The Technical Geohydrology Report – and all that jazz

A short look into the required study and aspects to note

Preanna Naicker
BSc(Hons) Hydrogeologist
pnaicker@geoss.co.za

GEOSS GROUNDWATER CONSULTANTS

GROUND WATER DIVISION www.gwd.org.za

GSSA Geological Society of South Africa

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Groundwater, Boreholes, and Water Use Licenses

Contents

- Purpose of the study
- Prior requirement: Yield and quality testing
- Contents of the geohydrological report
- Stand out aspects
- Other aspects
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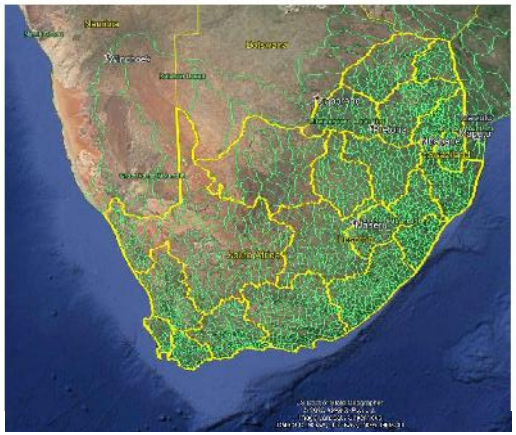
- Compliance conditions based on the findings

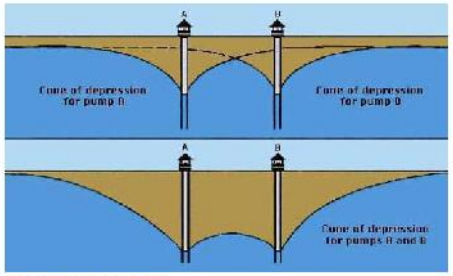
1st Purpose:
Abstraction above GA limit (Section 21(a))



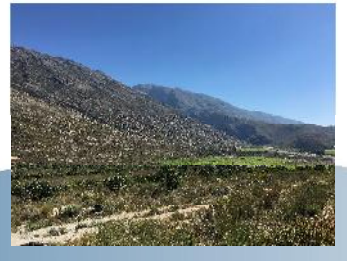
4.5 Ha farm
QC: G22H
GA limit: 400 m^3/ha/a

GA Limit = 4.5 ha x 400 m^3/ha/a
= 1 800 m^3/a

2nd Purpose:
Assess the impact on lawful users and local environment



San Diego State University



Yield test first!

- Prior to the study, the borehole must be tested according to the:

  National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes).

- 4 step test, 24 hour constant discharge test and recovery monitoring.

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Requirements for the report:

1. Introduction
2. Geographical setting
3. Scope of work
4. Methodology
5. Prevailing groundwater conditions
6. Aquifer characterization
7. Groundwater modelling
8. Geohydrological impacts

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9. Groundwater monitoring system
10. Groundwater Environmental Management Plan
11. Post-closure Management Plan
12. Conclusion and Recommendations

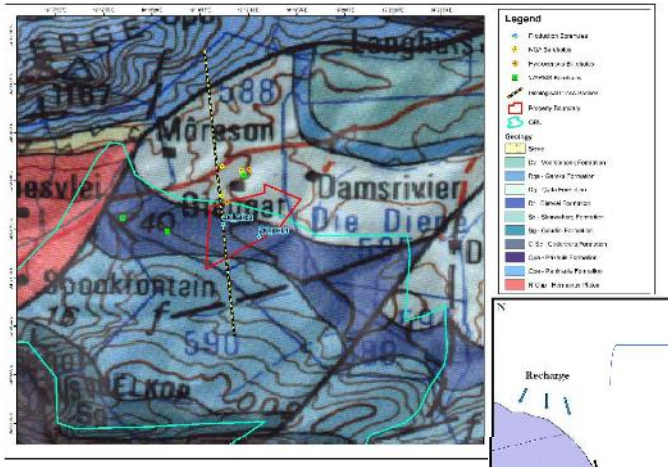
Stand-out aspect 1: Water Balance

Autumn

Summer

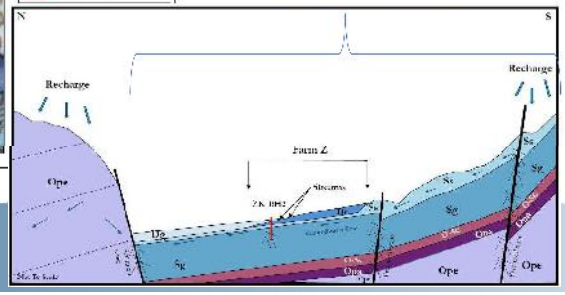
Month	Water Requirement (m³) Agricultural Use: Irrigation				
	Existing Lawful Use		Additional requirement		
	Groundwater	Surface water	ZK_BII1	ZK_BII2	River
January	1 232.3	1	7 055	14 165	1
February	1 232.3	1	7 055	14 165	1
March	1 232.3	1	7 055	14 165	1
April	1 232.3	1	7 060	14 165	1
May	1	1	1	1	1
June	1	33 275.2	1	1	2 498
July	1	33 275.2	1	1	2 498
August	1	33 275.2	1	1	2 498
September	1	33 275.2	1	1	2 498
October	1	1	1	1	1
November	1 232.3	1	7 053	14 169	1
December	1 232.3	1	7 056	14 165	1
Total (m³/a)	7 400	166 384	43 340	85 000	10 000
	173 784		137 340		
Application volume (m³/a)	311 124				

Stand-out aspect 2: Groundwater Resource Unit (GRU)

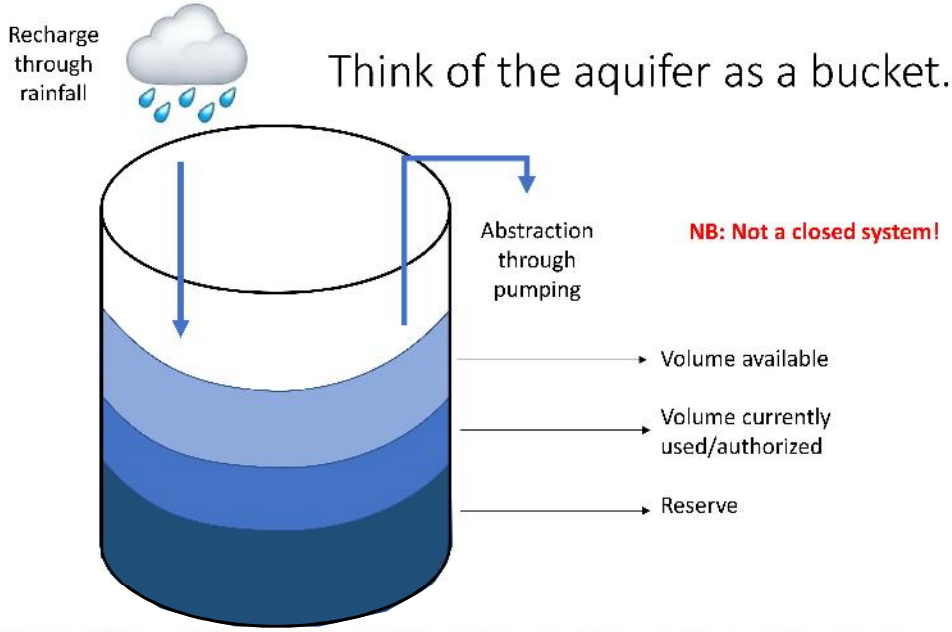


Groundwater Dictionary: http://www.dwa.gov.za/Groundwater/GroundwaterDictionary.aspx

Area part of the GRU



Think of the aquifer as a bucket…



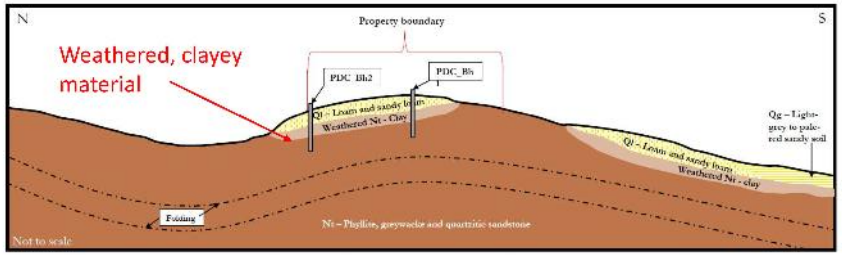
Stand-out aspect 3: Groundwater Risk Assessment

In most cases of abstraction there exist two apparent risks to groundwater:

- Depletion of the Groundwater Resource as a Result of Over-Abstraction
- Groundwater Quality Deterioration as a Result of Over-Abstraction

Other aspects: 1. Uncertainties

- The GRU is subjective



- Aquifers are not closed systems, there are other aspects to consider like groundwater throughflow, urban impact, etc. In addition, it is also a reality that there are an unknown number unauthorized users abstracting from the resource.

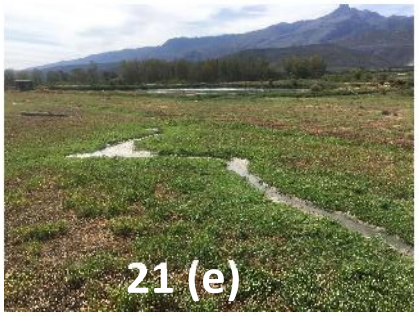
Other aspects: 2. Groundwater-surface water interaction

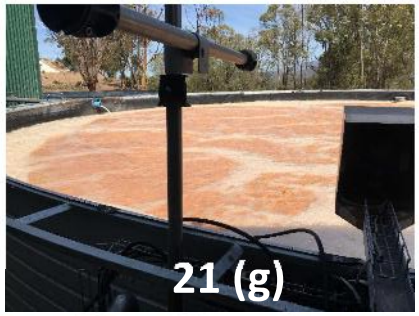
- Issue when licensing?
- Inorganic chemistry and stable isotope analysis

Other aspects 3:
Yield testing results are not indefinite

Section 21(g) and 21(e)

- Geohydrological study is not exclusive to Section 21(a)
  Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource
  Section 21(e): Engaging in a controlled activity

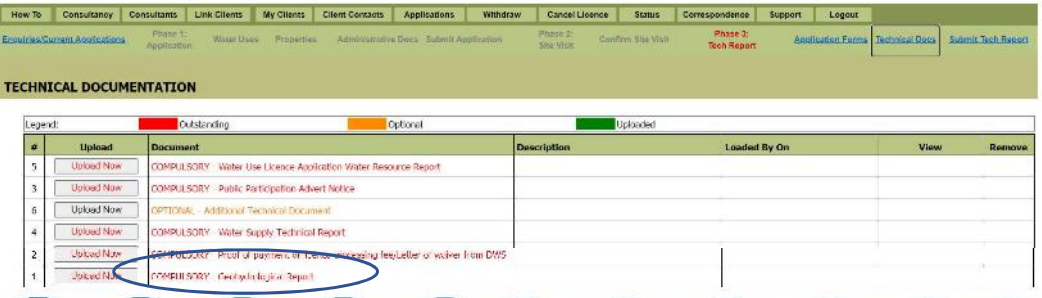




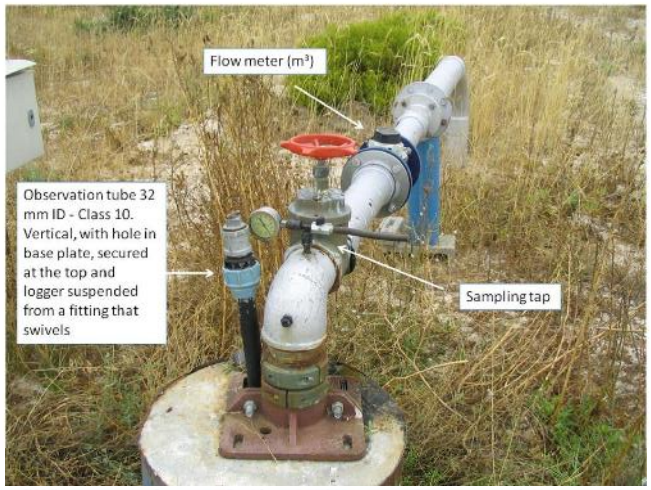
Submission

Old days →

Now… e-WULAAS online system



Compliance conditions



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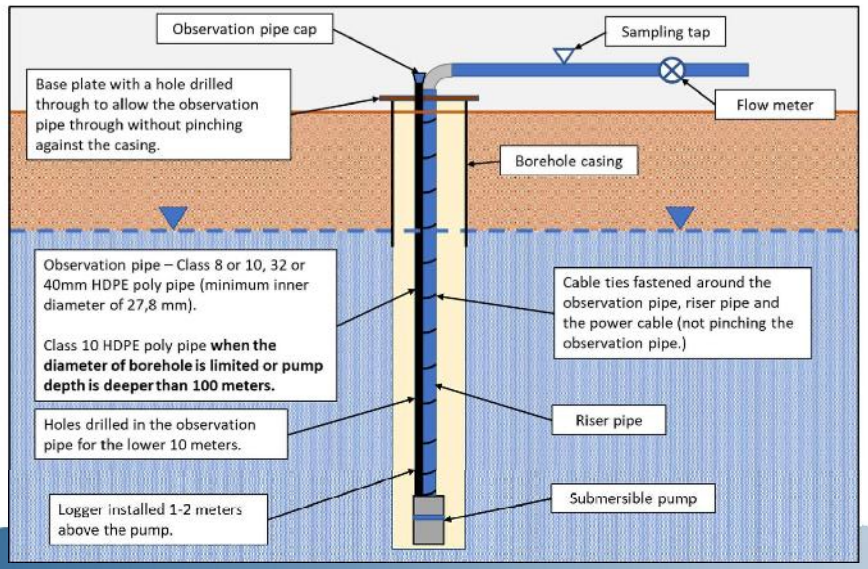

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Compliance Conditions

A competent person (Geohydrologist) shall be appointed by the licensee within 60 days after the date of issuance of this licence to :

9.1 Submit a groundwater monitoring programme for approval by the Responsible Authority. This programme shall include but not be limited to measurements of;
- 9.1.1 Groundwater quantity taken from each production boreholes as per clause 11 (Monthly),
- 9.1.2 Groundwater levels of each production and monitoring boreholes (Monthly).
- 9.1.3 Groundwater quality of each production and monitoring boreholes as per clause 12 (Quarterly),
- 9.1.4 Monthly rainfall,

9.2 Submit the threshold values and operational requirements according to best practice.

The Licensee must install and monitor an appropriate water measuring device to measure the amount of water abstracted continually, received and /or consumed, as applicable to the infrastructure. All measuring, recording and integrating devices shall be maintained in a sound state of repair and calibrated by a competent person at intervals as specified and required according to the device specifications. The licensee must calibrate the inflow and outflow meters and these calibration certificates shall be available for inspection by the Regional Head or Responsible Authority or his/her *representative upon request. A relevant maintenance and calibration schedule should be compiled and* maintained by the licensee.

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Compliance Conditions

Any changes to the approved monitoring programme should be kept and submitted to the Regional Head or Responsible Authority as soon as possible. The Regional Head or Responsible Authority could review and comment on the changes.

The production boreholes must be installed with a piezometer (dipper tube), flow meter and take off tap in the riser pipe for groundwater sampling by the licensee and/or the Department and/or its delegated authority and/or person.

The daily quantity of water taken from each of the respective production boreholes must be metered or gauged and the total recorded at the last day of each month.

The licensee must ensure that the water supply for domestic use is suitable for human consumption according to the variables in SANS 241:2011 (Drinking water quality specifications)

Water samples must be collected at production and monitoring boreholes on a quarterly basis and submitted to a SANAS accredited laboratory for analysis of the elements as per Table 4. The date, time and monitoring point in respect of each sample taken shall be recorded together with the results of the analysis

Dedicated monitoring personnel need to ensure that all monitoring equipment are in working order and maintained to ensure the consistency of data collection which ultimately enables efficient management of the groundwater resource.

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Thank you

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