





PROJECT MANAGEMENT, POWER LINE SURVEY AND DESIGN, WATER, TOPOGRAPHIC SURVEY
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GEOHYDROLOGICAL ASSESSMENT AND BOREHOLE FEASIBILITY STUDY FOR KWAZULU NATAL, DEPARTMENT OF EDUCATION AT ENHLABOSINI PRIMARY SCHOOL



Report	Final		
Project Number			
Client Reference	Department of Education KZN		
Title	Groundwater Assessment for Enhlabosini Primary School		
	Name	Signature	Date
Author	T Mthethwa Hydrogeologist		14/04/2026
Reviewer	M. Makhanya Senior Hydrogeologist (Pr- Sci Nat)		18/04/2026

EXECUTIVE SUMMARY

Khula Kuse Project was appointed by Topzinto Trading CC as an independent hydrogeological consultant to undertake geohydrological assessment for the siting of boreholes at Enhlabosini Primary School.

Methodology

The study was undertaken by first reviewing the literature to gather information pertaining to the site geology, hydrogeology, topography, and climate. This was done on a desktop level to characterize the site in terms of groundwater potential. The desktop study was followed by field assessment which consisted of the geophysical survey using electrical resistivity methods. The data from the survey was analyzed and interpreted in terms of groundwater feasibility and potential of drilling a successful borehole for the site. On completion of the siting, a drilling target were marked.

Findings

The following findings were made:

- Geology within the study are comprises the rocks of the Natal Group Sandstone.
- The principal groundwater occurrence within the site comprises of fractured aquifers. These aquifers are characterized by borehole yield ranging between 0.1 to 0.2 l/s.
- The results of the geophysical survey indicated the presence of the weathered aquifer (conductive zone) which is underlain by a fractured aquifer (less conductive).
- Based on this assessment a borehole is considered feasible for the site. Groundwater strike is anticipated within the weathered zone and in the contact zone between the weathered rock and the fresh rock.

Recommendations

- Based on the formation onsite, it is anticipated that Percussion drilling will be sufficient for the site.
- On successful drilling, yield testing is required for the borehole to determine aquifer parameters, sizing of the pump to be installed, pumping rate and duration.
- Water quality testing is recommended to ensure water is safe for human drinking and complies with SANS 241 Guidelines.



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1. Introduction

Khula Kuse Project was appointed by Topzinto Trading CC as an independent hydrogeological consultant to undertake geohydrological assessment for the siting of borehole at Enhlabosini Primary School.

2. Scope of Work

2.1. Desktop study

The review of the study area was conducted through collecting and reviewing the following data source:

- 1.) Hydrogeology map
- 2.) Geology maps
- 3.) Google earth satellite imagery

2.2. Geophysical Survey

The field geophysical survey was undertaken using ADTMS, Schlumberger method. The survey method is discussed in the report.

2.3. Data Analysis

Data collected during the survey was interpreted to determine the groundwater potential. Drill targets was marked after data analysis.

3. Desktop Assessment

3.1. Site Location

- Enhlabosini Primary School 28° 28'1.62"S 32° 6'14.16"E

3.2. Geology and Hydrogeology

A regional geology map constructed from the South African geological maps, sheets 2730: Vryheid, 2732: Hluhluwe and 2726: St Lucia, at a regional scale of 1:250 000 is provided in [Figure 2-2](#).

A large portion of the study area is underlain predominantly by sediments of the Karoo Supergroup, specifically those of the Dwyka, Vryheid, and Pietermaritzburg Formations. These sediments have been extensively intruded by Jurassic aged dolerite dykes and sills

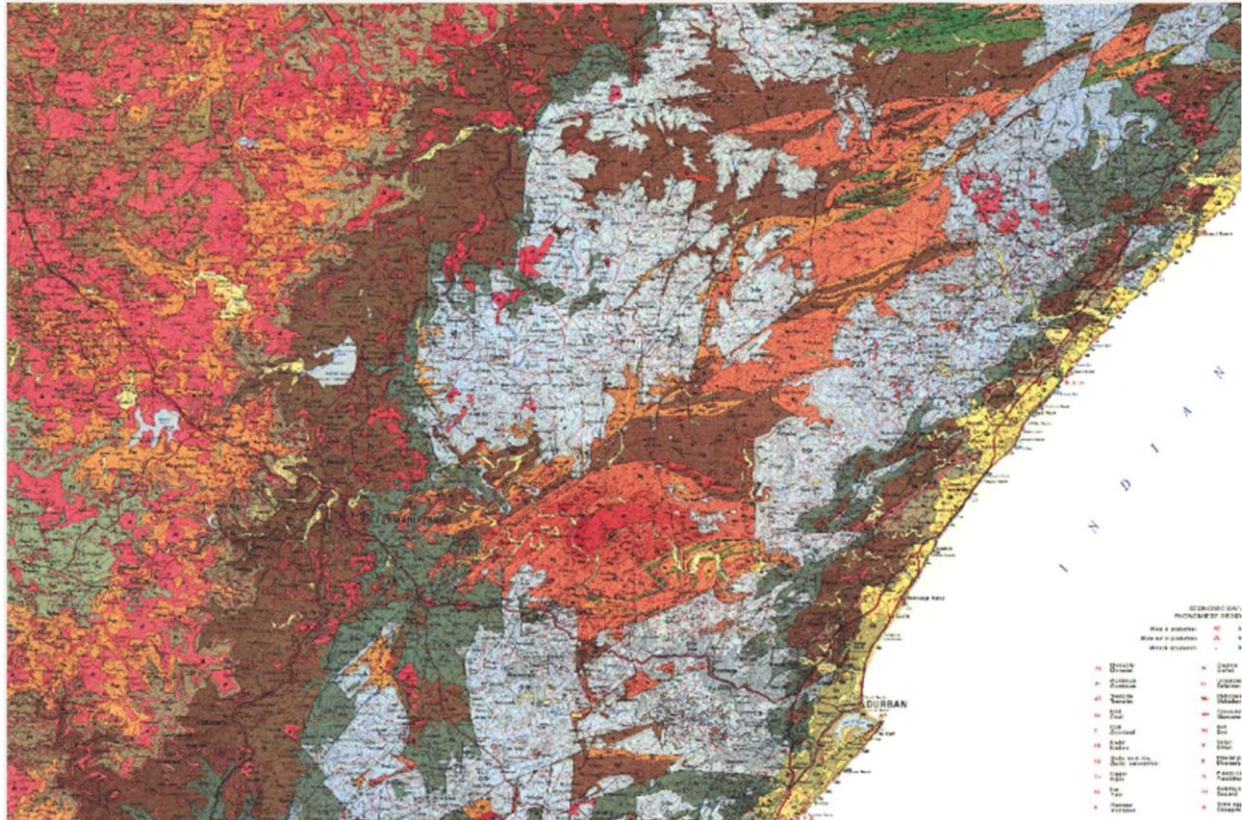
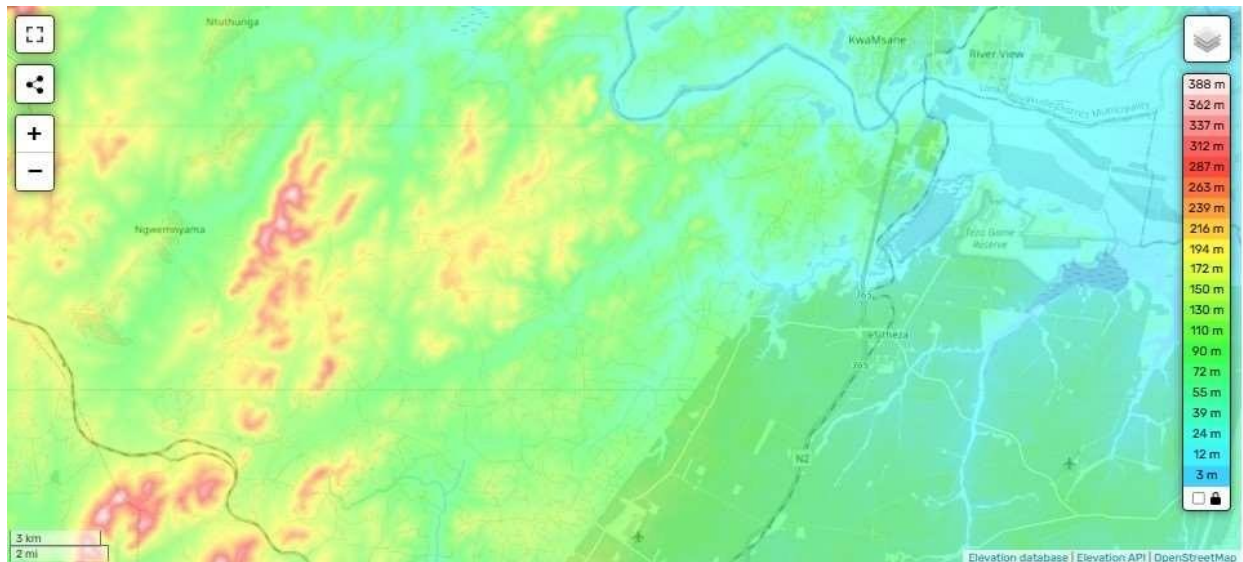


Figure 1: Geology Map

3.3. Topography and Rainfall

Figure 3a



The study of Enhlabosini is located in Empangeni, KwaZulu-Natal, South Africa. The estimate terrain elevation above sea level is 108 meters, has warm and wet summers, the winters are short, cool and dry. Over the course of the year the temperature varies from 7.2° C to 31° c.

Summer is the wetter season in the year from the month of October to March with average rainfall. December has most wet days with an average of 15.7 days with at least 1.016mm rainfall. Annual average for temperature and rainfall is shown in Figure 2 below

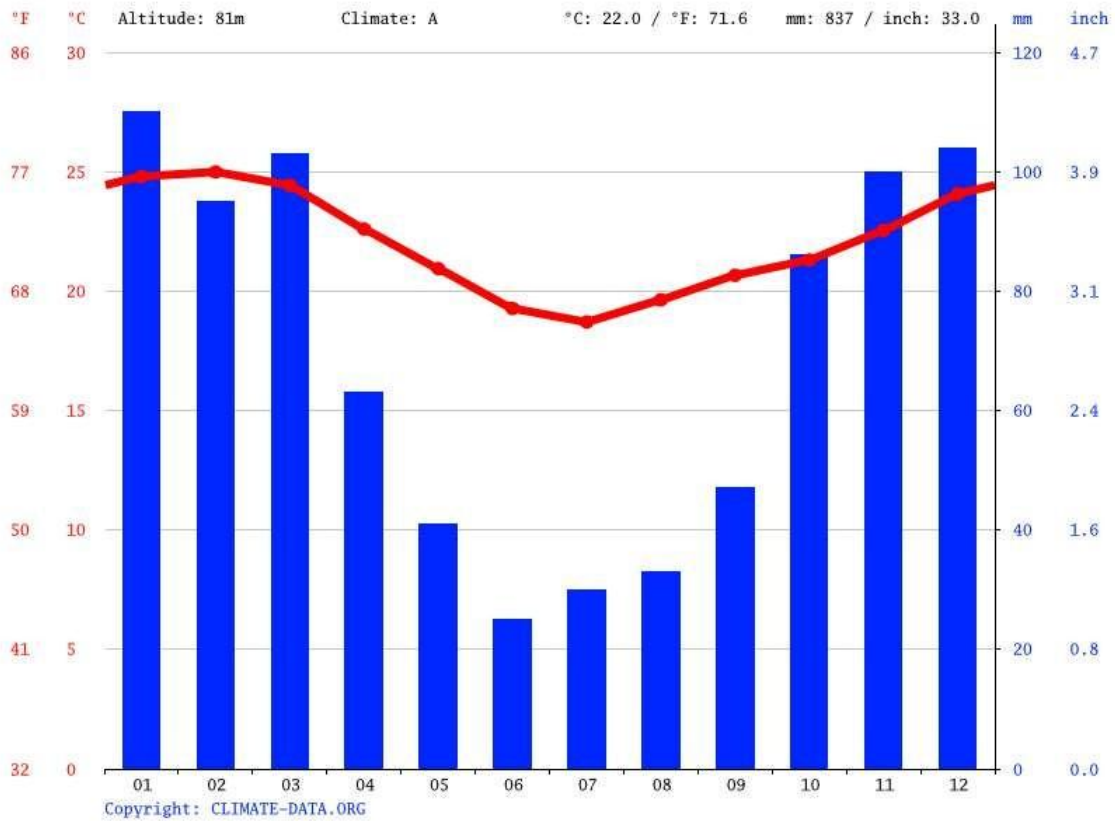


Figure 2: Annual average temperature and rainfall at Enhlabosini Primary School

4. Field Assessment

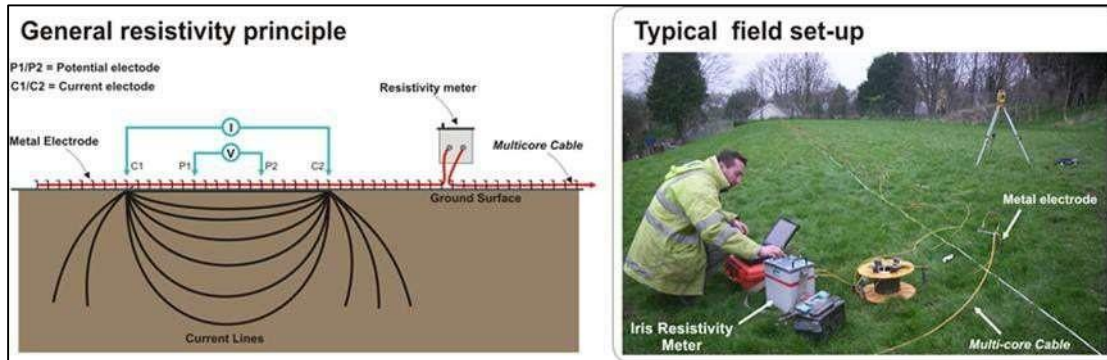
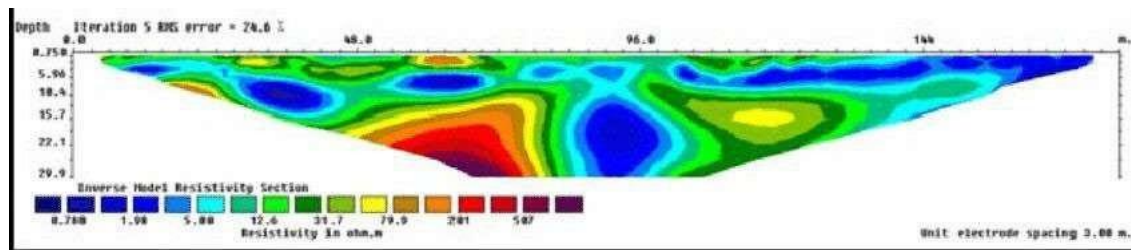


Figure: typical 2-D model from a resistivity survey.



4.1. Geophysical Survey

A geophysical survey was completed in the area, traversed line was undertaken using ADMTS 500, Schlumberger Resistivity Method with 4 cables (50m each), and 4 arrays of hammered electrodes in 5m intervals to take field measurements, points of survey line were recorded using a Garmin GPS.

4.2. Data Analysis

Recorded data was sorted on Ms Excel Spreadsheet to have it in correct order, remove negative values and outliers. Model was carried out using a RES2Dinv resistivity model to interpret the site profile and identify the potential drilling target. Refer to Figure 3 potential drill targets and Table 1 for apparent resistivity model.

Enhlabosini Primary School

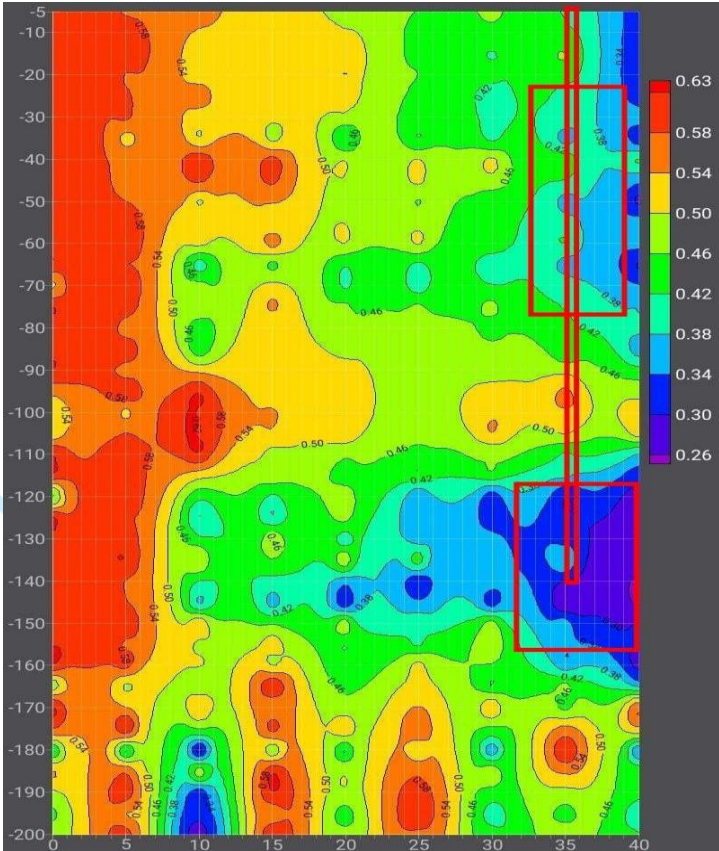


Figure 3: Potential drill target



Enhlabosini Primary School

Table 1: Resistivity Model

Site Name	Site Description	2D Inversion Model	Recommended Drilling Target Coordinates	
			Latitude (WGS84)	Longitude (WGS84)
Site 1 Mbonambi	Enhlabosini Primary School	<p>Depth= 142M</p> <p>Percussion Drilling methods</p> 	28° 28'1.62"S	32° 6'14.16"E

5. Conclusions

The following conclusions were derived from the desktop study, geophysical survey and drilling:

- The principal groundwater occurrence within the site comprises of fractured aquifers. These aquifers are characterized by borehole yield ranging between 0.1 to 0.2 l/s.
- The results of the geophysical survey indicated the presence of the weathered aquifer (conductive zone) which is underlain by a fractured aquifer (less conductive).
- Based on this assessment a borehole is considered feasible for the site. Groundwater strike is anticipated within the weathered zone and in the contact zone between the weathered rock and the fresh rock.

6. Recommendations

- Based on the formation onsite, it is anticipated that Percussion drilling will be sufficient for the site.
- On successful drilling, yield testing is required for the borehole to determine aquifer parameters, sizing of the pump to be installed, pumping rate and duration.
- Water quality testing is recommended to ensure water is safe for human drinking and complies with SANS 241 Guidelines.



**RUDIMENTARY GROUNDWATER SUPPLY AND MANAGEMENT & GEOLOGICAL & GEOPHYSICS
CONSULTING DRILLING AND SOLAR, ELECTRIC AND HAND PUMP SUPPLIER**

97 Innes Drive Berea Durban 4001-031 109 3628-info@topzinto.com

DRILLING REPORT

Project Information

- **Project:** Borehole Drilling Project
- **Client:** Department of Education
- **Contractor:** TopZinto Trading
- **School Name:** Enhlabosini Primary School
- **Location:** Umzimkhulu Area, KwaZulu-Natal
- **Drilling Dates:** 21–22 April 2026
- **Drilling Depth:** 120 Meters
- **Casing Installed:** 60 m
- **Driller:** Mr. Van der Mere

1. Project Overview

This report outlines the drilling activities completed for the borehole project at Enhlabosini Primary School. The purpose of the drilling operation was to identify and access underground groundwater sources to provide a reliable and sustainable water supply for the school.

The drilling was conducted over a two-day period between 21 April 2026 and 22 April 2026 by TopZinto Trading on behalf of the Department of Education.

2. Drilling Details

Item	Description
Drilling Method	Percussion / Down-the-Hole Hammer Drilling
Borehole Diameter	177 mm
Total Depth Drilled	120 metres
Drilling Period	21–22 April 2026
Casing Type	Mild Steel / Plain Steel Casing
Driller	Mr Van der Mere
Contractor	Topzinto Trading

3. Geological Formation Encountered

During drilling operations, several geological formations were encountered at varying depths. The drilling process progressed through weathered topsoil, clay layers, fractured rock formations, and water-bearing zones.

The borehole reached a final drilled depth of 120 meters, with promising groundwater intersections encountered at different levels.



Three significant water strike zones were encountered during drilling:

Strike Number	Depth Encountered	Observation
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First Strike	60 meters	Initial water inflow encountered
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Second Strike	90 metres	Increased water-bearing fracture zone
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Third Strike	110 metres	Strong water-bearing zone with improved yield
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The final strike at 110 metres indicated a productive water-bearing formation, supporting the likelihood of a sustainable groundwater source.

5. Drilling Progress Summary

Drilling commenced on 21 April 2026 and progressed steadily through varying geological formations. Initial penetration rates were moderate due to mixed ground conditions.

At approximately 60 metres depth, the first water-bearing fracture was encountered. Additional groundwater-bearing formations were intersected at 90 metres and 110 metres.

The drilling continued to a final depth of 120 metres to ensure adequate penetration into the aquifer zone and to improve borehole sustainability.

6. Borehole Condition

The borehole was completed successfully to the required depth. Ground conditions remained stable during drilling operations, and no major collapses or drilling interruptions were recorded.

The borehole demonstrated positive groundwater indications, with multiple strike zones contributing to the expected water supply.

7. Site Observations

- Drilling operations were completed successfully within the planned schedule.
- Weather conditions were suitable for drilling activities.
- Multiple groundwater strikes were encountered.
- Borehole depth achieved met the planned drilling target.
- Geological conditions indicated fractured rock zones capable of storing groundwater.

8. Conclusion

The borehole drilling at Enhlabosini Primary School was successfully completed to a total depth of 120 metres.

Three groundwater strike zones were intersected at depths of 60 metres, 90 metres, and 110 metres. These intersections indicate favorable groundwater conditions and suggest that the borehole has strong potential to provide a reliable water supply for the school.

The drilling operation conducted by Topzinto Trading on behalf of the Department of Education was completed efficiently and according to project requirements.

9. Prepared By

Contractor: Topzinto Trading

Driller: Mr. Van der Mere

Project Date: 21–22 April 2026

Client: Department of Education

Test Report

LABORATORY SERVICES DEPARTMENT

Test Report Number: 2026-1403

Page Number: 1 of 3

CUSTOMER INFORMATION	
Laboratory Customer Code	3450
Name	Deptatment of Education-Enhlabosini Primary School
Company Name	Topzinto Trading cc
Postal Address	12 Peace Avenue
Telephone Number	077 585 6606
Email Address	info@topzinto.com
Date Sample/s Taken	18-05-2026

LABORATORY TESTING INFORMATION	
Sample Matrix	Water
Sample Condition on Receipt & Handling	1 sample was received in good condition. The sample was logged and submitted immediately to the laboratory for analysis.
Date Sample/s Received	18-05-26
Date Testing Commenced	19-05-26
Date Testing Completed	25-05-26
Test Report Date	25-05-26
Results Interpretation Explanatory Information	<ol style="list-style-type: none"> These results are subject to change and must not be considered as final, unless this test report is signed by appropriate laboratory signatories. Should any results change, you will be informed thereof, before issuing the final test report. Results and or determinands/parameters marked with an asterisk (*) are not SANAS accredited and are not included in the SANAS Schedule of Accreditation for this laboratory. Results pertain to the sample/s as taken by you and in the condition received by this laboratory. All laboratory testing is done at the Head Office laboratory. Any sub-contracted testing will be clearly marked on the test report. Information pertaining to the testing methods, is obtainable from the laboratory. For SANS 241 conformance testing, acid extractable metals are analysed, except for chromium. All other results are reported as total unless indicated otherwise. In assessing the conformity of test results to the specification, as required by the customer, uMngeni-uThukela Water Laboratory Services reports all test results using the following decision rule: "A simple acceptance binary statement with zero guard band decision rule (pass/fail) as per ILAC G8_09_2019, will be used, where the combined UoM, at a 95% Confidence Interval, is within $\pm 10\%$ for Chemistry Water Methods; $\pm 15\%$ for Soils/Sludge Methods; $\pm 20\%$ for Microbiology Methods and $\pm 50\%$ for Hydrobiology methods. The probability of reporting a false rejection of a test result against a specification is $< 50\%$ Confidence Interval, for all incidents and failures that are within the uncertainty of measurement of the specific parameter/determinand." When a statement of conformity is not required, the decision rule is not applied, with test results reported as an absolute value. Statement of Conformity of results: Based on the laboratory's decision rule, all results that are depicted in bold font shall be deemed as non-compliant to the defined specification per determinand/parameter, where applicable. Statements 7, 8 and 9 (above) apply to accredited methods results only. Samples are held for 7 working days, where possible, after the provision of results and unless results are queried with a formal request for re-testing, it is implied that all test results are accepted and the sample/s will be discarded. Opinions and Interpretation of results are based on the test results obtained from the sample/s tested and falls outside the scope of accreditation.

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Telephone: (033) 341243/1344/1013 • Fax: (033) 341 1501

Test Report

LABORATORY SERVICES DEPARTMENT

Test Report Number: 2026-1403

Page Number: 2 of 3

Sample ID			3450		Uncertainty of Measurement (UoM)	SANS 241:2015 Drinking Water Standard Limits Required	SANS 241:2015 Drinking Water Classification
Sample Description			Enhlabosini Primary BH				
Method Number	Determinands	Units	Results				
1a	Alkalinity	mg CaCO ₃ /L	208		±6%	no limit	-
7	Appearance*	Descriptive	Slightly Turbid Grey		not applicable	no limit	-
30	Calcium	mg Ca/L	22.3		±7.8%	no limit	-
5a	Chloride (soluble)	mg Cl/L	93.2		±1.8%	≤300	aesthetic
19	Colour	mg Pt-Co/L	<1.00		±6.5%	≤15	aesthetic
Calculation	Combined Nitrate + Nitrite Ratio*	-	0.22		not applicable	≤1	acute health
21	Conductivity@ 25°C	mS/m	71.0		±1.5%	≤170	aesthetic
121	<i>E.coli</i> *	MPN/100mL	0		±8%	0	acute health
94	Fluoride	µg F/L	971		±5.3%	≤1500	chronic health
30	Iron	mg Fe/L	<0.02		±5.4%	≤0.3	aesthetic
						≤2.0	chronic health
27	Total Hardness	mg CaCO ₃ /L	<44.2		±8.7%	no limit	-
80	Heterotrophic plate count @ 37°C *	CFU/mL	89		±20%	≤1000	operational
30	Potassium	mg K/L	<5.00		±7.7%	no limit	-
30	Magnesium	mg Mg/L	20		±7.8%	no limit	chronic health
30	Manganese	mg Mn/L	0.01		±6.2%	≤0.1	aesthetic
						≤0.4	chronic health
30	Sodium	mg Na/L	106		±7.5%	≤200	aesthetic
5a	Nitrite (soluble)	mg N/L	<0.10		±2.4%	≤0.9	acute health
5a	Nitrate (soluble)	mg N/L	1.42		±2.9%	≤11	acute health
7	Odour*	Descriptive	Nil		not applicable	Inoffensive	aesthetic
46	pH	pH Units	7.41		±1.5%	≥5 to ≤ 9.7	operational
5a	Sulphate (soluble)	mg SO ₄ /L	12.1		±1.8%	≤250	aesthetic
						≤500	acute health
151	Total Organic Carbon	mg C/L	<1.00		±5%	≤10	chronic health
121	Total Coliforms*	MPN/100mL	22		±6%	≤10	operational
69	Turbidity	NTU	0.9		±6.1%	≤1	operational
						≤5	aesthetic

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Test Report

LABORATORY SERVICES DEPARTMENT

Test Report Number: 2026-1403

Page Number: 3 of 3

LABORATORY TECHNICAL SIGNATORY RESPONSIBLE FOR REVIEW AND AUTHORIZATION OF THIS TEST REPORT			
NAME	DESIGNATION	TECHNICAL SIGNATORY FOR METHODS	SIGNATURE
Mr TP Khumalo	Technical Supervisor - Chemistry	5a, 27, 59, 61, 67, 151	
Mr S Hadebe	Technical Supervisor - Chemistry	1a, 59, 94, 164, 165, 166, 167, 168, 169, 171	
Mr W Mpapane	Scientist - Chemistry	5a, 59, 61, 67, 151, 157, 158, 177	
Mr S Khuboni	Technician - Chemistry	19, 21, 30, 46, 69, 102, 102a	
Mrs ZP Sithole	Technical Supervisor - Chemistry	19, 21, 30, 46, 59, 69, 94, 102, 102a	
Ms K Pillay	Technician - Chemistry	19, 21, 46, 69, 102, 102a	

LABORATORY PERSONNEL RESPONSIBLE FOR REVIEW AND AUTHORIZATION OF THIS TEST REPORT		
NAME	DESIGNATION	SIGNATURE
Ms K Dlomo	Technical Supervisor Microbiology	
Ms P Magebeni	Technical Supervisor Microbiology	

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