHAR DATE: TIME (MIN) 1 2 3 5 7	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 7 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11	RPM 17H20 TIME (MIN) 1 2 3 5 7 7 10	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21	DISCHAR DATE: TIME (MIN) 1 2 3 5 5 7 10	GE RATE 5	TIME: YIELD	RPM (MIN) 1 2 3 5 7 10		DISCH, DATE: TIME (MIN) 1 2 3 3 5 7 10	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7 10	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 0 0 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.92 2.98	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15	RPM 17H20 TIME (MIN) 1 2 3 5 5 7 10 15	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10	DISCHAR(DATE: TIME (MIN) 1 2 3 5 5 7 10 15	GE RATE 5	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7 10 15	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7 10 15	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 0 0 5 5 5 20	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12	RPM 17H20 TIME (MIN) 1 2 3 5 5 7 10 15 20	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01	DISCHAR(DATE: TIME (MIN) 1 2 3 5 5 7 10 15 20	GE RATE 5	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7 10 15 20	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 0 0 5 5 5 5 20 8 0 0 5 5 8 0 0 8 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30	GE RATE 5	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20 30		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7 10 15 20 30	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7 10 15 20 30	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 7 10 15 20 30 40	GE RATE 5	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7 10 15 20	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20 30		DISCH, DATE: TIME (MIN) 1 2 3 5 5 7 10 15 20 30	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7 10 15 20 30	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 7 10 15 20 30 40	GE RATE 5 DRAW	TIME: YIELD	RPM TIME (MIN) 1 2 3 5 7 10 15 20 30 40		DISCH, DATE: TIME (MIN) 1 2 3 5 7 7 10 15 20 30 40	ARGE RATE	: E 6 TIME: YIELD	RPM TIME (MIN) 1 2 3 5 5 7 10 15 20 30 40	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 7 10 15 20 30 40 50 60	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60		DISCH, DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60	
DISCHARGE F DATE: IIME MIN) 2 3 5 7 7 0 0 5 5 7 7 0 0 5 5 5 7 0 0 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70		DISCH, DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70	
DISCHARGE F DATE: IIME MIN) 1 2 3 3 5 7 7 0 0 5 5 7 0 0 5 5 5 5 7 0 0 5 5 5 5	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80		DISCH, DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80	
DISCHARGE F DATE: IIME MIN) 1 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 0 0 0 5 5 5 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90	
DISCHARGE F DATE: IIME MIN) 2 3 3 5 7 0 0 5 5 5 0 0 5 5 0 0 5 5 0 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100	
DISCHARGE F DATE: IIME MIN) 2 3 3 5 7 0 0 5 5 5 0 0 5 5 5 0 0 5 5 5 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110	
DISCHARGE F DATE: IIME MIN) 2 2 3 3 5 7 0 0 5 5 5 5 5 5 6 0 5 5 5 6 0 6 0 6 0 6	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100	
DISCHARGE F DATE: IIME MIN) 1 2 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 0 5 5 7 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19	DISCHAR(DATE: TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110	
DISCHARGE F DATE: IIME MIN) 1 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 0 5 5 7 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	GE RATE 5 DRAW	TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	ARGE RATE	: E 6 TIME: YIELD	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	
DISCHARGE F DATE: IIME MIN) 1 2 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 1 5 5 7 7 0 0 1 5 5 7 7 0 0 0 1 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.47 3.53 3.59 	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13 30.11 	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14 1.10 1.07	DISCHAR(DATE: TIME (MIN) 1 2 3 3 5 5 7 10 15 20 30 40 50 50 60 60 60 70 80 90 100 110 120 pH	GE RATE 5 DRAW	TIME: YIELD (L/S)	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH	ARGE RATE	= 6 TIME: YIELD ((L/S)	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180	
DISCHARGE F DATE: IIME MIN) 1 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 0 5 5 7 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.41 3.47 3.53	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13 30.11 	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 130 1400 150 180 210	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14 1.10 1.07 1.05	DISCHAR(DATE: (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP	GE RATE 5 DRAW	TIME: YIELD (L/S) 	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 pH TEMP	ARGE RATE	E 6 TIME: YIELD ((L/S)	RPM (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210	
DISCHARGE F DATE: IIME MIN) 1 2 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 1 5 5 7 7 0 0 1 5 5 7 7 0 0 0 1 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.47 3.53 3.59 	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13 30.11 	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 150 180 210 240	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14 1.10 1.07 1.05 1.02	DISCHAR(DATE: (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP	GE RATE 5 DRAW	TIME: YIELD (L/S)	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 pH TEMP	ARGE RATE	= 6 TIME: YIELD ((L/S)	RPM TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	
DISCHARGE F DATE: IIME MIN) 1 2 2 3 3 5 7 7 0 0 5 5 7 7 0 0 5 5 7 7 0 0 1 5 5 7 7 0 0 1 5 5 7 7 0 0 0 1 5 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.47 3.53 3.59 	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13 30.11 	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 150 180 210 240 300	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14 1.10 1.07 1.05 1.02 0.98	DISCHAR(DATE: (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP	GE RATE 5 DRAW	TIME: YIELD (L/S)	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 pH TEMP	ARGE RATE	= 6 TIME: YIELD ((L/S)	RPM (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210	
DISCHARGE F DATE: IIME MIN) 2 2 3 3 5 7 0 0 5 5 5 5 5 5 6 0 5 5 5 6 0 5 5 5 6 0 6 0	RATE 4 21/08/2018 DRAW DOWN (M) 5.00 2.75 2.78 2.89 2.90 2.92 2.98 3.02 3.11 3.19 3.27 3.34 3.41 3.47 3.53 3.59 	TIME: YIELD (L/S) 29.44 29.91 30.15 30.11 30.15 30.12 30.10 30.16 30.11 30.12 30.10 30.13 30.11 	RPM 17H20 TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 150 180 210 240	RECOVERY (M) 3.12 2.76 2.61 2.41 2.27 2.21 2.10 2.01 1.86 1.74 1.62 1.57 1.51 1.45 1.36 1.25 1.19 1.14 1.10 1.07 1.05 1.02	DISCHAR(DATE: (MIN) 1 2 3 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP	GE RATE 5 DRAW	TIME: YIELD (L/S)	RPM (MIN) 1 2 3 5 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240		DISCH, DATE: TIME (MIN) 1 2 3 3 5 5 7 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 pH TEMP	ARGE RATE	= 6 TIME: YIELD ((L/S)	RPM TIME (MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	

				FORM 5]		
			CONSTAN	IT DISCHAR		T & RECOV	ERY							
	HOLE TEST RE		SHEET											
	NO : IOLE NO:	P2009	ASE 2 4 A	MAP REFER	ENCE:				PROVINCE					
ALT BH		0	ASE 3.4A			E 19.55587			DISTRICT: SITE NAME		CALVIN	IIA		
ALT BH		0								•	0			
BOREH	IOLE DEPTH:	77.20		DATUMLEVE	EL ABOV	E CASING (n	n):	0.40	EXISTING F	PUMP:	NEW B	NEW BOREHOLE		
	LEVEL (mbdl):			CASING HE		• •		0.38	CONTRACTOR: AB F			-		
	OF PUMP (m): ANT DISCHARG	70.25 E TEST 8	RECOVER	DIAM PUMP	INLEI (M	m):		310	PUMP TYP	E:	GW 960	J2		
	TARTED			TEST COMP	LETED									
DATE.	22/08/2018	TIME:	08H00		DATE.	25/00/2010		08H00	TYPE OF P			CW 0602		
DATE:	22/08/2018	TIVE:	08100		DATE: OBSER	25/08/2018 VATION HOL			ATION HOLE	-	OBSER	GW 9602 VATION HOLE 3		
					NR:			NR:			NR:			
	DISCHARGE BO	DREHOLE			Distance	()/		Distance			Distand	1 //		
	DRAW	YIELD		RECOVERY		Drawdown	,		Drawdown	Recovery		Drawdown		
(MIN) 1	DOWN (M) 0.21	(L/S)	MIN 1	(M) 6.68	(min) 1	m	(m)	(min) 1	(m)		(min) 1	(m)		
2	0.21	13.56	2	6.40	2			2	-		2			
3	0.44		3	6.27	3			3			3			
5	0.58		5	6.16	5			5			5			
7	0.81		7	6.09	7 10			7			7 10			
10 15	1.18 1.31	28.09 28.11	10 15	6.02 5.89	10 15			10 15			10 15			
20	1.42	28.17	20	5.81	20			20			20			
30	1.59	28.13	30	5.65	30			30			30			
40	1.77	28.10	40	5.53	40			40			40			
60 90	2.00 2.31	28.12 28.11	60 90	5.28 5.03	60 90			60 90			60 90			
90 120	2.53	28.00	120	4.79	90 120			120			120			
150	2.75	28.09	150	4.57	150			150			150			
180	2.94	28.07	180	4.37	180			180			180			
210	3.22	28.05	210	4.20	210			210			210			
240 300	3.38 3.66	28.09 28.10	240 300	4.09 3.74	240 300			240 300			240 300			
360	3.90	28.12	360	3.50	360			360			360			
420	4.10	28.10	420	3.28	420			420			420			
480	4.30	28.08	480	3.09	480			480			480			
540 600	4.66 4.68	28.11 28.07	540 600	2.95 2.77	540 600			540 600			540 600			
720	4.87	28.17	720	2.57	720			720			720			
840	5.12	28.11	840	2.37	840			840			840			
960	5.34	28.14	960	2.27	960			960			960			
1080	5.50	28.11	1080 1200	2.19	1080 1200		-	1080 1200		-	1080 1200			
1200 1320	5.66 5.80	28.11 28.09		2.14 2.09	1320			1320			1320			
1440	5.95	28.10	1440	2.04	1440			1440			1440			
1560	6.08	28.06	1560		1560			1560			1560			
1680	6.18	28.11	1680		1680			1680			1680			
1800 1920	6.27 6.37	28.13 28.09	1800 1920		1800 1920			1800 1920			1800 1920			
2040	6.45	28.05	2040		2040			2040			2040			
2160	6.57	28.09	2160		2160			2160			2160			
2280	6.68		2280		2280			2280			2280]		
2400 2520	6.74 6.85	28.09 28.11	2400 2520		2400 2520			2400 2520			2400 2520			
2520 2640	6.91	28.11			2520 2640			2520	<u> </u>		2520			
2760	6.99	28.10	2760		2760			2760			2760	<u> </u>		
2880	7.08		2880		2880			2880			2880			
3000			3000		3000			3000			3000			
3120 3240			3120 3240		3120 3240			3120 3240			3120 3240			
3240 3360		1	3360		3240			3240			3240			
3480			3480	<u> </u>	3480			3480			3480			
3600			3600		3600			3600			3600			
3720			3720		3720			3720			3720			
3840 3960			3840 3960		3840 3960			3840 3960			3840 3960			
4080		<u> </u>	4080		4080			4080			4080			
4200			4200		4200			4200			4200			
4320		Ļ	4320		4320			4320			4320			
	ne pumped(mir	ו):		2880		W/L			W/L			W/L		
Average	e yield (l/s):			28.11		L	I			I				

BOREHOLE TEST RECORD

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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

AB

Ground water solutions t/a AB Pumps CC

P2009

PR0JECT #

								BBR	MICHAEL
CONSULTANT:	GEOSS						_		ABEL
DISTRICT:	CALVINIA						_		ERNEST
PROVINCE:	NORTHERN CAP	PE					_	PRODUCTION BONUS:	PHINEAS
FARM / VILLAGE NAME :							_		SIMON
							-		
DATE TESTED:	26/08/2018						-	EC meter number	51
MAP REFERENCE:									
CO-ORDINATES:									
FORMAT ON GPS:	hddd	°mm '	SS.S	"		hddd	°mm.mmm		hddd.ddddd
LATITUDE:		•		II	- OR		•	- OR	S 31.35771
LONGITUDE:		•			-		0	-	E 19.69145
BOREHOLE NO:	CAL -PHASE	3-6			_				
TRANSMISSIVITY VALUE:					_				
TYPE INSTALLATION:	NEW BOREHOL	E			_				
BOREHOLE DEPTH: (mbgl)	111.42				_				
COMMENTS:									
SAMPLE INSTRUCTIONS : Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	EM
		-	16			macro	bacterio-logical		
Date sample taken	29/08/20	18	11 CO	nsultant took sample, give	name:			DATA CHECKED BY:	AVN
Time sample taken	01H20								
CONSULTANT GUIDELINES						1	1	Г	1
BOREHOLE DEPTH:	m	STE	P 1:		l/s	WATER STRIKE 1:			m
BLOW YIELD:	m	STE	P 2:		l∕s	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	STE	P 3:		l/s	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	STE	P 4:		l/s	COMMENTS:			
RECOVERY:		STE	P 5:		l∕s				
AFTER STEPS:	h	STE	P 6:		Vs	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DI	JRATION:		min				
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	111.40
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	75.17
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPEI				YES/NO	0
SUPPLIED NEW STEEL BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC				NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:	-			NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				м	100
LOGGERS FOR WATERLEVEL MONI	TORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
									· · ·
It is hereby acknowledged that u	pon leaving the	site, all exis	ting equipn	nent is in an acceptable co	ndition.				
NAME.					CNATURE				
NAME: DESIGNATION:				SI	DATE		_		
DEGIGINATION.					DATE:		_		

		FORM 5 E			143
-		STEPPED DISCHARGE TEST & RECOVERY			
BOREHOLE TEST	RECORD SHEE	Т			018
PROJ NO :	P2009	MAP REFERENCE: 0	PROVINCE:	NORTHERN CAPE	
BOREHOLE NO:	CAL -PHAS	E 3-6	DISTRICT:	CALVINIA	
ALT BH NO:	0		SITE NAME:	0	
ALT BH NO:	0			0	

				FORM 5 F								
			CONSTAN	IT DISCHAR		T & RECOV	ERY					
BORE	HOLE TEST R	ECORD										
PROJ N		P2009		MAP REFER	ENCE:				PROVINCE			IERN CAPE
-	IOLE NO:		ASE 3-6			E 19.69145			DISTRICT:		CALVIN	IIA
ALT BH ALT BH		0 0							SITE NAME		0	
	IOLE DEPTH:	111.42		DATUMLEVE	EL ABOV	E CASING (n	n):	0.54	EXISTING	PUMP:	NEW B	OREHOLE
	LEVEL (mbdl):			CASING HE				0.21	CONTRAC		ABPUN	
	OF PUMP (m):			DIAM PUMP		PUMP TYP	E:	WA 110)-2			
	ANT DISCHARG	E TEST 8	RECOVERY	TEST COMPI	ETED							
		I										
DATE:	27/08/2018	TIME:	13H30		DATE:	30/08/2018		01H30	TYPE OF P	-	00000	WA 110-2
					NR:	VATION HOL	.E 1	NR:	ATION HOLI	= 2	NR:	VATION HOLE 3
	DISCHARGE BO	OREHOLE			Distance	e(m);		Distance	(m);		Distand	ce(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	0.15		1	43.07	1	 		1			1	
2 3	0.27	11.65	2	42.95 42.86	2 3			2 3			2 3	
5	0.40	11.96	5	42.70	5			5			5	
7	1.68		7	42.55	7			7			7	
10	2.26	12.15	10	42.36	10			10			10	
15 20	3.36 4.28	12.07	15 20	42.10 41.99	15 20			15 20			15 20	
20 30	4.28	12.09	20 30	41.99	20 30			20 30			20 30	
40	8.36	12.07	40	41.38	40			40			40	
60	11.34	12.11	60	41.04	60			60			60	
90	14.94	12.09	90	40.72	90			90			90	
120 150	17.74 19.90	12.15 12.13	120 150	40.56 40.44	120 150			120 150			120 150	
150	21.67	12.13	150	40.44	150	<u> </u>		150			150	
210	23.19	12.05	210		210			210			210	
240	24.79	12.09	240	40.15	240			240			240	
300	26.68	12.06	300	40.03	300			300			300	
360 420	28.34 29.77	12.04	360 420	39.91 39.79	360 420	}		360 420			360 420	
480	30.84	12.02	480	39.66	480			480			480	
540	31.77	12.10	540	39.55	540			540			540	
600	32.57	12.07	600	39.42	600			600			600	
720 840	33.87 35.15	12.04 12.36	720 840	39.17 38.93	720 840	 		720 840			720 840	
960	36.33	12.30	960	38.67	960			960			960	
1080	37.35	12.13	1080	38.44	1080			1080			1080	
1200	38.43	12.11	1200	38.22	1200			1200			1200]
1320 1440	39.25 39.97	12.09 12.12	1320 1440	38.09 37.85	1320 1440	 		1320 1440			1320 1440	
1560	40.60	12.12	1560	57.00	1560			1560			1560	
1680	41.16	12.07	1680		1680			1680			1680	
1800	41.67	12.07	1800		1800			1800			1800	
1920	42.16	12.06	1920		1920	ļ		1920			1920	
2040 2160	42.68 43.21	12.09	2040 2160		2040 2160			2040 2160			2040 2160	
2280	10.21		2280		2280			2280			2280	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640 2760			2640 2760		2640 2760			2640 2760			2640 2760	
2760			2880		2880	}		2880			2880	
3000			3000		3000			3000			3000	
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360 3480			3360 3480		3360 3480			3360 3480			3360 3480	
3600			3600		3600			3600			3600	
3720			3720		3720			3720			3720	
3840			3840		3840			3840			3840	
3960			3960		3960			3960			3960	
4080 4200			4080 4200		4080 4200			4080 4200			4080 4200	
4320			4320		4320			4320			4320	
	ne pumped(mir	ו):		2160		W/L			W/L			W/L
Average	e yield (l/s):			12.07								

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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
	μ\$/cm	Microsiemens per centimeter
BO	REHO	DLE TEST REC



Ground water solutions t/a AB Pumps CC

CONCULTANT.								PR0JECT #	P2009
CONSULTANT:								BBR	PIETER MUNYAI
CUNSULIANT:	BVI								NXAMILE
	CALVINIA								KOLLEN
	NORTHERN CAR	ΡE						PRODUCTION BONUS:	
	KREITZBERG								
<u>Tracking Theeride Traine :</u>	Intentation								
DATE TESTED:	14/08/2018							EC meter number	
DATE TESTED.	14/00/2010						•	EO meter number	II
MAP REFERENCE:									
CO-ORDINATES:				-					
FORMAT ON GPS:	hddd	°mm '	SS.S			hddd	°mm.mmm '		hddd.dddd
							•		
LATITUDE:		• •			OR		•	- OP	S 31.63272
LONGITUDE:		•			-		0	_	E 19.75683
BOREHOLE NO:	CAL-PHASE	3.9			-				
TRANSMISSIVITY VALUE:					_				
TYPE INSTALLATION:	NEW BOREHOL	E			-				
BOREHOLE DEPTH: (mbgl)	62.15				_				
COMMENTS: WE OLNY	DID STEP, WE V	VERE INSTRU	CTED TO PL	ILL THE PIPES OUT					
SAMPLE INSTRUCTIONS :						r	n – – – – – – – – – – – – – – – – – – –		1
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	ELZAAN
Date sample taken	14/08/20	18	If co	nsultant took sample, give	name:				
					ilamo.			DATA CHECKED BY:	AVN
Time sample taken	15H50							DATA CHECKED BY:	AVN
Time sample taken	15H50							DATA CHECKED BY:	AVN
	15H50 m	STE	:P 1:	5.00	l/s	WATER STRIKE 1:		DATA CHECKED BY:	AVN
CONSULTANT GUIDELINES BOREHOLE DEPTH:	m			5.00	l/s			DATA CHECKED BY:	I
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YIELD:	m	STE	P 2:	5.00	Vs Vs	WATER STRIKE 2:		DATA CHECKED BY:	m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL:	m m m	STE	:P 2: :P 3:	5.00 8.00 10.00	Vs Vs Vs	WATER STRIKE 2: WATER STRIKE 3:		DATA CHECKED BY:	m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH:	m	STE STE STE	:P 2: :P 3: :P 4:	5.00	Vs Vs Vs Vs	WATER STRIKE 2:		DATA CHECKED BY:	m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YIELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY:	m m m	STE STE STE STE	:P 2: :P 3: :P 4: :P 5:	5.00 8.00 10.00	Vs Vs Vs Vs Vs	WATER STRIKE 2: WATER STRIKE 3: COMMENTS:	AFRS PHONE - (NAME &		m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS:	m m m h	STE STE STE STE STE	:P 2: :P 3: :P 4: :P 5: :P 6:	5.00 8.00 10.00	Vs Vs Vs Vs Vs Vs	WATER STRIKE 2: WATER STRIKE 3: COMMENTS:	BERS PHONE : (NAME & '		m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT:	m m m	STE STE STE STE STEP DL	:P 2: :P 3: :P 4: :P 5: :P 6: JRATION:	5.00 8.00 10.00	Vs Vs Vs Vs Vs	WATER STRIKE 2: WATER STRIKE 3: COMMENTS:	IERS PHONE : (NAME &)	[]	m m m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION:	m m m h	STE STE STE STE STEP DU UNIT	EP 2: EP 3: EP 4: EP 5: EP 6: JRATION: QTY	5.00 8.00 10.00 MAX	Vs Vs Vs Vs Vs Vs min	WATER STRIKE 2: WATER STRIKE 3: COMMENTS:	IERS PHONE : (NAME & '	TEL)	m m m
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT:	m m m h	STE STE STE STE STEP DU UNIT NO	EP 2: EP 3: EP 4: EP 5: EP 6: JRATION: QTY 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T	Vs Vs Vs Vs Vs Vs min EST:	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	IERS PHONE : (NAME & '	[]	m m m QTY 62.15
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CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTNESS TEST: VERTICALLY TEST: CASING DETECTION:	m m m h	STE STE STE STE STEP DU UNIT NO	EP 2: EP 3: EP 4: EP 5: EP 6: JRATION: QTY 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T	Vs Vs Vs Vs Vs Vs EST: FTER TEST:	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL)	m m m QTY 62.15
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTINESS TEST: VERTCALLY TEST:	m m m h	STE STE STE STE STE DUNIT NO NO	P 2: P 3: P 4: P 5: P 6: JRATION: QTY 0 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A	Vs Vs Vs Vs Vs Min EST: VFTER TEST: 27	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL)	m m m 017Y 62.15 19.53
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTNESS TEST: VERTICALLY TEST: CASING DETECTION: SUPPLIED NEW STEEL BOREHOLE (BOREHOLE MARKING	m m m h	STE STE STE STE STEP DU UNIT NO NO	P 2: P 3: P 4: P 5: P 6: RATION: QTY 0 0 1	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A SAND/GRAVEL/SILT PUMPEI DATA REPORTING AND REC SLUG TEST:	Vs Vs Vs Vs Vs Min EST: VFTER TEST: 27	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL)	m m m 62.15 19.53 0
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTNESS TEST: VERTICALLY TEST: CASING DETECTION: SUPPLIED NEW STEEL BOREHOLE (m m m h	STE STE STE STE STEP DL UNIT NO NO NO	IP 2: IP 3: IP 4: IP 5: IP 6: IRATION: O 0 0 1 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A SAND/GRAVEL/SILT PUMPEI DATA REPORTING AND REC	Vs Vs Vs Vs Vs Min EST: VFTER TEST: 27	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL) UNIT M YES/NO NO	m m m 62.15 19.53 0 1
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YIELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER CONSTANT: DESCRIPTION; STRAIGHTNESS TEST: VERTICALLY TEST: CASING DETECTION: SUPPLIED NEW STEEL BOREHOLE (BOREHOLE MARKING SITE CLEANING & FINISHING	m m m h h	STE STE STE STE STEP DL UNIT NO NO NO NO	P 2: P 3: P 4: P 5: P 6: VRATION: QTY 0 0 1 0 0 0 0 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A SAND/GRAVEL/SILT PUMPEI DATA REPORTING AND REC SLUG TEST:	Vs Vs Vs Vs Vs Min EST: VFTER TEST: 27	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL) UNIT M YES/NO NO NO	m m m 62.15 19.53 0 1 0
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CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YIELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTNESS TEST: VERTCALLY TEST: CASING DETECTION: SUPPLIED NEW STEEL BOREHOLE G BOREHOLE MARKING SITE CLEANING & FINISHING LOGGERS FOR WATERLEVEL MONIT	m m m h h cover:	STE STE STE STE UNIT NO NO NO NO NO	P 2: P 3: P 4: P 5: P 6: JRATION: 0 0 1 0 0 1 0 0 1 0 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A SANDIGRAVEL/SILT PUMPEI DATA REPORTING AND REC SLUG TEST: LAYFLAT (M): LOGGERS FOR pH AND EC:	Vs Vs Vs Vs Vs Vs Min EST: FTER TEST: ORDING	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME	JERS PHONE : (NAME & '	TEL) UNIT M YES/NO NO NO M	m m m 62.15 19.53 0 1 0 50
CONSULTANT GUIDELINES BOREHOLE DEPTH: BLOW YELD: STATIC WATER LEVEL: PUMP INSTALLATION DEPTH: RECOVERY: AFTER STEPS: AFTER STEPS: AFTER CONSTANT: DESCRIPTION: STRAIGHTNESS TEST: VERTCALLY TEST: CASING DETECTION: SUPPLIED NEW STEEL BOREHOLE G BOREHOLE MARKING SITE CLEANING & FINISHING LOGGERS FOR WATERLEVEL MONF It is hereby acknowledged that up	m m m h h cover:	STE STE STE STE UNIT NO NO NO NO NO Site, all exist	P 2: P 3: P 4: P 5: P 6: JRATION: 0 0 1 0 0 1 0 0 1 0 0	5.00 8.00 10.00 MAX BOREHOLE DEPTH AFTER T BOREHOLE WATER LEVEL A SAND/GRAVEL/SILT PUMPEI DATA REPORTING AND REC SLUG TEST: LAYFLAT (M): LOGGERS FOR PH AND EC: tent is in an acceptable co	Vs Vs Vs Vs Vs Vs Min EST: FTER TEST: ORDING	WATER STRIKE 2: WATER STRIKE 3: COMMENTS: TELEPHONE NUME		TEL) UNIT M YES/NO NO NO M	m m m 62.15 19.53 0 1 0 50
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				• 			RM 5	_							
				STEPPED I	DISCHAR	GE TEST &	RECO	VERY							
	E TEST REC				ENIOE						105	NODT		405	
PROJ NO : BOREHOLI		P2009	HASE 3.9	MAP REFER	ENCE:	0				PROVI DISTRI		CALVIN	IERN C.	APE	
ALT BH NO		0								SITE N					
ALT BH NO		0								0		KREITZ	BERG		
BOREHOLE	E DEPTH (m)		62.15		DATUML	EVEL ABOVE	E CASIN	IG (m):	0.42	EXISTI	NG PUMP:	NEW B	OREHO	LE	
	VEL (mbdl):		19.19			HEIGHT: (ma	0,		0.36		ACTOR:	AB PUN	ИPS		
DEPTH OF	PUMP (m):		58.00			/IP INLET (m			170.00	PUMP -	TYPE:	BP 50	BP 50		
DISCHARG			RPM	557		DISCHARG	ETEST	& REC	960		ARGE RATE	2	RPM	1223	
DISCHARG	ENALEI			557	DISCHAR	GE KATE Z			900	DISCH		- 3		1223	
DATE:	14/08/2018		07H30		DATE:	14/08/2018		08H30			14/08/201		09H30		
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER	
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	. /	(MIN)	(M)	
	0.10		1		1	0.42		1		1	0.99	10.46	1		
2	0.10		2		2	0.44	8.24	2		2	1.00		2		
3	0.11		3		3	0.47		3		3	1.03	11.27	3		
5	0.11	3.79	5		5	0.50	8.21	5		5	1.07		5		
7	0.12	4.21	7		7	0.55		7		7	1.10	11.28	7		
10	0.12		10		10	0.62	8.23	10		10	1.15		10		
15	0.13	4.20	15		15	0.65		15		15	1.21		15		
20	0.18		20		20	0.68		20		20	1.27	11.26	20		
30	0.24	4.21	30	1	30	0.77	8.25	30		30	1.36		30	1	
40	0.26		40		40	0.85	0.20	40	1	40	1.43		40	1	
+0 50	0.20	4.22	40 50		40 50	0.90	8.23	40 50		40 50	1.43	11.28	40 50		
		4.22	50 60				0.23			50 60		11.20	50 60	-	
6 0	0.36				60 	0.95		60			1.55				
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		
pН			150		рН			150		рН			150		
TEMP	14.30	°C	180		TEMP	15.60	°C	180		TEMP	20.90	°C	180		
EC	502	µS/cm	210		EC	522	µS/cm	210		EC	534	µS/cm	210		
DISCHARG	E RATE 4		RPM	1405	DISCHAR	GE RATE 5		RPM	•	DISCH	ARGE RATE	6	RPM		
DATE:	14/08/2018	TIME:	10H30		DATE:		TIME:			DATE:		TIME:			
TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER	
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)		(MIN)	(M)	
4		(Ľ/Ŭ)	(10111)	, <i>,</i>	4		(L/O)	(10111)	(10)	(101114)		(Ľ/Ŭ)	1	(101)	
•	1.65	40.07	1	1.96						1					
2	1.66	13.87	2	1.88	2			2		2			2		
3	1.67		3	1.81	3	-		3		3			3		
5	1.68	14.05		1.72	5			5		5			5		
7	1.73		7	1.60	7			7	ļ	7			7	<u> </u>	
10	1.76	14.01	10	1.53	10			10		10			10		
15	1.80		15	1.42	15			15		15			15		
20	1.84	14.03	20	1.37	20			20		20			20		
30	1.95		30	1.26	30			30		30			30		
40	2.03		40	1.17	40			40		40			40	1	
50	2.11	14.04	50	1.09	50	1		50	1	50	1		50	1	
50 60	2.17	. 1.07	60	1.05	50 60	1		60	1	60			60	1	
	2.17				70	1							70		
70	+		70	1.00		+		70	<u> </u>	70 80				+	
80			80	0.97	80			80		80			80		
90	_		90	0.94	90			90		90			90		
100			100	0.90	100	-		100		100			100		
110	_		110	0.88	110	ļ		110	<u> </u>	110			110	ļ	
120			120	0.87	120			120		120			120		
рН			150	0.82	pН			150		pН			150		
ТЕМР	20.10	°C	180	0.79	TEMP	T	°C	180	Γ	TEMP		°C	180	Γ	
EC	518	μS/cm		0.76	EC		μS/cm	210		EC		μS/cm			
-		, 9, 911	240	00		1		240		Ē			240	1	
			300	1	1	1		300	<u> </u>				300	1	
						+			 				300		
			360					360							

				FORM 5	F								
				IT DISCHAR	GE TES	T & RECOV	ERY						
BOREH PROJ N	HOLE TEST R	ECORD P2009	SHEET	MAP REFER		0.04.00070			PROVINCE	·.	NODT	HERN CAPE	
	IOLE NO:		ASE 3.9	MAP KEFEK	ENCE:	E 19.75683			DISTRICT:		CALVIN		
ALT BH		0				2 .00000			SITE NAME				
ALT BH	NO:	0							KREITZBERG				
	IOLE DEPTH:	62.15		DATUMLEV		,	n):	0.42	EXISTING PUMP: NEW BOREHOLE				
	LEVEL (mbdl): OF PUMP (m):			CASING HE DIAM PUMP		0.36 170	CONTRAC		AB PUN BP 50	MPS			
	ANT DISCHARC					170		<u> </u>	DI 30				
TEST S	TARTED			TEST COMP	LETED								
DATE:		TIME:			DATE:		TIME:		TYPE OF P	UMP∙		BP 50	
DATE.			1			VATION HOL		OBSERV	ATION HOLI	-	OBSER	RVATION HOLE 3	
					NR:			NR:			NR:		
	DISCHARGE B	1			Distanc		-	Distance	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	Distan		
TIME (MIN)	DRAW DOWN (M)	YIELD	TIME MIN	RECOVERY		Drawdown			Drawdown (m)	Recovery		Drawdown (m)	
(/////////////////////////////////////	0.21	(L/S)	1	(M) 6.68	(min) 1	m	(m)	(min) 1	(m)		(min) 1	(m)	
2	0.21	1	2	6.40	2			2			2		
3	0.44		3	6.27	3			3			3		
5	0.58		5	6.16	5			5			5		
7 10	0.81		7 10	6.09 6.02	7 10			7 10			7 10		
10 15	1.18	-	10 15	6.02 5.89	10 15			10			10 15		
20	1.42		20	5.81	20			20			20	1	
30	1.59		30	5.65	30			30			30		
40	1.77		40	5.53	40			40			40		
60 90	2.00		60 90	5.28	60 90			60 90			60 90		
90 120	2.31 2.53		120	5.03 4.79	90 120			120			90 120		
150	2.75		150	4.57	150			150			150		
180	2.94		180	4.37	180			180			180		
210	3.22		210	4.20	210			210			210		
240	3.38		240	4.09	240 300			240			240 300		
300 360	3.66 3.90		300 360	3.74 3.50	360			300 360			360		
420	4.10		420	3.28	420			420			420		
480	4.30		480	3.09	480			480			480		
540	4.66		540	2.95	540			540			540		
600 720	4.68 4.87		600 720	2.77 2.57	600 720			600 720			600 720		
840	5.12		840	2.37	840			840			840		
960	5.34		960	2.27	960			960			960		
1080	5.50		1080	2.19	1080			1080			1080		
1200	5.66		1200	2.14	1200			1200			1200		
1320 1440	5.80 5.95		1320 1440	2.09 2.04	1320 1440			1320 1440			1320 1440		
1560	6.08		1560	2.04	1560			1560			1560		
1680	6.18		1680		1680			1680			1680		
1800	6.27		1800		1800			1800			1800		
1920	6.37		1920		1920 2040			1920			1920		
2040 2160	6.45 6.57	-	2040 2160	+	2040 2160			2040 2160			2040 2160		
2280	6.68	1	2280		2280			2280			2280		
2400	6.74		2400		2400			2400			2400		
2520	6.85		2520		2520			2520			2520		
2640 2760	6.91 6.99		2640 2760		2640 2760			2640 2760			2640 2760		
2760 2880	6.99 7.08	1	2760		2760			2760			2760		
3000			3000		3000			3000			3000		
3120			3120		3120			3120			3120		
3240			3240		3240			3240			3240		
3360 3480			3360 3480	+	3360 3480			3360 3480			3360 3480		
3480 3600			3480	+	3480 3600			3480			3480 3600	}	
3720			3720		3720			3720			3720	1	
3840			3840		3840			3840			3840		
3960			3960		3960			3960			3960		
4080			4080		4080			4080			4080		
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	ne pumped(mi	n).	1	Ì		W/L			W/L			W/L	
Total tin	ne pumpeu(inii												

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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
BOI	REHO	DLE TEST RE



Ground water solutions t/a AB Pumps CC

									PR0JECT #	P2009
									BBR	JOHAN
CONSULTANT:		GEOSS						_		ABEL
DISTRICT:		HANTAM						_		ERNEST
PROVINCE:		NORTHERN CAP	ΡE					-	PRODUCTION BONUS:	SIMON
FARM / VILLAGE NAM	<u> //E :</u>	KRUITBURG CA	LVINIA					_		BRIGHT
								_		HENRY
DATE TESTED:		25/05/2018						_	EC meter number	#51
MAP REFERENCE:										
CO-ORDINATES:		له ما ما ما	°mm'	~~ ~			hddd	°mm.mmm		المراجا والمراجا والمراجا
FOF	MAT ON GPS:	naaa	mm	55.5			naaa	mm.mmm		hddd.ddddd
			• •					•		31.65036
	LATITUDE:		• •		"	OR		•	OR	19.80109
	LONGITUDE:					-			_	
BOREHOLE NO:		CAL-S2-4				-				
TRANSMISSIVITY VA	LUE:					-				
TYPE INSTALLATION	<u>l:</u>	NEW BOREHOL	E			-				
BOREHOLE DEPTH:	(mbgl)	185.96				-				
COMMENTS:										
<u>oommetero.</u>										
SAMPLE INSTRUCTI										
Water sample taken	0143 .	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	NAOMI
Date sample taken		27/05/20	18	lf co	nsultant took sample, give	name:		· · · · ·	DATA CHECKED BY:	AILENE
Time sample taken		07H45								
		07845								
CONSULTANT GUID	ELINES									
BOREHOLE DEPTH:		m	STE	P 1:		l∕s.	WATER STRIKE 1:			m
BLOW YIELD:		m	STE	P 2:		√s	WATER STRIKE 2:			m
STATIC WATER LEVE	L:	m	STE	P 3:		√s	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	STE	P 4:		l/s	COMMENTS:			
RECOVERY:			STE	P 5:		l∕s				
AFTER STEPS:		h	STE	P 6:		√s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP DU	JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TES	D:		NO	0	BOREHOLE DEPTH AFTER T	EST:			м	185.96
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL		(mbch)		м	16.46
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPE				YES/NO	0
SUPPLIED NEW STEE	EL BOREHOLE	COVER:	NO	0	DATA REPORTING AND REC				NO	1
BOREHOLE MARKING			NO	0	SLUG TEST:				NO	0
SITE CLEANING & FIN			NO	1	LAYFLAT (M):				м	100
LOGGERS FOR WATE		FORING	NO	1	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknow	ledged that up	oon leaving the	site, all exist	ting equipn	nent is in an acceptable co	ndition.				
	ME.					CNATURE				
DESIGNATI					SI	GNATURE:		-		
DESIGNATI	UN					DATE:		_		

				STEPPED I			RM 5	_						
	TEST DEC		лест	STEPPEDL	JISCHARG	ie iesi &	RECO	VERY						
BOREHOLE	IEST REU		1EE I			24.05020								
PROJ NO : BOREHOLE N	10	P2009 CAL-S2		MAP REFER	ENCE:	31.65036				PROVIN DISTRI			IERN C	APE
ALT BH NO:	NO:	0	-4			19.80109						HANTA	IVI	
ALT BH NO:		0								SITE N/	HIVIE.	KRUIT	BURG C	ALVINIA
BOREHOLE [0	185.96					G(m):	0.65	EVICTIN	NG PUMP:	0		
WATER LEVE	. ,		6.29			EIGHT: (ma		G (III).	0.05			AB PUN	IDC	
DEPTH OF PL			154.09			P INLET (m			117.00	PUMP		DW 40		
			134.03	6		SCHARG		& PEC			III L.	DW 40	52	
DISCHARGE			RPM	5		GE RATE 2		RPM		DISCH.	ARGE RATE	= 3	RPM	
DIOGNAROL					DIOOTIAN					DIOOTII				
DATE:	25/05/2018	TIME:	13H40		DATE:	25/05/2018	TIME:	15H20		DATE:	25/05/201	TIME:	17H00	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	1.16		1		1	7.22	2.32	1		1	13.12		1	
n	1.54		2		2	7.39	2.58	2		2	13.37		2	
2		<u> </u>											F	
3	1.68	<u> </u>	3		3	7.78	2.81	3		3	15.32	4.21	3	
5	1.88	1.31	5		5	8.39	3.07	5		5	16.21	4.41	5	
7	1.94	1.50	7		7	8.88	3.06	7		7	16.61	4.53	7	
10	2.10	2.03	10		10	9.21	3.07	10		10	16.96		10	İ
			-					-		-				
15	3.16	2.03	15		15	9.83	3.07	15		15	17.46	4.50	15	ļ
20	3.66	2.02	20		20	10.20	3.05	20		20	17.77	4.50	20	L
30	4.39	2.02	30		30	10.77	3.05	30		30	18.37	4.50	30	
40	4.97	2.01	40		40	11.17	3.05	40		40	18.80	4.50	40	
			-											
50	5.26	2.02	50		50	11.37	3.04	50		50	19.15	4.54	50	
60	5.64	2.01	60		60	11.64	3.04	60		60	20.25	4.53	60	L
70	5.95	2.00	70		70	12.01	3.04	70		70	20.73	4.33	70	
80	6.22	2.00	80		80	12.33	3.06	80		80	21.17	4.52	80	
									1					
90	6.61	2.01	90		90	12.73	3.05	90		90	21.62	4.52	90	
100	6.89		100		100	13.02		100		100	22.01		100	
110			110		110			110		110			110	
120			120		120			120		120			120	
-		<u> </u>						-						
pН		<u> </u>	150		рН			150		рН			150	
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	486.00	µS/cm	210		EC	480.00	µS/cm	210		EC	524.00	µS/cm	210	
DISCHARGE	RATE 4		RPM		DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	Ξ6	RPM	
DATE:	25/05/2018	TIME	18H40		DATE:		TIME:			DATE:		TIME:		
	DRAW		1			DRAW		TIME	RECOVERY					RECOVER
TIME				RECOVERY		DRAW	YIELD		RECOVERT	TIME	DRAW	YIELD	TIME	
(* *** ··)		YIELD	TIME	(* *					(n. m.					(M)
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	
(MIN) 1				(M) 70.22	(MIN) 1	DOWN (M)	(L/S)		(M)	(MIN) 1	DOWN (M)	(L/S)	(MIN) 1	
1	DOWN (M) 22.52	(L/S)		70.22	1	DOWN (M)	(L/S)	(MIN) 1	(M)	1	DOWN (M)	(L/S)	` '	
1 2	DOWN (M) 22.52 20.23	(L/S)	(MIN) 1 2	70.22 40.11	1 2	DOWN (M)	(L/S)	(MIN) 1 2	(M)	1 2	DOWN (M)	(L/S)	1 2	
1 2 3	DOWN (M) 22.52 20.23 28.86	(L/S) 6.58	(MIN) 1 2 3	70.22 40.11 28.98	1 2 3	DOWN (M)	(L/S)	(MIN) 1 2 3	(M)	1 2 3	DOWN (M)	(L/S)	1 2 3	
1 2 3 5	DOWN (M) 22.52 20.23 28.86 33.37	(L/S) 6.58 6.61	(MIN) 1 2 3 5	70.22 40.11 28.98 25.12	1 2 3 5	DOWN (M)	(L/S)	(MIN) 1 2 3 5	(M)	1 2 3 5		(L/S)	1 2 3 5	
1 2 3 5	DOWN (M) 22.52 20.23 28.86	(L/S) 6.58	(MIN) 1 2 3	70.22 40.11 28.98	1 2 3	DOWN (M)	(L/S)	(MIN) 1 2 3	(M)	1 2 3			1 2 3	
1 2 3 5 7	DOWN (M) 22.52 20.23 28.86 33.37 37.50	(L/S) 6.58 6.61 6.60	(MIN) 1 2 3 5	70.22 40.11 28.98 25.12	1 2 3 5	DOWN (M)	(L/S)	(MIN) 1 2 3 5	(M)	1 2 3 5			1 2 3 5	
1 2 3 5 7 10	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11	(L/S) 6.58 6.61 6.60 6.62	(MIN) 1 2 3 5 7 10	70.22 40.11 28.98 25.12 22.91 21.54	1 2 3 5 7 10	DOWN (M)	(L/S)	(MIN) 1 2 3 5 7 10	(M) 	1 2 3 5 7 10			1 2 3 5 7 10	
1 2 3 5 7 10 15	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11	(L/S) 6.58 6.61 6.60 6.62 6.61	(MIN) 1 2 3 5 7 10 15	70.22 40.11 28.98 25.12 22.91 21.54 19.82	1 2 3 5 7 10 15	DOWN (M)	(L/S)	(MIN) 1 2 3 5 7 10 15	(M)	1 2 3 5 7 10 15			1 2 3 5 7 10 15	
1 2 3 5 7 10 15 20	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68	(MIN) 1 2 3 5 7 10 15 20	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92	1 2 3 5 7 10 15 20	DOWN (M)	(L/S)	(MIN) 1 2 3 5 7 10 15 20		1 2 3 5 7 10 15 20			1 2 3 5 7 10 15 20	
1 2 3 5 7 10 15 20	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11	(L/S) 6.58 6.61 6.60 6.62 6.61	(MIN) 1 2 3 5 7 10 15	70.22 40.11 28.98 25.12 22.91 21.54 19.82	1 2 3 5 7 10 15		(L/S)	(MIN) 1 2 3 5 7 10 15	(M)	1 2 3 5 7 10 15			1 2 3 5 7 10 15	
2 2 3 5 7 10 15 20 30	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68	(MIN) 1 2 3 5 7 10 15 20	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29	1 2 3 5 7 10 15 20		(L/S)	(MIN) 1 2 3 5 7 10 15 20		1 2 3 5 7 10 15 20			1 2 3 5 7 10 15 20	
1 2 3 5 7 10 15 20 30 40	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16	1 2 3 5 7 10 15 20 30 40		(L/S)	(MIN) 1 2 3 5 7 10 15 20 30 40		1 2 3 5 7 10 15 20 30 40			1 2 3 5 7 10 15 20 30 40	
2 2 3 5 5 7 10 15 20 30 40 50	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22	1 2 3 5 7 10 15 20 30 40 50		(L/S)	(MIN) 1 2 3 5 7 10 15 20 30 40 50		1 2 3 5 7 10 15 20 30 40 50			1 2 3 5 7 10 15 20 30 40 50	
2 2 3 5 5 7 10 15 20 30 40 50 50 60	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84 6.85 6.83	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16	2 3 5 7 10 15 20 30 40 50 60			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60		1 2 3 5 7 10 15 20 30 40 50 60			1 2 3 5 7 10 15 20 30 40 50 60	
2 2 3 5 5 7 10 15 20 30 40 50 50 60	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22	1 2 3 5 7 10 15 20 30 40 50			(MIN) 1 2 3 5 7 10 15 20 30 40 50		1 2 3 5 7 10 15 20 30 40 50			1 2 3 5 7 10 15 20 30 40 50	
2 2 3 5 7 10 15 20 30 40 50 50 50 50 70 70	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84 6.85 6.83	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16	2 3 5 7 10 15 20 30 40 50 60			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60		1 2 3 5 7 10 15 20 30 40 50 60			1 2 3 5 7 10 15 20 30 40 50 60	
1 2 3 5 7 10 15 20 30 40 50 60 70 30	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.84 6.85 6.83 6.84 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57	2 2 3 5 7 10 15 20 30 40 50 60 70 80			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80		1 2 3 5 7 10 15 20 30 40 50 60 70 80			1 2 3 5 7 10 15 20 30 40 50 60 70 80	
1 2 3 5 7 10 15 20 30 40 50 60 70 80 90	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.86 6.84 6.85 6.83 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80	2 2 3 5 7 10 15 20 30 40 50 60 70 80 90			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90			2 3 5 7 10 15 20 30 40 50 60 70 80 90	
1 2 3 5 7 10 15 20 30 40 50 60 70 30 90 100	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.84 6.85 6.83 6.84 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 11.20	2 3 5 7 10 15 20 30 40 50 50 60 70 80 90 100			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100			2 3 5 7 10 15 20 30 40 50 60 70 80 90 100	
1 2 3 5 7 10 15 20 30 40 50 60 70 30 90 100	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.84 6.85 6.83 6.84 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80	2 3 5 7 10 15 20 30 40 50 50 60 70 80 90 100 110			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 110		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110			2 3 5 7 10 15 20 30 40 50 60 70 80 90	
1 2 3 5 7 10 15 20 30 40 50 60 70 30 90 100 110	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.84 6.85 6.83 6.84 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 11.20	2 3 5 7 10 15 20 30 40 50 50 60 70 80 90 100			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100			2 3 5 7 10 15 20 30 40 50 60 70 80 90 100	
1 2 3 5 7 10 15 20 330 40 50 60 70 80 90 110 120	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.86 6.84 6.83 6.83 6.84 6.84	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 11.20 10.40 10.02	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120			1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120	
2 2 3 5 5 7 10 15 20 30 40 50 60 60 60 60 60 90 110 120 pH	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.84 6.84 6.84 6.84 6.80 	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 155 100 110 155 100 115 100 115 100 115 100 100	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 10.40 9.12	2 2 3 5 7 10 15 20 30 40 50 60 60 70 80 90 110 120 pH			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH			1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	
2 2 3 5 5 7 10 15 20 30 40 50 50 50 50 50 50 50 50 50 50 50 50 50	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.85 6.84 6.84 6.84 6.84 6.84 6.84 6.84 6.85 6.84 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.85 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 150 180	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 11.20 10.40 10.02 9.12 8.15	2 3 5 7 10 15 20 30 30 40 50 60 60 60 70 80 90 100 110 120 pH TEMP		°C	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180	
2 2 3 5 5 7 10 15 20 30 40 50 50 50 50 50 50 50 50 50 50 50 50 50	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.84 6.84 6.84 6.84 6.80 	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 155 100 110 155 100 115 100 115 100 115 100 100	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 10.40 9.12	2 2 3 5 7 10 15 20 30 40 50 60 60 70 80 90 110 120 pH			(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150	
2 2 3 5 5 7 10 15 20 30 40 50 50 50 50 50 50 50 50 50 50 50 50 50	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.85 6.84 6.84 6.84 6.84 6.84 6.84 6.84 6.85 6.84 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.85 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 110 120 150 180	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 11.20 10.40 10.02 9.12 8.15	2 3 5 7 10 15 20 30 30 40 50 60 60 70 80 90 100 110 120 pH TEMP		°C	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180	
1	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.85 6.84 6.84 6.84 6.84 6.84 6.84 6.84 6.85 6.84 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.85 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 10.40 10.02 9.12 8.15 7.50 6.82	2 3 5 7 10 15 20 30 30 40 50 60 60 70 80 90 100 110 120 pH TEMP		°C	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	
2 2 3 5 7 10 15 20 30 40 50 60 60 70 80 90 110 120 pH TEMP	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.85 6.84 6.84 6.84 6.84 6.84 6.84 6.84 6.85 6.84 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.85 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 110 120 150 180 210 240 300	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 10.40 10.02 9.12 8.15 7.50 6.82 6.01	2 3 5 7 10 15 20 30 30 40 50 60 60 70 80 90 100 110 120 pH TEMP		°C	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210	
2 2 3 5 5 7 10 15 20 30 40 50 60 60 60 60 70 80 90 110 120 pH TEMP	DOWN (M) 22.52 20.23 28.86 33.37 37.50 43.11 49.11 53.21 59.24 62.22 64.25 67.76 68.66 70.71 71.48	(L/S) 6.58 6.61 6.60 6.62 6.61 6.68 6.84 6.85 6.83 6.84 6.85 6.84 6.84 6.84 6.84 6.84 6.84 6.84 6.85 6.84 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.84 6.85 6.84 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.84 6.85 6.85 6.84 6.85	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	70.22 40.11 28.98 25.12 22.91 21.54 19.82 18.92 17.29 16.16 14.22 13.16 13.15 12.57 11.80 10.40 10.02 9.12 8.15 7.50 6.82	2 3 5 7 10 15 20 30 30 40 50 60 60 70 80 90 100 110 120 pH TEMP		°C	(MIN) 1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240		1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 pH TEMP		•°C	1 2 3 5 7 10 15 20 30 40 50 60 70 80 90 100 110 120 150 180 210 240	

				FORM 5	F							
חטטבי				NT DISCHAR	GE TES	T & RECO\	/ERY					
BOREF PROJ N	HOLE TEST R	P2009	SHEET	MAP REFER	ENCE	31.65036			PROVINCE		NORTH	HERN CAPE
	IOLE NO:	CAL-S2	-4		LNCL.	19.80109			DISTRICT:		HANTA	
ALT BH	NO:	0							SITE NAME	:	KRIJITI	BURG CALVINIA
ALT BH		0										BOILO CALVINIA
	IOLE DEPTH:	185.96				•	m):	0.65 0.18	EXISTING F		0 AB PUI	
	LEVEL (mbdl) OF PUMP (m)			CASING HE DIAM PUMP		• •		0.18 117			АВ РОГ DW 40	
	ANT DISCHAR							•••			511 10	
TEST S	TARTED	-	-	TEST COMP	LETED		T	T				
DATE:	26/05/2018	TIME:	08H00		DATE:		TIME:		TYPE OF P	UMP:		DW 4002
						VATION HO		OBSERV	ATION HOLE	-	OBSEF	VATION HOLE
					NR:	CAL S2-3		NR:			NR:	
	DISCHARGE B	-	1		Distanc		900	Distance	1.	0	Distant	
	DRAW DOWN (M)	(L/S)	TIME	RECOVERY (M)	TIME: (min)	Drawdown m	(m)	TIME: (min)	Drawdown (m)	Recovery	(min)	Drawdown (m)
	1.55	(1,0)	1	27.78	(1111) 1		\''' <i>\</i>	1	1. ¹¹ /		1	\''' <i>\</i>
2	3.32		2	26.35	2			2			2	
3	4.21	2.20	3	25.35	3			3			3	
5	5.39	4.02	5	24.50	5 7	0.03	15.50	5			5	
7 10	5.72 7.28	4.04	7 10	23.84 23.00	7 10	0.08	15.42	7 10			7 10	
15	8.56	4.04	15	23.00	10	0.08	15.42	10	1		15	
20	9.37	4.09	20	21.01	20	0.31	15.00	20			20	
30	11.72	4.07	30	20.81	30	0.60	14.78	30			30	
40 NO	12.52	4.05	40	20.01	40	0.88	14.61	40			40	
50 90	13.87 15.32	4.05	60 90	18.72 17.18	60 90	1.39 2.11	14.33 13.87	60 90			60 90	
120	16.79	4.03	120	16.12	90 120	2.73	13.37	120			120	
50	17.85	4.04	150	15.17	150	3.33	12.83	150			150	
80	18.87	4.08	180	14.13	180	3.87	12.38	180			180	
210	19.32	4.08	210	13.54	210	4.43	11.92	210			210	
240	20.24	4.06	240	12.70	240 300	4.84	11.55	240			240	
300 360	21.89 23.75	4.06	300 360	11.58 10.80	300	5.85 6.59	10.76 9.83	300 360			300 360	
420	24.81	4.05	420	9.25	420	7.32	9.47	420			420	
480	25.81	4.09	480	9.21	480	7.97	9.05	480			480	
540	26.63	4.09	540	8.57	540	8.48	8.49	540			540	
6 0 0	28.17	4.09	600	7.80	600 720	9.18 10.33	7.93	600			600 720	
720 840	29.60 30.59	4.07	720 840		720 840	10.33		720 840			840	
960	31.77	4.03	960		960	11.59		960			960	
1080	32.47	4.04	1080		1080	12.20		1080			1080	
1200	33.58	4.02	1200		1200	13.65		1200			1200	
1320 1440	34.11		1320		1320 1440	14.53		1320 1440			1320 1440	
1560	34.86		1440 1560		1560	15.55		1560			1560	
680			1680		1680			1680			1680	
800			1800		1800			1800			1800	
1920			1920		1920			1920			1920	
2040 2160			2040 2160		2040 2160			2040 2160			2040 2160	
2160		1	2160		2160			2160			2160	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640			2640		2640			2640			2640	
2760 2880			2760 2880		2760 2880			2760 2880			2760 2880	
3000			3000		2880			3000	1		3000	
3120		\bot	3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480 2600		+	3480		3480	<u> </u>	-	3480			3480	
3600 3720		+	3600 3720		3600 3720	<u> </u>	1	3600 3720	+		3600 3720	+
3840			3840		3840	1		3840	1		3840	1
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
4200			4200		4200	<u> </u>		4200			4200	
4320 Total tin	ne pumped(mi	in):	4320	1440	4320	W/L	14.93	4320	W/L		4320	W/L
				4.03	I		1-1.00	1			1	

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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
BOF	<u>EHC</u>	DLE TEST RE



Ground water solutions t/a AB Pumps CC Т

									PR0JECT #	P2009
									BBR	MICHAEL
CONSULTANT:		GEOSS								ABEL
DISTRICT:		CALVINIA						_		ERNST/PHINEAS
PROVINCE:		NORTHERN CAP	PE					_	PRODUCTION BONUS:	SIMON
FARM / VILLAGE NAM	<u>E:</u>	CALVINIA						_		HENRY
								-		
DATE TESTED:		28/06/2018						-	EC meter number	#31
								-		
MAP REFERENCE:										
CO-ORDINATES:			• •					•		
FOR	MAT ON GPS:	hddd	°mm '	SS.S			hddd	°mm.mmm		hddd.ddddd
			• •					•		31.61755
	LATITUDE:		• •		11	OR		0	- OR	19.74473
	LONGITUDE:					-			_	19./44/3
BOREHOLE NO:		CAL-S2-10				-				
TRANSMISSIVITY VAL	UE:					-				
TYPE INSTALLATION		NEW BOREHOL	E			-				
BOREHOLE DEPTH: (mbgl)	151.16				-				
0000000										
COMMENTS:										
SAMPLE INSTRUCTION	<u>NS :</u>	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	NAOMI
				M			macro	bacterio-logical		
Date sample taken		01/07/20	18	If CO	nsultant took sample, give	name:			DATA CHECKED BY:	AILENE
Time sample taken		09H10								
CONSULTANT GUIDE	LINES								1	
BOREHOLE DEPTH:		m	STE	P 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m	STE	P 2:		Vs	WATER STRIKE 2:			m
STATIC WATER LEVEL	:	m	STE	P 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	STE	P 4:		Vs	COMMENTS:			
RECOVERY:			STE	P 5:		Vs				
AFTER STEPS:		h	STE	P 6:		Vs	TELEPHONE NUME	BERS PHONE : (NAME &	(EL)	
AFTER CONSTANT:		h	STEP DU	JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
						TOT.				
STRAIGHTNESS TEST VERTICALLY TEST:			NO	0	BOREHOLE DEPTH AFTER T		(mbab)		м	151.15 20.55
							(mbch)			
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPER				YES/NO	0
SUPPLIED NEW STEE	LBOREHOLE	JOVER:	NO	0	DATA REPORTING AND REC	ORDING			NO	1
BOREHOLE MARKING			NO		SLUG TEST:				NO	0
SITE CLEANING & FINI			NO	1	LAYFLAT (M):				м	
LOGGERS FOR WATE	RLEVEL MONI	IORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
It is hereby acknowl	edged that up	oon leaving the	site, all exist	ting equipm	nent is in an acceptable cor	ndition.				
					SI					
DESIGNATIO	DN:					DATE:		_		

							RM 5	_						
				STEPPED	DISCHAR	GE TEST &	RECO	/ERY						
	E TEST REC		IEET											
	NO	P2009	10	MAP REFER	ENCE:	31.61755							IERN C	APE
BOREHOLE	NO:	CAL-S2	2-10			19.74473				DISTRI SITE N		CALVIN		
ALT BH NO:		0									~w∟.	CALVIN	IIA	
BOREHOLE	DEPTH (m)		151.16		DATUML	EVEL ABOVE	E CASIN	G (m):	0.54	EXISTI	NG PUMP:	0		
WATER LEV	EL (mbdl):		19.44		CASING	HEIGHT: (ma	agl):		0.22	CONTR	RACTOR:	AB PU	N PS	
DEPTH OF F	PUMP (m):		100.15			VP INLET (m			178.00	PUMP -	TYPE:	WA-110)-2	
						DISCHARG	E TEST							
DISCHARGE	ERATE 1		RPM	98.8	DISCHAR	GE RATE 2		RPM	190	DISCH	ARGE RATE	- 3	RPM	459
DATE:	28/06/2018	TIME:	12H00		DATE:	28/06/2018	TIME:	13H00		DATE:	28/06/201	TIME:	14H00	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVE
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	0.18		1		1	0.48		1		1	0.94		1	
2	0.20		2		2	0.57	4.14	2		2	0.96		2	
3	0.21	2.33	3		3	0.66	4.69	3		3	0.98	5.78	3	
5	0.23	2.30	5		5	0.73	4.95	5		5	1.03	6.81	5	
7	0.24	2.31	7		7	0.77	5.04	7		7	1.05	7.99	7	
10	0.25	2.37	, 10		, 10	0.79	5.07	, 10		, 10	2.03	8.51	, 10	19.50
15	0.25		15	1	15			15		15			15	13.30
		2.36				0.81	5.10	-			2.98			+
20	0.25	2.35	20		20	0.85	5.10	20		20	3.42		20	
30	0.27	2.36	30		30	0.87	5.07	30	ł	30	3.73	12.28		
40	0.27	2.36	40		40	0.88	5.05	40		40	3.73	-	40	
50	0.28	2.35	50		50	0.90	5.07	50		50	3.82	12.24	50	L
60	0.29	2.35	60		60	0.91	5.07	60		60	3.93		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	
														1
120			120		120			120		120	-		120	
pН	_		150		рН			150		рН			150	
TEMP		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	810.00	µS/cm	210		EC	778.00	µS/cm	210		EC	812.00	µS/cm	210	
DISCHARGE	E RATE 4		RPM	706.8	DISCHAR	GE RATE 5		RPM		DISCH	ARGE RATE	6	RPM	
DATE:	28/06/2018	TIME:	15H00		DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	3.95		1	2.72	1		. ,	1		1		. ,	1	
2	3.99	13.81	2	1.55	2			2		2			2	1
3	4.42		3	1.33				3		3			3	1
-					3			-		-			-	1
5	4.67	15.72		1.05	5			5		5			5	
7	6.41		7	0.93	7			7		7			7	
10	7.66	18.50		0.82	10			10	ļ	10			10	
15	9.11	18.96	15	0.76	15			15		15			15	
20	9.51	19.20	20	0.68	20			20		20			20	
30	9.94	19.06	30	0.60	30			30		30			30	
40	10.08	19.04		0.55	40			40		40			40	
50	10.56	19.07		0.51	-10 50	1		50	1	50	İ		50	1
50 60	10.50	19.11		0.49	50 60			60		60	1		60	1
									-					+
70	10.83	19.12		0.44	70			70		70			70	
80	10.94	19.10		0.41	80			80		80	ļ		80	
90	11.03	19.04	90	0.39	90			90		90	ļ		90	
100	11.09	19.03	100	0.37	100			100		100			100	
110	11.17	19.00	110	0.36	110			110		110			110	
120	11.28	19.02	120	0.35	120			120		120			120	
рН			150	0.31	pН			150		pН			150	1
ГЕМР		°C	180	0.29	ТЕМР	1	°C	180	1	ТЕМР	t	°C	180	1
	+							210						+
EC	+	µS/cm		0.27	EC	+	µS/cm		+	EC	<u> </u>	µS/cm		+
	+		240	0.25		+		240	ł		<u> </u>		240	┨────
	1		300	0.21				300	1		L		300	
			360					360					360	

				FORM 5	F							
1				IT DISCHAR		T & RECOV	ERY					
	OLE TEST R		SHEET			04.04===					NORT	
PROJN	OLE NO:	P2009 CAL-S2-	-10	MAP REFER	ENCE:	31.61755 19.74473			PROVINCE DISTRICT:		CALVIN	IERN CAPE
ALT BH		0	-10			19.74475			SITE NAME			
ALT BH		0									CALVIN	IIA
	OLE DEPTH:	151.16		DATUMLEVE			n):	0.54	EXISTING F		0	
	LEVEL (mbdl)			CASING HE				0.22	CONTRAC		AB PU	
	OF PUMP (m): ANT DISCHARC		RECOVERY	DIAM PUMP	INLE I (m	m):		178	PUMP TYP	E:	WA-110)-2
TEST ST				TEST COMP	LETED							
DATE:	29/06/2018	TIME:	09H20		DATE:	VATION HOL	TIME:		TYPE OF P ATION HOLI			WA-110-2 RVATION HOLE 3
					NR:	VATION TIOL	<u> </u>	NR:		_ Z	NR:	VATION TIOLE 3
	DISCHARGE B	OREHOLE			Distanc	e(m);		Distance	(m);		Distan	ce(m);
	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	4.72	10.47	1	4.79	1			1			1	
2 3	5.40 6.61	16.47 19.78	2	4.35 4.24	2 3			2 3			2 3	+
5	8.59	20.05	5	4.24	5			5			5	1
7	9.26		7	3.98	. 7			7			7	<u> </u>
10	9.87		10	3.88	10			10			10	
15	10.37	20.15	15	3.76	15			15			15	l
20 30	10.64 11.08	20.24 20.15	20 30	3.68 3.55	20 30			20 30			20 30	<u> </u>
30 40	11.08	20.15	30 40	3.55	30 40			30 40			30 40	+
40 60	11.66	20.08	60	3.30	60			60			60	
90	11.98	20.20	90	3.13	90			90			90	
120	12.32	20.13	120	3.04	120			120			120	
150	12.61	20.12	150	2.90	150			150			150	l
180 210	12.83 12.96	20.10 20.09	180 210	2.79 2.70	180 210			180 210			180 210	
210	12.96	20.09	240	2.70	240			210			240	<u> </u>
300	13.43	20.13	300	2.52	300			300			300	1
360	13.66	20.15	360	2.43	360			360			360	
420	13.90	20.13	420	2.35	420			420			420	<u> </u>
480 540	14.11 14.21	20.10	480 540	2.31 2.26	480 540			480 540			480 540	<u> </u>
540 600	14.21	20.15	540 600	2.26	540 600			540 600			540 600	+
720	14.89	20.13	720	2.10	720			720			720	†
840	15.17	20.16	840	2.06	840			840			840	
960	15.46	20.10	960	2.02	960			960			960	
1080	15.73	20.01	1080	1.98	1080 1200			1080			1080 1200	
1200 1320	15.94 16.23		1200 1320	1.93 1.88	1200 1320			1200 1320			1200	+
1440	16.57	20.01	1440	1.85	1440			1440			1440	†
1560	16.71	20.07	1560	1.82	1560			1560			1560	
1680	16.96	20.09	1680	1.80	1680			1680			1680	
1800	17.07	20.10	1800	1.75	1800			1800			1800	ł
1920 2040	17.69 17.88	20.08 20.05	1920 2040	1.71 1.67	1920 2040			1920 2040			1920 2040	<u> </u>
2040	17.88		2040	1.67	2040 2160			2040			2040	<u> </u>
2280	18.35	20.02	2280	1.61	2280			2280			2280	
2400	18.41		2400	1.58	2400			2400			2400	
2520	18.54		2520	1.55	2520			2520			2520	
2640	18.73 18.94	20.10 20.09	2640	1.53 1.51	2640 2760			2640 2760			2640	<u> </u>
2760 2880	18.94	20.09	2760 2880	1.51	2760			2760			2760 2880	1
3000	10.00		3000	1.13	3000			3000			3000	†
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360			3360		3360			3360			3360	l
3480 3600		-	3480		3480 3600			3480			3480	
3600 3720		+	3600 3720		3600 3720			3600 3720			3600 3720	+
3840		1	3840		3840			3840			3840	†
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
		1	4200	1	4200	1	1	4200	1	1	4200	1
4200												
4320	ne pumped(mi	n).	4320	2880	4320	W/L		4320	W/L		4320	W/L

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	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

PR0JECT #

AB

P2009

								BBR	MICHAEL
CONSULTANT:	GEOSS						_		ABEL
DISTRICT:	CALVINIA						_		PHINEAS
PROVINCE:	NORTHERN CA	PE					_	PRODUCTION BONUS:	ERNEST
FARM / VILLAGE NAME :	SPITZKOP						_		SIMON
							-		
DATE TESTED:	16/08/2018						-	EC meter number	51
MAP REFERENCE:									
CO-ORDINATES:									
FORMAT ON GP	s: hddd	°mm ˈ	SS.S	"		hddd	°mm.mmm	•	hddd.dddd
LATITUD	E:	•		"	OR		•	OR	S 31.37297
LONGITUD	E:	•		"			•	<u> </u>	E 19.97083
BOREHOLE NO:	REDRILL - 3	9602							
TRANSMISSIVITY VALUE:									
TYPE INSTALLATION:	NEW BOREHO	LE							
BOREHOLE DEPTH: (mbgl)	151.00								
0.011151150									
COMMENTS:									
SAMPLE INSTRUCTIONS :									
Water sample taken	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	ELZAAN
Date sample taken	19/0820	018	If co	nsultant took sample, give i	name:			DATA CHECKED BY:	AVN
Time sample taken	15H55					l		L	
CONSULTANT GUIDELINES									
BOREHOLE DEPTH:	m	STE	P 1:		Vs	WATER STRIKE 1:			m
BLOW YIELD:	m	STE	P 2:		Vs.	WATER STRIKE 2:			m
STATIC WATER LEVEL:	m	STE	P 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION DEPTH:	m	STE	P 4:		Vs	COMMENTS:			
RECOVERY:		STE	P 5:		√s				
AFTER STEPS:	h	STE	P 6:		<i>l</i> /s	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:	h	STEP DI	JRATION:		min				
DESCRIPTION:		UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST:		NO	0	BOREHOLE DEPTH AFTER T	EST:			M	151.00
VERTICALLY TEST:		NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	8.53
CASING DETECTION:		NO	1	SAND/GRAVEL/SILT PUMPER				YES/NO	0
SUPPLIED NEW STEEL BOREHOL	E COVER:	NO	0	DATA REPORTING AND REC				NO	1
BOREHOLE MARKING		NO	0	SLUG TEST:				NO	0
SITE CLEANING & FINISHING		NO	1	LAYFLAT (M):				м	100
LOGGERS FOR WATERLEVEL MO	NITORING	NO	0	LOGGERS FOR pH AND EC:				NO	0
					alitica.				
It is hereby acknowledged that	upon leaving the	e site, all exis	ung equipn	ient is in an acceptable col	iuition.				
NAME:				SI	GNATURE:				
DESIGNATION:		-			DATE:		_		

							RM 5	_						
				STEPPED I	DISCHARC	GE TEST &	RECO	/ERY						
	E TEST REC		HEET		ENIOE						105	NODT		105
PROJ NO : BOREHOLE	NO	P2009	LL - 396	MAP REFER	ENCE:	0				PROVII DISTRI		CALVIN	IERN C	APE
ALT BH NO:	NO.		LL - 390	02						SITE N				
ALT BH NO:		0								SHEN		SPITZK	OP	
	DEPTH (m)	-	151.00		DATUMLE		E CASIN	G (m):	0.40	EXISTI	NG PUMP:	NEW B	OREHO	LE
WATER LEV	. ,		8.15			IEIGHT: (ma		. ,	0.34	CONTR	RACTOR:	AB PUN	N PS	
DEPTH OF F	PUMP (m):		79.25			1P INLET (m			310.00	PUMP '	TYPE:	GW 96	02	
				S		DISCHARG	E TEST		OVERY	-				
DISCHARGE	ERATE 1		RPM	224.5	DISCHAR	GE RATE 2		RPM	653	DISCH	ARGE RATI	Ξ3	RPM	
DATE:	16/08/2018	TIME	13H30		DATE:	16/08/2018	TIME	15H10		DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY		DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)		(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M		(MIN)	(M)
1	1.57		1		1	12.13		1	24.61	1			1	
2	1.65		2		2	13.51	7.50	2	20.59	2			2	
		0.70	-		-			-		-			-	
3	1.93	3.72	3		3	14.79	8.10	3	15.24	3			3	
5	2.28	4.50	5		5	16.66	10.24	5	10.88	5			5	
7	2.56		7		7	23.53	11.43	7	8.90	7			7	
10	3.75	4.90	10		10	33.27	13.17	10	7.73	10			10	
15	5.50	5.01	15		15	48.31	14.50	15	6.71	15			15	
20	6.34	5.00	20		20	69.91	15.10	20	4.96	20	Ι		20	
30	7.46	5.08	30			69.91		30	3.98	30	l		30	l
40	8.52	5.09	40			69.91	12.00	40	3.06	40			40	
-			40 50					40 50		40 50			40 50	
50	9.16	5.06				69.91	11.64		2.63		<u> </u>			
60	9.67	5.06	60					60	2.11	60			60	
70	10.06	5.09	70					70	1.87	70			70	
B0	10.58	5.08	80					80	1.23	80			80	
9 0	10.91	5.07	90					90	0.77	90			90	
100	11.08	5.09	100					100	0.51	100			100	
110			110					110	0.37	110			110	
120			120					120	0.26	120			120	
pH			150		pН			150	0.19	рH			150	
										•				
TEMP		°C	180		TEMP		°C	180	0.18	TEMP		°C	180	
EC	1181	µS/cm	210		EC		µS/cm	210		EC		µS/cm	210	
DISCHARGE	ERATE 4		RPM			GE RATE 5		RPM			ARGE RATI		RPM	
DATE:		TIME:			DATE:		TIME:		•	DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1			1		1			1		1			1	
2			2		2			2		2			2	
3			3		3			3	1	3			3	
-	-				-					-			-	
5	-		5		5			5		5			5	
7			7		7			7		7			7	
10			10		10			10		10			10	
15			15		15			15		15			15	
20			20		20			20		20			20	
30			30		30			30	1	30	l		30	İ
40			40		40			40		40			40	
									1					
	1		50		50	<u> </u>		50	<u>├</u> ───	50 00	<u> </u>		50	
50		1	60		60	ł		60	ł	60	<u> </u>		60	<u> </u>
50 60				1	70	ļ		70	ļ	70		<u> </u>	70	
50 60 70			70					80		80			80	
50 60 70			70 80		80				I	90			90	
50 60 70 80								90						1
50 60 70 80 90			80		80			90 100		100			100	
50 60 70 80 90 100			80 90 100		80 90 100			100						
50 60 70 80 90 100 110			80 90 100 110		80 90 100 110			100 110		110			110	
50 60 70 80 90 100 110 120			80 90 100 110 120		80 90 100 110 120			100 110 120		110 120			110 120	
50 60 70 80 90 100 110 120 pH			80 90 100 110 120 150		80 90 100 110 120 pH			100 110 120 150		110 120 рН			110 120 150	
50 50 70 80 90 100 110 120 pH TEMP			80 90 100 110 120 150 180		80 90 100 110 120 pH TEMP		°C	100 110 120 150 180		110 120 pH TEMP		°C	110 120 150 180	
50 50 70 80 90 100 110 120 pH TEMP		°C µS/cm	80 90 100 110 120 150		80 90 100 110 120 pH		°C µS/cm	100 110 120 150		110 120 рН		°C µS/cm	110 120 150	
50 50 70 80 90 100 110 120 pH TEMP			80 90 100 110 120 150 180		80 90 100 110 120 pH TEMP			100 110 120 150 180		110 120 pH TEMP			110 120 150 180	
50 50 70 80 90 100 110 120 pH TEMP			80 90 100 110 120 150 180 210		80 90 100 110 120 pH TEMP			100 110 120 150 180 210		110 120 pH TEMP			110 120 150 180 210	
50 60 70 80 90 100 110 120 pH TEMP EC			80 90 1100 110 120 150 180 210 240		80 90 100 110 120 pH TEMP			100 110 120 150 180 210 240		110 120 pH TEMP			110 120 150 180 210 240	

				FORM 5	-							
				IT DISCHAR	GE TES	T & RECOV	ERY					
	HOLE TEST R		SHEET									
	IO : IOLE NO:	P2009	L - 39602	MAP REFER	ENCE:	S 31.37297 E 19.97083			PROVINCE DISTRICT:	:	NORTH	HERN CAPE
ALT BH			L - 39602			E 19.97083			SITE NAME			
ALT BH		0							0		SPITZK	OP
BOREH	IOLE DEPTH:	151.00		DATUMLEVE	el abov	E CASING (n	n):	0.40	EXISTING F	PUMP:	NEW B	OREHOLE
	LEVEL (mbdl)			CASING HE		• •		0.34	CONTRAC		AB PU	
	OF PUMP (m):			DIAM PUMP	INLEI (M	m):		310	PUMP TYP	=:	GW 96	02
	TARTED		I NEOD FEIT	TEST COMP	LETED							
DATE	17/00/0010		4.01.10.0		DATE		TIN 4 5					014/0000
DATE:	17/08/2018	TIME:	16H00		DATE:	VATION HOL	TIME: F 1	OBSERV	TYPE OF P	-	OBSER	GW 9602 RVATION HOLE 3
					NR:	WINDIATIO		NR:			NR:	
	DISCHARGE B	OREHOLE			Distanc	e(m);		Distance	(m);		Distan	ce(m);
TIME	DRAW	YIELD	TIME	RECOVERY		Drawdown	,		Drawdown	Recovery		Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1 2	2.74 5.22	5.35	1	17.24 15.67	1 2			1			1 2	
3	5.85	6.51	3	15.24	3			3			3	
5	9.03	7.08	5	13.72	5			5			5	
7	10.42	7.07	7	13.29	7			7			7	
10	11.01	7.09	10 15	12.50 11.08	10 15			10			10 15	
15 20	12.71 14.21	7.08	15 20	11.08 9.73	15 20			15 20			15 20	+
30	15.68	7.09	30	7.79	30			30			30	
40	17.40	7.07	40	5.98	40			40			40	
60	18.90	7.10	60	4.22	60			60			60	
90	20.55	7.10	90	2.52	90			90			90	
120 150	21.47 21.98	7.08	120 150	1.70 1.27	120 150			120 150			120 150	
180	22.36	7.10	180	1.27	180			180			180	
210	23.10	7.07	210		210			210			210	
240	23.39	7.04	240		240			240			240	
300	23.75	7.04	300		300			300			300	
360 420	23.89 24.06	7.01	360 420		360 420			360 420			360 420	
480	24.98	7.06	480		480			480			480	
540	25.38	7.01	540		540			540			540	
600	25.72	7.09	600		600			600			600	
720	26.18	7.04	720		720			720			720	
840 960	26.83 27.04	7.06	840 960		840 960			840 960			840 960	
1080	27.04	7.08	1080		1080			1080			1080	
1200	27.04	7.10	1200		1200			1200			1200	
1320	27.22	7.06	1320		1320			1320			1320	
1440 1560	27.34	7.09	1440		1440 1560			1440 1560			1440 1560	
1680	27.49 27.61	7.10	1560 1680		1680			1680			1680	
1800	27.68	7.09	1800		1800			1800			1800	
1920	27.75	7.07	1920		1920			1920			1920	
2040	27.81	7.08	2040		2040			2040			2040	
2160 2280	27.89 27.97	7.05	2160 2280		2160 2280			2160 2280			2160 2280	
2280 2400	27.97	7.09	2280		2280			2280		ļ	2280	
2520	28.16	7.08	2520		2520			2520			2520	1
2640	28.19	7.10	2640		2640			2640			2640	
2760	28.21	7.07	2760		2760			2760			2760	
2880 3000	28.22		2880 3000		2880 3000			2880 3000			2880 3000	
3000 3120		+	3000		3000			3000			3000	
3240		1	3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480			3480		3480			3480			3480	
3600			3600		3600 3720			3600			3600	
3720 3840		+	3720 3840	+	3720 3840			3720 3840			3720 3840	
3960		1	3960	1	3960			3960			3960	
4080		L	4080		4080			4080		<u> </u>	4080	
4200			4200		4200			4200			4200	
4320		<u> </u>	4320	2000	4320	\A//I		4320	\A//I		4320	\A//I
	ne pumped(mi e yield (l/s):	n):		2880 7.10		W/L			W/L			W/L
, werayt	, yiuiu (1/3 <i>)</i> .					1		1			1	1

Telephone: 043-732 1211		Abbreviations
Fax no: 043-732 1422	EC	Electrical conductivity
Fax to e-mail: 0866 717 732	mbgl	Meters below ground level
E mail: office@abpumps.co.za	mbch	Meters below casing height
	mbdi	Meters below datum level
	magi	Meters above ground level
	L/S	Litres per second
	RPM	Rates per minute
	s/w/L	Static water level
	μS/cm	Microsiemens per centimeter

BOREHOLE TEST RECORD



Ground water solutions t/a AB Pumps CC

									PR0JECT #	P2009
									BBR	JOHAN
CONSULTANT:		GEOSS								ABEL
DISTRICT:								_		ERNEST
PROVINCE:		NORTHERN CAP	ΡE					_	PRODUCTION BONUS:	PHINEAS
FARM / VILLAGE NAM	<u>E:</u>	KRUITBERG CAL	LVINIA					_		SIMON
								-		HENRY
DATE TESTED:		22/05/2018						-	EC meter number	
MAP REFERENCE:										
CO-ORDINATES:			• •					0		
FOR	MAT ON GPS:	naaa	°mm '	SS.S			hddd	°mm.mmm		hddd.ddddd
			• •					0		31.65122
	LATITUDE:		• •		"	OR		•	OR	19.80162
	LONGITUDE:					-			-	
BOREHOLE NO:		CAL-S2-3				-				
TRANSMISSIVITY VAL	UE:					-				
TYPE INSTALLATION		NEW BOREHOLD	E			-				
BOREHOLE DEPTH: (mbgl)	121M				-				
COMMENTS										
COMMENTS:										
SAMPLE INSTRUCTION Water sample taken	<u>NS :</u>	Yes	No		Test for:		macro	bacterio-logical	DATA CAPTURED BY:	NAOMI
Date sample taken		24/05/20		lf co		namo:			DATA CHECKED BY:	AILENE
			10	11 CO	nsultant took sample, give	name.			DATA CHECKED BT:	AILENE
Time sample taken		08H48								
CONSULTANT GUIDE	LINES	r I								
BOREHOLE DEPTH:		m	STE	P 1:		l∕s	WATER STRIKE 1:			m
BLOW YIELD:		m	STE	P 2:		√s	WATER STRIKE 2:			m
STATIC WATER LEVEL	:	m	STE	P 3:		Vs	WATER STRIKE 3:			m
PUMP INSTALLATION	DEPTH:	m	STE	P 4:		l/s	COMMENTS:			
RECOVERY:			STE	P 5:		l∕s				
AFTER STEPS:		h	STE	P 6:		Vs	TELEPHONE NUME	BERS PHONE : (NAME &	TEL)	
AFTER CONSTANT:		h	STEP DU	JRATION:		min				
DESCRIPTION:			UNIT	QTY					UNIT	QTY
STRAIGHTNESS TEST			NO	0	BOREHOLE DEPTH AFTER T	EST:			м	120.98
VERTICALLY TEST:			NO	0	BOREHOLE WATER LEVEL A		(mbch)		м	14.81
CASING DETECTION:			NO	1	SAND/GRAVEL/SILT PUMPER		(YES/NO	0
SUPPLIED NEW STEE		COVEP:	NO	0	DATA REPORTING AND REC				NO	1
BOREHOLE MARKING	LDORLHOLL	OOVEN.	NO	0	SLUG TEST:	ORDING			NO	0
SITE CLEANING & FINI	SHING		NO	1	LAYFLAT (M):				M	30
LOGGERS FOR WATE			NO	1	LOGGERS FOR pH AND EC:				NO	0
									UFI	<u> </u>
It is hereby acknowl	edged that up	pon leaving the	site, all exist	ting equipn	nent is in an acceptable co	ndition.				
NAM					SI	GNATURE:		_		
DESIGNATIO	DN:					DATE:		_		

				STERRER P		-	RM 5							
BOREHOI	E TEST REC	26U 6F		STEPPED I	DISCHAR	GE TEST &	RECO	VERY						
PROJ NO :	LILJIKLO	P2009		MAP REFER	ENCE	31.65122				PROVI	NCE	NORTH	IERN C	APE
BOREHOLE	E NO:	CAL-S2	2-3		LINCL.	19.80162				DISTRI		0		
ALT BH NO		ABEL				10100102				SITE N		KRUITBERG CALVINIA		
ALT BH NO	:	0										KRUIII	BERGC	ALVINIA
BOREHOLE	E DEPTH (m)		121M		DATUMLE	EVEL ABOV	E CASIN	IG (m):	0.75	EXISTI	NG PUMP:	0		
	VEL (mbdl):		6.92			IEIGHT: (ma			0.10		RACTOR:	AB PUN		
DEPTH OF	PUMP (m):		39.15			/IP INLET (m			117.00	PUMP	TYPE:	GW240	2	
				S		DISCHARG			OVERY					
DISCHARG	E RATE 1	1	RPM		DISCHAR	GE RATE 2		RPM		DISCH	ARGE RATI	53	RPM	
DATE:	22/05/2018	TIME:	15H00		DATE:	22/05/2018	TIME:	16H40		DATE:	23/05/201	TIME:	18H20	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	0.58		1		1	3.83	1.30	1		1	8.12	2.40	1	
2	0.80	0.72	2		2	3.97	1.60	2		2	8.63	2.71	2	
3	0.93	0.86	3		3	4.34	1.74	3		3	8.98	2.82	3	
			-					-						
5	1.09	0.92	5		5	4.92	1.94	5		5	9.64	3.08	5	
1	1.28	1.01	7		7	5.25	1.98	7		7	10.24		7	<u> </u>
10	1.63	1.01	10		10	5.74	2.02	10		10	10.64	3.07	10	
15	1.94	1.00	15		15	6.06	2.04	15		15	11.13	3.06	15	
20	2.16	1.01	20	ſ	20	6.35	2.02	20	T	20	11.42	3.05	20	
30	2.46	1.01	30		30	6.68	2.02	30	1	30	12.01	3.08	30	1
														-
40	2.70	1.03	40		40	6.93	2.02	40	-	40	12.40	3.05	40	
50	2.89	1.02	50		50	7.17	2.01	50	-	50	12.82	3.05	50	ļ
60	3.05	1.02	60		60	7.42	2.00	60		60	13.03	3.04	60	
70	3.19	1.00	70		70	7.48	2.01	70		70	13.31	3.03	70	
30	3.33	1.02	80		80	7.68	2.01	80		80	13.64	3.04	80	
90 90	3.48	1.01	90		90	7.91	2.01	90	1	90	13.84	3.05	90	
		1.01					2.01		-			3.05		
100	3.54		100		100	8.04		100	-	100	14.03		100	
110			110		110			110		110			110	
120			120		120			120		120			120	
pН			150		pН			150		pН			150	
Temp		°C	180		TEMP		°C	180		TEMP		°C	180	
EC	469.00	µS/cm	210		EC	498.00	µS/cm	210		EC	491.00	µS/cm	210	
-		μ0/cm			-		μ0/cm	RPM		-				
DISCHARG			RPM			GE RATE 5		RPIVI			ARGE RATI		RPM	
DATE:	22/05/2018		20H00		DATE:	1	TIME:	1	T	DATE:	1	TIME:	1	1
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVER
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M	(L/S)	(MIN)	(M)
1	14.88	3.85	1	30.79	1			1		1			1	
2	16.44	4.22	2	22.70	2			2		2			2	
-		1.22	-		-	1	<u> </u>						3	
3	17.66	1	3	15.68	3	+		3		3 -	-			+
5	20.08	4.50			5			5		5			5	
7	22.20		7	10.72	7			7		7			7	
10	25.37	4.70	10	9.48	10			10		10			10	
15	30.65	4.76	15	8.63	15			15		15			15	
20	31.48		20	7.98	20	Ì		20	1	20			20	1
	01.40	A 5 4				1					1			1
	_	4.51	30	7.06	30			30		30			30	
		4.44	40	6.36	40		ļ	40		40			40	
		4.42	50	5.93	50			50		50			50	
			60	5.55	60		L	60		60			60	
			70	5.39	70			70		70			70	
			80	5.12	80	1		80		80			80	
						-								
			90	4.90	90	<u>↓</u>	I	90		90			90	
			100	4.91	100			100		100			100	
			110	4.52	110			110		110			110	
			120	4.13	120			120		120			120	
			150	3.73	рН		i – –	150		pН			150	1
оH	1	°C				+	°C					°C		+
			180	3.35	TEMP	I		180	+	TEMP			180	
TEMP		-												
TEMP		μS/cm	210	3.07	EC		µS/cm	210		EC		µS/cm	210	
pH TEMP EC		-	210 240	3.07 2.69	EC		µS/cm	210 240		EC		µS/cm	210 240	
TEMP		-			EC		µS/cm			EC		µS/cm		

S/W/L:(mbch) 6.14

				FORM 5	F							
				NT DISCHAR	GE TES	T & RECOV	ERY					
	HOLE TEST R		SHEET		ENIOE	04.05400					NODT	
PROJ N BORFH	IO : IOLE NO:	P2009 CAL-S2	-3	MAP REFER	ENCE:	31.65122 19.80162			PROVINCE DISTRICT:		NOR IF	IERN CAPE
ALT BH		ABEL	0			10.00102			SITE NAME	:	•	
ALT BH	NO:	0									KRUIII	BERG CALVINIA
	IOLE DEPTH:	121N		DATUMLEV		(n):	0.75	EXISTING F		0	
	LEVEL (mbdl) OF PUMP (m)			CASING HE		• •		0.10			AB PUN	
	ANT DISCHAR			DIAM PUMP Y				117	PUMP TYPI	L .	GW240	12
	TARTED			TEST COMP	LETED							
DATE:	23/05/2018	TIME:	08H50		DATE:	25/05/2018		08H42	TYPE OF P			GW2402
JAIL.	23/03/2010	TIME.	001130			VATION HOL			ATION HOLE		OBSER	RVATION HOLE
					NR:	CAL S2-4		NR:			NR:	
	DISCHARGE B	_			Distanc	. ,,	900	Distance			Distand	
		YIELD	TIME	RECOVERY	TIME:	Drawdown		TIME:	Drawdown	Recovery	TIME:	Drawdown
MIN)	DOWN (M) 1.39	(L/S) 2.08	MIN 1	(M) 20.66	(min) 1	m	(m)	(min) 1	(m)		(min) 1	(m)
2	2.09	2.00	2	19.02	2			2			2	
3	2.96	2.43	3	17.97	3			3			3	
5	4.85	2.82	5	16.70	5	0.06		5			5	
7	5.61	2.86	7	16.32	7	0.04	13.08	7			7	
10 15	6.61 7.41	2.88 2.85	10 15	15.34 14.94	10 15	0.01	13.04 12.96	10 15			10 15	
20	8.70	2.83	20	14.94	20	0.24	12.90	20			20	
30	8.88	2.82	30	13.64	30	0.68	12.69	30			30	
40	9.57	2.80	40	13.22	40	0.98	12.48	40			40	
60 90	10.57 11.46	2.82	60 90	12.68 12.02	60 90	1.54 2.30	12.10 11.63	60 90			60 90	
120	11.40	2.80	120	11.53	90 120	2.30	11.03	120			120	
150	12.88	2.81	150	11.17	150	3.63	10.84	150			150	
180	13.39	2.83	180	10.76	180	4.20	10.52	180			180	
210	13.90	2.81	210	10.39	210	4.68	10.19	210			210	
240	14.26	2.80	240	10.17	240	5.15	9.97	240			240	
300 360	15.01 15.70	2.81	300 360	9.70 9.27	300 360	6.01 6.72	9.47 9.04	300 360			300 360	
420	16.32	2.82	420	8.94	420	7.36	8.68	420			420	
480	16.88	2.82	480	8.58	480	7.94	8.35	480			480	
540	17.39	2.81	540	8.28	540	8.44	8.05	540			540	
600 720	17.83 18.96	2.80	600 720	7.98 7.42	600 720	8.92 9.73	7.76 7.24	600 720			600 720	
840	19.78	2.82	840	7.42	720 840	9.73	6.36	840			840	
960	20.68	2.81	960	7.05	960	11.04	6.14	960			960	
1080	21.06	2.81	1080	6.87	1080	11.62	5.86	1080			1080	
1200	21.98	2.80	1200	6.32	1200	12.10	5.41	1200			1200	
1320 1440	22.87 23.97	2.81	1320 1440	5.14 4.87	1320 1440	12.57 13.14	5.08 4.82	1320 1440			1320 1440	
1560	23.97	2.02	1560	4.07	1560	13.14	4.02	1560			1560	
1680			1680		1680			1680			1680	
1800			1800		1800			1800			1800	
1920			1920		1920			1920			1920	
2040 2160		+	2040 2160		2040 2160			2040 2160			2040 2160	
2280		1	2280		2280			2280			2280	
2400			2400		2400			2400			2400	
2520			2520		2520			2520			2520	
2640			2640		2640			2640			2640	
2760 2880		+	2760 2880	+	2760 2880	-		2760 2880			2760 2880	
3000		1	3000	1	3000	1		3000			3000	
3120			3120		3120			3120			3120	
3240			3240		3240			3240			3240	
3360			3360		3360			3360			3360	
3480 3600			3480 3600		3480 3600			3480 3600			3480 3600	
3600 3720		-	3600		3600	-		3600			3600	
3840			3840		3840			3840			3840	
3960			3960		3960			3960			3960	
4080			4080		4080			4080			4080	
4200			4200 4320		4200 4320			4200 4320			4200 4320	
1320 -		1	TULU	1	7020	1	1	1040		1	17020	1
4320 Total tim	ne pumped(mi	in):		1440		W/L	1.7		W/L			W/L

18. <u>APPENDIX E: – BOREHOLE LOGS – H & A DRILLING</u>

LUS UI DO	rehole No.:	Cal_DV4							
ocation:	Calvinia	Latitude	•	-31.411618					
Date:	30/4/2018	Longitud		19.775263					
Client:	BVI Engineering		Elevation:						
				·					
Lithological Description	Lithology Symbol &	& Depth (m)	Borehole Constructi	on Description & water strike					
Clay (0 - 9)	0								
				6.5" Steel casing					
Dolerite (9 - 13)									
	20								
				Water level (35m)					
	40			6.5" Open Hole					
	40								
				Mator of the (40 m)					
	60			Water strike (49m)					
Shale (13 - 207)									
	80			Water strike (82m)					
	80			Water strike (85m)					
	100								
	100								
	120								
	140								
	160								
	180								
	200								
		_ ·							
Drilled By: Drill Method:	H&A Drilling Air percussion	Remarks	Blow Yield - 3 L/s	\mathbf{i}					
Logged By:	Charles Peek		BIOW HEIG- 5 L/S	GEOHYDROLOGICAL AND SPATIAL SOLUTIONS					

Log of Bo	rehole No.:	Cal_DV1		
	Calcinia			
Location:	Calvinia	Latitude:		-31.455414
Date:	30/4/2018	Longitud		19.773937
Client:	BVI Engineering	Ground E	levation:	1009 m
Lithological Description	n Lithology Symbol & Depth		Borehole Constructi	on Description & water strike
	0			
Clay (0 - 5)	+			 8" Steel casing
Dolerite (5 - 10)				(0 - 6)
	20			
				8" Open Hole (6 - 165)
	40			(0-103)
Shale (10 - 140)				
	60			
	80			
	100			
	100			
	120			
	140			
				Water strike (144 r
		\$\$\$\$		Water strike (155m
Baked shaleShale	160			
(10 - 140)		10101		
Drilled By:	H&A Drilling	Remarks		
Drill Method:	Air percussion	Nerriar N3.	Blow Yield - 25 L/	s
Logged By:	Charles Peek			GEOHYDROLOGICAL AND SOMUAL SCILLTONS

LUG UI DUI	rehole No.:	Cal_DV2						
Location:	Calvinia	Latitude	•	_21	.429912			
Date:	30/4/2018	Longitud		_	19.785117			
Client:	BVI Engineering		Elevation: 1058 m					
chent.	BVI Lingineering	Ground		103	0111			
Lithological Description	Lithology Symbol &	Depth (m)	Borehole Construc	tion	Description & water strike			
	0	·						
Clay (0 - 5)				•	6.5" Steel casing			
Dolerite (5 - 10)				_	(0 - 6)			
	20				()			
	20							
	40				6.5" Open Hole			
					(6 - 200)			
	60							
Shale (10 - 200)								
	80			_				
				_				
	100			_				
				_				
				_				
	120			_				
	120							
				_				
				_				
	140							
	110			_				
				_				
				_				
	160							
				_				
	180							
	200							
	LIQA Drilling	Remarks	•					
Drilled By: Drill Method:	H&A Drilling Air percussion	Remarks	Blow Yield - 0.1	/c	\bowtie			
Logged By:	Charles Peek		BIOW HEIU - 0.1	-/ 3	GEOHYDROLOGICAL			

	f Barahala Na :		1
GEOSS Repor	t No. 2018/10-18	cal_Dv3	23 October 2018
Location:	Calvinia	Latitude:	-31.430694
Date:	30/4/2018	Longitude:	19.7883

LOG OT BO	rehole No.:	Cal_S1_K	В	
Location:	Calvinia	Latitude:		-31.636869
Date:	30/4/2018	Longitud		19.758089
Client:	BVI Engineering		levation:	1081 m
		Cround		
Lithological Description	Lithology Symbol 8	& Depth (m)	Borehole Constru	Description 8 water strike
Clay (0 - 2)	0			6.5" Steel casir
				(0-6)
Shale (2 - 62)	20			Water level (35m)
Sinale (2 - 62)	40			6.5" Open Hole 180)
				Water strike (48m
	60			
	80			
Dolerite (62 - 110)	100			
	120			
	140			
Shale (110 - 180) -				
	160			
	180			
			• • • • • • • • • •	
Drilled By:	H&A Drilling	Remarks		
Drill Method:	Air percussion Charles Peek		Blow Yield - 1.2	5 L/S

Log of Borehole No.: Cal_S2_3B Location: Calvinia Latitude: -31.650182 Date: 30/5/2018 Longitude: 19.802443 Client: **BVI Engineering Ground Elevation:** 1160 m Description & Lithological Description Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 6.5" Steel casing Clay (0 - 2) (0 - 4) 10 6.5" Open Hole (4 -122) 20 Shale (2 - 52) Water strike (33m) 30 \mathcal{N} -40 50 60 70 Dolerite (52 - 102) 80 90 100 110 Shale (102 - 122) _ 120 Drilled By: H&A Drilling **Remarks:** Drill Method: Air percussion Blow Yield - 0.2 L/s Logged By: **Charles Peek** GEOSS

Log of Borehole No.: Cal

Cal_Nat5

Location:	Calvinia	Latitude:	-31.435236
Date:	30/5/2018	Longitude:	19.784485
Client:	BVI Engineering	Ground Elevation:	1036m

Lithological Description	Lithology Sym	bol & Depth (m) B	Borehole Construction				Description & water strike	
Shale	0							6.5" Steel casing (0	
(0 - 70)								6)	
						•		6.5" Open Hole	
								(6 - 170)	
	20								
	40								
	60								
	3	RECERCE							
		88888							
	80	333333 <u>-</u>							
		3333333							
	100								
		88888							
		33333 <u>8</u>							
Dolerite (70 - 168)									
		888888							
	120	888888							
		33333 <u>5</u>							
	140	33333 <u>8</u>							
	140								
	8	333333							
	160								
		88888			N			Water strike (168m)	
		1	I						
Drilled By:	H&A Drilling	Rer	narks:					\smile	
Drill Method:	Air percussion			Blow	/Yield	-5 L/s		SECHITIZ RUGGICAL	
Logged By:	Charles Peek			1				AND SAMUAL SOLUTIONS ATTENNATIONAL DAY/ITE GEOSS	

Log of Borehole No.:

Cal_Phase3_3

LUG UI DU		Į					
Location:	Calvinia	Latitude:			-31	.398477	
Date:	30/5/2018	Longitud	e:			9.553632	
Client:	BVI Engineering	Ground E		tion:	905		
Lithological Descriptior	Lithology Symbol	& Depth (m)	oth (m) Borehole Constructi			Description & water strike	
					•	6.5" Steel casing (0 6) 6.5" Open Hole	
	20					(6 - 150)	
	40				▲	Water strike (37m)	
Shale (0 - 150)	60						
	80						
	100						
	120						
	140					Water strike (143m)	
Drilled By:	H&A Drilling Air percussion	Remarks		Dia	1 1 /c		
Drill Method:	All percussion	1		Blow Yield -	· I L/S		

Log of Borehole No.: Cal_S1-1 -31.643388 Location: Calvinia Latitude: Date: 30/4/2018 Longitude: 19.883707 Client: **BVI Engineering Ground Elevation:** 1191 m Description & **Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 Clay/sand (0 - 10) 6.5" Steel casing -(0-6) 20 6.5" Open Hole (6 - 180) 40 Shale (10 - 180) 60 80 100 120 140 160 180 Drilled By: H&A Drilling **Remarks:** Drill Method: Air percussion Blow Yield - 0.1 L/s Logged By: **Charles Peek** GEOSS

Log of Borehole No.: Cal_S1-2 Location: Calvinia Latitude: -31.61826 Date: 30/4/2018 Longitude: 19.893412 Client: **BVI Engineering Ground Elevation:** 1136 m Description & **Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 Clay/sand (0 - 10) -6.5" Steel casing (0-6) 20 6.5" Open Hole (6 - 152) 40 Shale (10 - 152) 60 80 100 120 140 Drilled By: H&A Drilling **Remarks:** Drill Method: Air percussion Blow Yield - 0.1 L/s Logged By: **Charles Peek** GEOSS

Log of Borehole No.: Cal_S1-3 Location: Calvinia Latitude: -31.618808 Date: 30/4/2018 Longitude: 19.893628 Client: **BVI Engineering Ground Elevation:** 1136 m Description & **Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 Clay/sand (0 - 15) -6.5" Steel casing (0-6) 20 6.5" Open Hole (6 - 120) Shale (15 - 120) 40 60 80 100 120 Drilled By: H&A Drilling **Remarks:** Drill Method: Air percussion Blow Yield - 0.1 L/s Logged By: **Charles Peek** GEOSS

Log of Borehole No.:

Cal_S2_3

Location:	Calvinia	Latitude:	-31.651334
Date:	30/5/2018	Longitude:	19.801571
Client:	BVI Engineering	Ground Elevation:	1161 m

Lithological Description	Lithology Symbol & Depth (m)		Borehole Constru	Description & water strike	
	0				6.5" Steel casing
					(0 - 4)
					, ,
	10				
Shala (0, 42)					6.5" Open Hole (4
Shale (0 - 42)	20				122)
					Water strike (23m
			N		Water strike (27m
	30		Ň		Water strike (31m
	40			-	
Dolerite (42 - 56)	50	8888			
		3333			
		9999			
	60				
	70				
Shale (56 - 92)					
	80				
	90				
	90	888			
Dolerite (92 - 102)	100	· ·		_	
	00000	25252		_	
	110			_	
Shale (102 - 122)					
	120 +				
Drilled By:	H&A Drilling	Remarks:			
Drill Method:	Air percussion		Blow Yield - 2.78	L/s	\mathbf{i}
ogged By:	Charles Peek				BEDHYDROLOGICAL AND SPATIAL SOLUTIONS INTERNATIONAL (PTY)LTD
					GEOSS

Log of Borehole No.: Cal_S2_4 Location: Calvinia Latitude: -31.650359 Date: 30/4/2018 Longitude: 19.801047 Client: **BVI Engineering Ground Elevation:** 1154 m **Description & water Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** strike 0 6.5" Steel casing (0-+ 4.5) 20 6.5" Open Hole (4.5 ł 40 187) 60 80 Shale (0 - 187) 100 120 140 \mathcal{N} Water strike (146m) N Water strike (155m) 160 \mathcal{N} Water strike (168m) 180 Remarks: Drilled By: H&A Drilling Drill Method: Blow Yield - 3.8 L/s Air percussion Logged By: **Charles Peek** GEOSS

ſD . . **N** I

Log of Bo	reho	e No.:	Cal_S2_7						
Location: Date: Client:	Calvinia 30/5/2018 BVI Engineering		Longitude: 19			19.7	31.650782 9.76698 124 m		
Lithological Description						tructio	ion Description & wate strike		
	0								6.5" Steel casing
	_				_				
	20 —		·						(0 - 6)
	40						•		6.5" Open Hole (6 - 152)
						N			Water strike (47m)
	60 -								
Shale (0 - 152)	80 -								
	100 -								
	120 -								
	140 +								
			· ·						
Drilled By: Drill Method:	H&A Drilling Air percussion		Remarks:	Remarks: Blow Yield - 0.1 L/			0.1 L/s	′s	
Logged By:	Charles I	Peek							

Cal S2 8

Location:	Calvinia	Latitude	1	-31	L.64988
Date:	30/5/2018	Longitud			.77017
Client:	BVI Engineering		Elevation:		24 m
Lithological Description	Lithology Syml	ool & Depth (m)	Borehole Constru	ction	Description & water strike
	0	ununu —			
				-	6.5" Steel casing
					(0 - 9)
		88888	-		6.5" Open Hole (9
		9999999			202)
	20				Water strike (19m)
					Water strike (24m)
					Water strike (30m)
			/ / ↓ ←		Water strike (37m)
	40 - 3	88888			
					Water strike (42m)
			/ V ← _		Water strike (47m)
	. <u>X</u>				
		88888			
	60				
Dolerite (0 - 152)] - ∭				
	80				
		88888			
	100	88888			
			Λ/ \bullet		Water strike (102m)
	120				
	120				
	1 🛛 🖗				
	140 - 👸				
	1 🛛 🖗				
	1 98	100000			
Drilled By:	H&A Drilling	Remarks		- 1 /-	\checkmark
Drill Method:	Air percussion		Blow Yield - 1.	5 L/ S	SECHYDROLOGICAL AND SPATIAL SOLUTIONS
Logged By:	Charles Peek				

Log of Borehole No.: Cal_S2_9 Location: Latitude: -31.65136 Calvinia Date: 30/5/2018 Longitude: 19.7831 **Ground Elevation:** Client: **BVI Engineering** 1136 m **Description & water Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** strike 0 6.5" Steel casing Weathered shale (0 -← (0 - 22) 6) _ 20 6.5" Open Hole (6 -180) 40 60 80 Shale (22 - 180) 100 120 N Water strike (121m) 140 160 180 Drilled By: H&A Drilling Remarks: Drill Method: Air percussion Blow Yield - 0.3 L/s Logged By: **Charles Peek** GEOSS

log of Borehole No ·

Cal S1 KB B

Log of Bo	rehole No.:	Cal_S1_KB	B_B	
Location:	Calvinia	Latitude:		-31.64276
Date:	30/5/2018	Longitude	:	19.75856
Client:	BVI Engineering	Ground El		1081 m
Lithological Description	Lithology Symbol &	Depth (m)	Borehole Construct	ion Description & water strike
				 6.5" Steel casing (0 - 6)
	20			6.5" Open Hole (6 - 150)
	40			Water strike (43m)
Shala (0, 450)	60			
Shale (0 - 150)	80			
	100			
	120			
	140			
		—		
Drilled By:	H&A Drilling	Remarks:		
Drill Method:	Air percussion		Blow Yield - 0.3 L	/s
Logged By:	Charles Peek			GEOSS

Cal_S1_KB_B2

Location:	Calvinia	Latitude:	-31.64276
Date:	30/5/2018	Longitude:	19.75856
Client:	BVI Engineering	Ground Elevation:	1081 m

Lithological Description	Lithology Symbol & D	epth (m)	Borehole Construction	Description & water strike	
	0			6.5" Steel casing (0 - 6)	
				6.5" Open Hole (6 - 80)	
	20				
Shale (0 - 80)	40				
	60				
	80				
Drilled By:	H&A Drilling	Remarks:	Blow Yield - To low		
Drill Method: Logged By:	Air percussion Charles Peek		to measure		

Log of Borehole No.: Cal_Phase3_5 Latitude: Location: Calvinia -31.396265 Date: 28/09/2018 Longitude: 19.55079 Client: **BVI Engineering Ground Elevation:** 901 m **Description & water Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** strike 0 Shale 6.5" Steel casing (0 - 17) (0 - 6) 20 6.5" Open Hole (6 -127) 40 60 Baked Shale (17 - 111) 80 100 120 Shale (111- 127) Drilled By: H&A Drilling **Remarks:** Drill Method: Blow Yield - 0.1 L/s Air percussion Logged By: **Charles** Peek

GEOSS

Cal_Phase3_12

Location:	Calvinia		Latitude			-	31.626433
Date:	28/09/2018	2	Longitud				19.776246
Client:					ימר		1089 m
chent.	BVI Eligilie	ering	Ground I	levatio	JII.		1089 111
Lithological Description	Litholo	gy Symbol & D	epth (m)	Bore	ehole Con	structio	n Description & wate strike
Sand	0						
(0 - 5)	×						6.5" Steel casing
Baked Dolerite			7).				(0 - 6)
(5 - 7)							
	20 —		0				water strike
					N		32 m
	_				7.0		52 111
	-						
					_		6.5" Open Hole (6
	40 +		0				182)
					N		water strike
			0				52 m
	60 —		0				
	80 -		0				
			0				
Baked Shale (7- 182)	4						
			2				
	100 +	———————————————————————————————————————	Ŋ				
							water strike
					\wedge	-	115 m
	120						
	120 -						
	_						
	140		0				
	160		0				
	-						
	400						
	180 +						
			_	-	r 1		
Drilled By:	H&A Drillir	ng	Remarks	:			
Drill Method: Logged By:	Air percuss Charles Pe			В	low Yield	- 2 L/s	provoacion ca

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Cal_Phase3_13

	renole No.:	Cal_Phase3	_	
Location:	Calvinia	Latitude:		-31.641369
Date:	28/09/2018	Longitude:	19.76428	
Client:	BVI Engineering	Ground Elev	vation:	1095 m
Lithological Description	Lithology Symbol & Do	epth (m)	Borehole Constructio	on Description & water strike
	0			 6.5" Steel casing
-				(0 - 6)
	20			
	40			6.5" Open Hole (6 - 182)
	60			
Shale (0- 192)	80			
	100			
	120			
	140			
	160			
	180			
Drilled By: Drill Method: Logged By:	H&A Drilling Air percussion Charles Peek	Remarks:	Blow Yield - 0.1 L/	/s

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Cal Phase3 8Alt

Location:	Calvinia	Latitude:		_:	31.63271
Date:		30/5/2018 Longitude:			
Client:	BVI Engineering	Ground E			9.748168 136 m
chent.	DVI Engineering	Ground E		1	150 11
Lithological Description	on Lithology Symbol	& Depth (m)	Borehole C	onstruction	Description & wate strike
	0				
Shale				•	6.5" Steel casing
(0 - 182)					(0 - 6)
	20				
					6.5" Open Hole (6
	40				182)
	60				
	80				
	- 00				
	100				
	120				
	140				
	160				
	180				
	LIQA Drilling	Remarks:			
Drilled By: Drill Method:	H&A Drilling Air percussion	Kemarks:		ld - 0.1 L/s	\bowtie
	Charles Peek		BIOW THE	iu - 0.1 L/S	GEOHYDROLOGICAL AND SPATIAL SOLUTIONS
.ogged By:	Charles Peek				GEOSS

Cal Phase3 9

Location:	Calvinia		Latituda	Latitude:					-31.632714		
Date:	30/5/2018		Longitude						756781		
Client:		oring			n .				36 m		
chent.	BVI LIIgillet	BVI Engineering Ground Elevation:							50 111		
Lithological Description	on Litholog	gy Symbol &	Depth (m)	Borehole Constructio					Description & water strike		
Shale	0		=						8" Steel casing (0		
(0 - 31)									6)		
(0 0 -)	++										
	10										
	20										
							-		8" Open Hole (6 -		
									100)		
	30				Λ	/ 🖛	-		Water strike (27 - 30m)		
	—						-		5011)		
	40		<u> </u>				_				
	50		×			V-	-	-	Water strike (52m)		
Dolerite (31 - 100)											
	60		<u> </u>								
						V	-		Water strike (59m)		
			88								
	70		<u> </u>								
							_				
							_				
							_				
	80										
					Λ	/		-	Water strike (88m)		
	90								. ,		
	100	101000000					_				
							_		C Fll Open Liste / 400		
Shala (100 117)							-		6.5" Open Hole (100		
Shale (100 - 117)	110						-		117)		
							-				
Drilled By:	H&A Drillin	σ	Remarks:								
Drill Method:	Air percuss				ow Yie	ld - 2	5 L/	s	\mathbf{i}		
	Charles Pee								GEOHYDROLOGICAL		

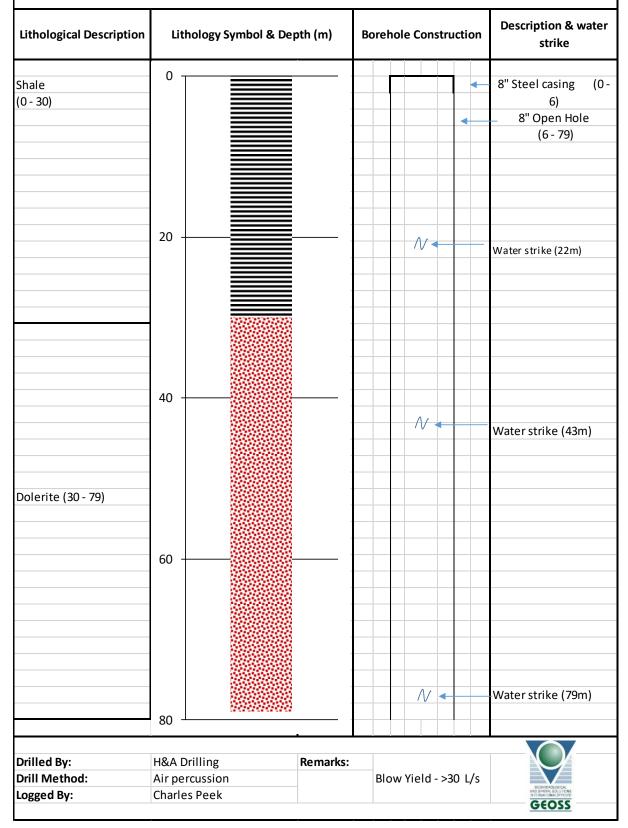
Log of Borehole No.: Cal_vlok1 Location: Calvinia Latitude: -31.382153 Date: 30/5/2018 Longitude: 19.956044 Client: **BVI Engineering Ground Elevation:** 1092 m Description & Lithological Description Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 6.5" Steel casing (0 - 18) 10 20 6.5" Open Hole (18 Shale (0 - 70) - 207) 30 40 50 60 70 80 Dolerite (70 - 96) 90 100 N water strike (106 m) 110 120 Shale (56 - 92) 130 140 150 160 Dolerite (136 - 197) 170 180 190 Shale (197 - 207) -200 Drilled By: H&A Drilling **Remarks: Drill Method:** Air percussion Blow Yield -0.3 L/s Logged By: **Charles** Peek GEOSS

LOG OF BO	rehole No.:	ReDrill39	9602		
Location:	Calvinia	Latitude		-31.37	2061
Date:	30/5/2018	Longitud		19.970	
Client:	BVI Engineering		e: Elevation:	19.970 1092 n	
chent.	BVI Engineering	Ground		1092 11	1
Lithological Description	Lithology Symbol & I	Depth (m)	Borehole Construct	ion	Description & water strike
	0				
					8" Steel casing (0 - 54)
Shale (0 - 31)	10				
	20				
	30	88			
Dolerite (31 - 70)	40				
	50				Water strike (47 -50 m)
	60	<u> </u>			
	70	×		8"	Open Hole (54 100)
	80				
	90				
	100				
	110			6	.5" Open Hole 100 - 150)
Shale (70- 150)	120				
	130				
	140				
	150				
Drilled By:	H&A Drilling	Remarks	•		
Drill Method: Logged By:	Air percussion Charles Peek	Remarks	Blow Yield -> 25 I	_/s	BECHITDROLOGICAL

Log of Borehole No.: Cal_vlok2 Location: Calvinia Latitude: -31.401289 Date: 30/5/2018 Longitude: 20.007778 Client: **BVI Engineering Ground Elevation:** 1092 m Description & **Lithological Description** Lithology Symbol & Depth (m) **Borehole Construction** water strike 0 6.5" Steel casing (0 - 6) Shale (0 - 60) 10 6.5" Open Hole (6 -152) 20 30 40 Water strike N (39 m) 50 N Water strike 60 (59 m) 70 Dolerite (60 - 87) 80 90 100 110 120 Shale (87-152) 130 140 150 Drilled By: H&A Drilling **Remarks:** Drill Method: Air percussion Blow Yield -0.1 L/s Logged By: **Charles Peek** GEOSS

Log of Borehole No.: Cal_Phase3_4A

Date: 30/5/2018 Longitude: 19.556679 Client: BV// Engineering Ground Elevation: 902 m	Location:	Calvinia	Latitude:	-31.435236
Client: BV/I Engineering Ground Elevation: 902 m	Date:	30/5/2018	Longitude:	19.556679
Chefic. Dvi Engineering Ground Lievation. 502 m	Client:	BVI Engineering	Ground Elevation:	902 m



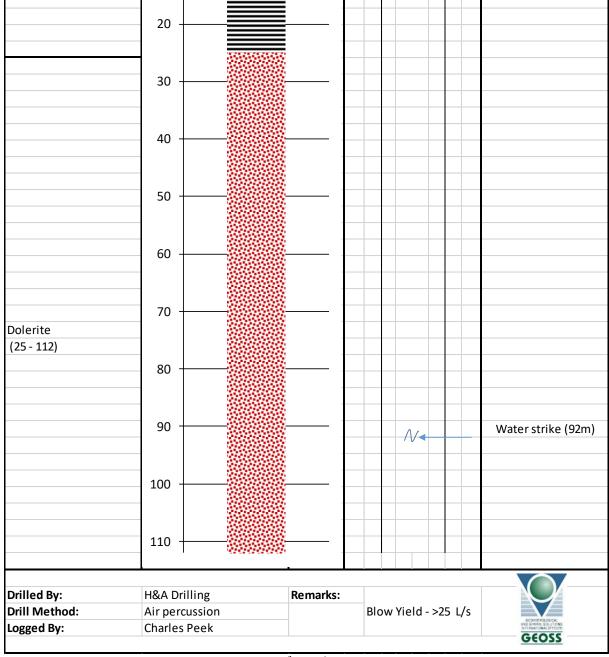
Cal_Phase3_7

Location:	Calvinia	Latitude:	-31.435236
Date:	30/5/2018	Longitude:	19.667129
Client:	BVI Engineering	Ground Elevation:	956 m

Lithological Description	Lithology	y Symbol & De	pth (m)	Boreh	ole Con	struc	tion	Description & water strike
	0							
Shale	Ű						-	
(0 - 45)								6.5" Steel casing (0 - 6)
							-	6.5" Open Hole
								(6 - 137)
	20							
	20							
	-		-					
	_		-					
	_		-					
	_		-					
	10		-					
	40							
	4	00000000						
		- 3838838						
	60							
	_		-					
	-	- 3838388	-					Water strike (70m)
	_				\mathcal{N}			Water stilke (7011)
	_	- 8888888						
	_		-					
	80							
	_							
	_							
Dolerite	_							
(45 - 133)								
	100							
	_		-					
	_		-					
	_							
	_		-					
	120	_3333555						
	-						_	
	-		_	_				
			_					
	4							
Shale								
(133 - 137)								
Drilled By:	H&A Drilling		Remarks:					
Drill Method:	Air percussio			Blo	w Yield ·	- 0.1	L/s	
Logged By:	Charles Peel		1					GEOHYDROLOGICAL AND SPATIAL SOLUTIONS INTERNATIONAL (PTY)LTD
00 1			1					GEOSS

Cal Phase3 6

Location:	Calvinia	Latitude:	Latitude: Longitude:		-31.357725 19.6915	
Date:	30/5/2018	Longitude				
Client:	BVI Engineering	Ground E	Ground Elevation:		906 m	
Lithological Description	Lithology Symbol & Depth (m)		Borehole Construction		Description & water strike	
Shale (0 - 25)					6.5" Steel casing (0 - 6) - 6.5" Open Hole (6 - 112)	



(last page)