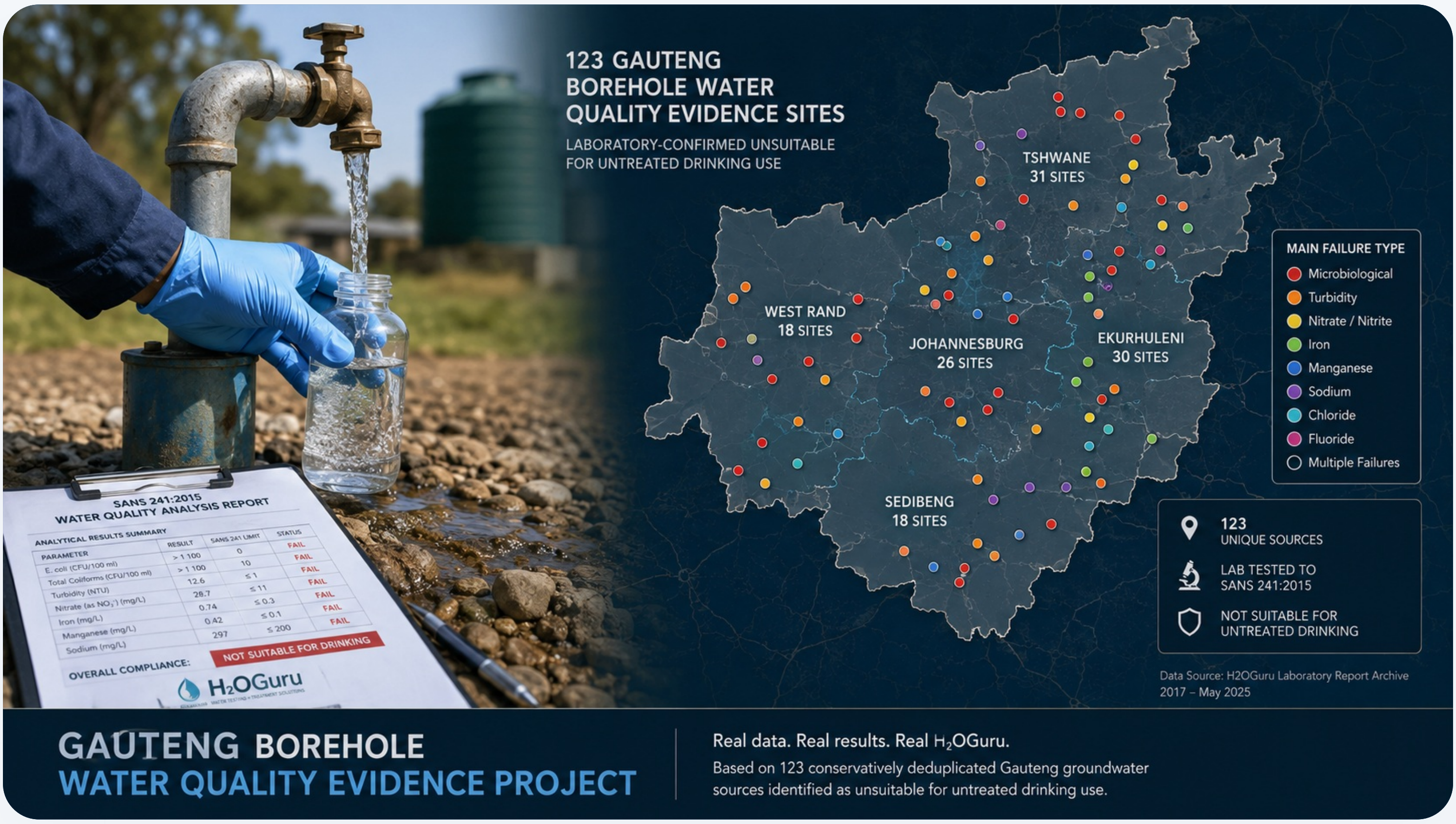


H2OGURU GAUTENG BOREHOLE WATER QUALITY EVIDENCE PROJECT

Gauteng Borehole Water Quality: What 123 Unsuitable Groundwater Sources Reveal

A structured H2OGuru evidence report built from real laboratory assessments across Gauteng. The final public statistics use a conservative, deduplicated set of 123 unsuitable borehole or groundwater sources. The purpose is to document real failure mechanisms, regional patterns and treatment implications without pretending that a selected problem dataset represents every borehole in Gauteng.

123	80	68	29
conservatively deduplicated Gauteng groundwater sources used for public statistics	unique sources tagged with a direct microbiological failure	sources with two or more direct failure families	sources with three or more direct failure families

Contents

1. Executive Summary

H2OGuru has assembled a substantial archive of borehole-water laboratory assessments from Gauteng. After a final audit, the public analysis is based on 123 conservatively deduplicated groundwater sources that were classified as unsuitable for untreated drinking use. These sources are drawn from Johannesburg, Tshwane, Ekurhuleni, the West Rand and Sedibeng.

Important statistical boundary

This is a selected problem dataset, not a random population survey of all Gauteng boreholes. The figures below describe the composition of H2OGuru's unsuitable-source archive. They must not be interpreted as the percentage of all Gauteng boreholes that are unsafe.

Within this selected evidence set, microbiological failure is the largest direct problem family identified, followed by turbidity and several recurring chemical failure groups. Many sources have more than one problem at the same time.

Direct failure family	Unique sources tagged	Share of selected evidence set
Microbiological contamination	80	65.0%
Turbidity / suspended-solids-related failure	52	42.3%
Nitrate and Nitrite	27	22.0%
Manganese	23	18.7%
Iron	15	12.2%
Aluminium	9	7.3%
Sodium	10	8.1%
Chloride	8	6.5%

Sulphate	6	4.9%
Fluoride	8	6.5%
Direct pH failure	1	0.8%

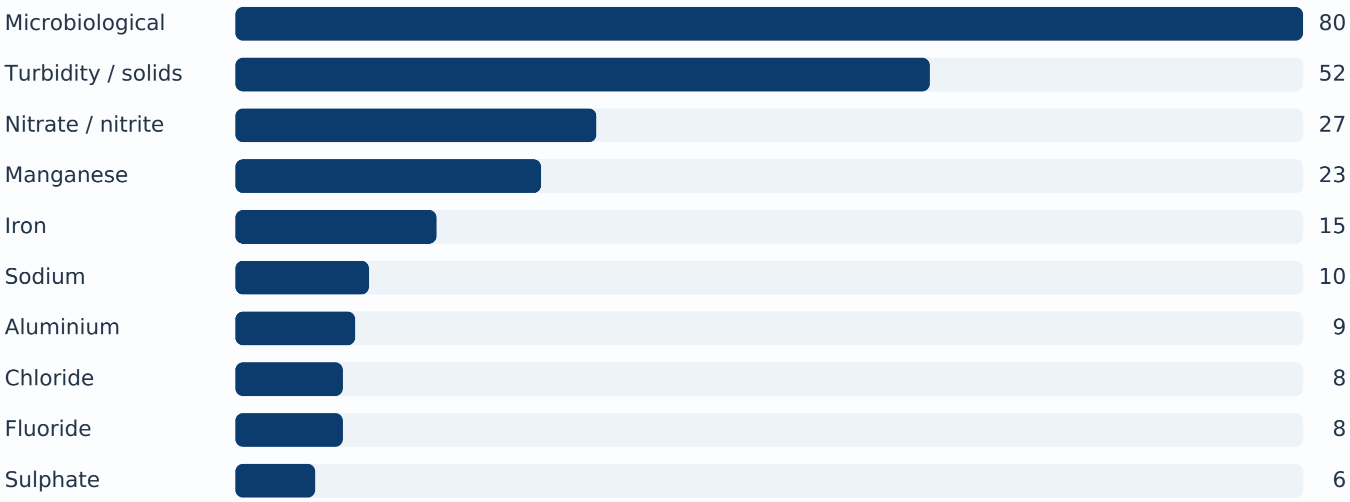
The single most important finding

There is no single Gauteng borehole-water profile. One borehole may fail because of Faecal Coliforms, another because of nitrate, another because of manganese or sodium, and another because of pH. Some sources contain several problems simultaneously. This variability is why laboratory testing must come before treatment selection.

H2OGuru selected unsuitable-source dataset

Direct failure families identified across 123 unique sources

Counts overlap because one source can contain more than one failure family.



Source: H2OGuru Gauteng Borehole Water Quality Evidence Project master dataset. These counts describe the selected unsuitable-source archive and are not prevalence estimates for all Gauteng boreholes.

2. Dataset Methodology

The final master dataset contains 125 confirmed Gauteng records. Known repeat or time-series samples from the same physical source were conservatively collapsed for public statistics, resulting in 123 unique-source records.

Gauteng confirmation update

The 14 records that were previously held back for location verification have now been confirmed by the user as Gauteng records. They are included in the totals. Where the underlying report does not provide enough information to assign a municipality confidently, the source is grouped under Gauteng, exact sub-region unresolved rather than guessing a town.

Confirmed

125

Gauteng records meeting the unsuitable-source criteria.

Unique sources

123

Conservative deduplicated count used for public statistics.

Held back

0

The 14 previously unresolved records have now been confirmed by the user as Gauteng and included. Where an exact municipality could not be resolved, they are grouped as Gauteng, exact sub-region unresolved.

An additional 26 structured candidate records were excluded because they were outside Gauteng, were not borehole/groundwater sources, or otherwise fell outside the project scope.

Classification rules

SPC alone was not used as a domestic potability failure when Faecal Coliforms and Total Coliforms were absent. Hardness and non-SANS corrosion indices were retained as operational or infrastructure information but were not used alone to classify a borehole as non-potable. Multi-borehole properties remain separate where reports explicitly identify distinct physical boreholes.

3. What the Dataset Contains

The evidence set is not a collection of one repeated problem. It is a collection of overlapping failure mechanisms.

Health and hygiene

Total Coliforms, Faecal Coliforms, E. coli where tested, nitrate/nitrite, fluoride and other direct chemical failures.

Physical quality

Turbidity, suspended solids, rusty or yellow water, particulate metal loading and source instability.

Infrastructure

Hardness, scaling, corrosivity and aggressive water, kept separate from direct health failures.

68 of the 123 unique sources, or 55.3%, were tagged with at least two direct failure families. 33 sources, or 26.8%, had at least three. This overlap is one of the strongest arguments against generic, single-purpose borehole filter packages.

More than half of the selected sources had multiple direct failure families

68 of 123 sources, 55.3%

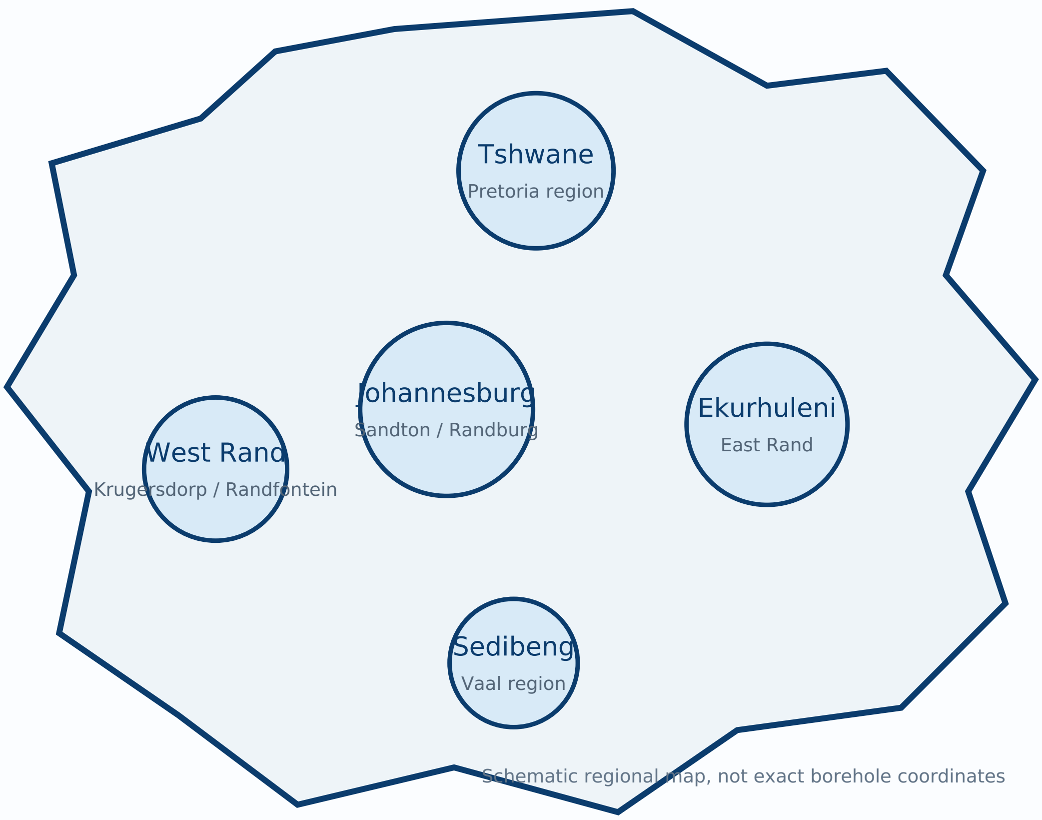
Two or more direct failure families

This is why treatment often needs more than one process stage.

4. Regional Distribution of the Audited Evidence Set

Anonymised regional evidence view

Gauteng Borehole Water Quality Evidence Map



● Evidence regions represented in the H2OGuru archive

Private property coordinates are intentionally not published. Exact sub-region was left unresolved where the underlying report did not support a confident municipality assignment.

Region	Unique sources in the audited unsuitable-source set	Share of selected evidence set
Johannesburg metro and northern suburbs	47	38.2%
Pretoria / Tshwane	40	32.5%
Ekurhuleni / East Rand	13	10.6%
West Rand	7	5.7%
Sedibeng	1	0.8%
Gauteng, exact sub-region unresolved	15	12.2%

These numbers reflect where H2OGuru's unsuitable-source evidence came from. They should not be used to rank municipalities by groundwater quality because sampling density is not uniform across the province.

5. Microbiological Failures

80 of the 123 unique sources were conservatively tagged with a direct microbiological failure. This includes clear Total Coliform non-compliance, Faecal Coliform detection, E. coli where reported, or report conclusions explicitly identifying microbiological contamination.

The archive contains examples ranging from moderate Total Coliform deterioration to severe faecal contamination, including some results above laboratory reporting ranges. Importantly, microbiological problems are not confined to visibly dirty water.

H2OGuru interpretation principle

SPC is an operational indicator. Faecal Coliforms, E. coli and clear Total Coliform failures change the drinking-water risk assessment and should not be treated as interchangeable with an isolated elevated SPC.

6. Nitrate and Nitrite

22 unique sources were tagged with a direct nitrate/nitrite failure in the audited dataset. Several cases were well above the applied drinking-water criterion.

Randfontein | Clear water

TON 48.8 mg N/L

A Wheatlands borehole had no Total or Faecal Coliform contamination and turbidity of only 0.43 NTU, yet Nitrate and Nitrite (TON) measured 48.8 mg N/L. This is a strong example of an invisible chemical failure.

Linbro Park | Multi-borehole site

Four boreholes, four nitrate failures

Four distinct boreholes at one Johannesburg property recorded TON results of 15.3, 18.4, 24.1 and 18.4 mg N/L. Their microbiological profiles differed, showing that boreholes at the same site can share one chemical problem while differing in another water-quality dimension.

Treatment implication

UV and ordinary sediment cartridges do not remove dissolved nitrate. Nitrate requires treatment specifically capable of dissolved-ion reduction.

7. Turbidity and Suspended Solids

46 unique sources were tagged with a direct turbidity-related failure. This includes moderate exceedances, rusty or yellow water and highly turbid source water with substantial suspended solids.

High turbidity matters beyond appearance. It can overload cartridge filters, reduce UV transmission, interfere with disinfection and substantially increase maintenance costs.

Greenside

Turbidity 39.1 NTU

A Greenside borehole combined very high turbidity with Total Coliform failure and elevated aluminium.

Akasia

Turbidity 74 NTU

An Akasia borehole combined severe turbidity with faecal contamination, iron, manganese and extreme hardness, illustrating a multi-stage treatment challenge rather than a simple cartridge-filter problem.

8. Iron, Manganese and Aluminium

The audited evidence set contains 15 iron-tagged sources, 23 manganese-tagged sources and 9 aluminium-tagged sources.

Iron

Often associated with orange or brown staining, metallic taste, deposits and filter fouling.

Manganese

Can cause dark-brown or black staining and deposits and may require specialised oxidation/filtration.

Aluminium

Appears in several turbid or otherwise poor-quality sources and must be assessed as part of the complete chemical profile.

One Gauteng record contained iron of 6.20 mg/L with manganese, turbidity and elevated ammonia. An Auckland Park borehole recorded manganese at 1.20 mg/L. These are fundamentally different treatment cases from microbiological-only failures.

9. Sodium, Chloride, Sulphate and Fluoride

The final audit tagged 10 sodium failures, 8 chloride failures, 6 sulphate failures and 8 fluoride failures among the 123 unique unsuitable sources.

Lynnwood Glen

Sodium 238 mg/L with excellent microbiology

This source demonstrates why chemical analysis matters even when the water is clear and microbiologically excellent. It was unsuitable because of dissolved sodium, not bacterial contamination.

Newlands, Pretoria

Chloride plus microbiology

A borehole with Faecal Coliform and Total Coliform failures also had chloride of 323 mg/L and high hardness. One source therefore presented hygiene, salinity and infrastructure concerns simultaneously.

10. pH and Aggressive Groundwater

The conservative direct-failure tagging identified one source whose report explicitly classified drinking water as unsuitable because of pH. At Noordheuwel, pH was 4.92 while microbiology was excellent.

Other sources in the archive show extremely soft, mineral-poor water with severe corrosion indices while still meeting measured health-related parameters. This is why pH, hardness and corrosion behaviour must be interpreted separately.

11. Hardness and Infrastructure Risk

Hardness is widespread in Gauteng groundwater, but the final statistics deliberately do not count hardness as a direct potability failure. Some very hard boreholes remain potable.

Raslouw, Centurion

Hardness 602 mg/L as $CaCO_3$, yet potable

This example is valuable because it prevents an important interpretation error: extremely hard water can be operationally expensive without being the parameter that makes water unsafe to drink.

Hardness matters because of scale in geysers, heating elements, taps, shower heads, valves and appliances. It belongs in treatment design, but it should not inflate a drinking-water failure statistic.

12. Multiple Failures in One Source

59 unique sources had at least two direct failure families. 29 had three or more. This is one of the strongest findings of the structured audit.

Combined problem pattern	Why one treatment stage is insufficient
Faecal contamination + nitrate	Disinfection does not remove dissolved nitrate.
Turbidity + iron + manganese	Source stabilisation, solids control, oxidation and media filtration may all be required.
High sodium + aggressive soft water	Dissolved-ion reduction and infrastructure stabilisation are different objectives.
Chloride + microbiological contamination + hardness	Health, taste/corrosion and scaling problems need different treatment mechanisms.

13. Clear Water Can Still Be Unsafe

Several of the strongest H2OGuru cases were described as clear. Clear water with 48.8 mg N/L TON and clear water containing Faecal Coliforms demonstrate the same principle from opposite directions: visual appearance cannot verify chemistry or microbiology.

What a clear glass can tell you

It can tell you the water looks clear. It cannot tell you that nitrate, fluoride, sodium or bacteria are within drinking-water limits.

14. Gauteng Evidence Atlas

Area	Illustrative finding	What it demonstrates
Linbro Park, Johannesburg	Four distinct boreholes with TON 15.3 to 24.1 mg N/L	Site-wide chemical patterns can coexist with different microbiological profiles
Wheatlands, Randfontein	TON 48.8 mg N/L, clear water	Invisible chemical failure
Greenside, Randburg	Turbidity 39.1 NTU, Total Coliforms, aluminium	Physical, microbiological and chemical failure together
East Lynne, Pretoria	Faecal Coliforms 12 CFU/100 mL, Total Coliforms 20 CFU/100 mL, hardness 359 mg/L	Microbiological failure in very hard groundwater
Newlands, Pretoria	Faecal Coliforms 14 CFU/100 mL, chloride 323 mg/L, hardness 381 mg/L	Hygiene, salinity and scaling issues together
Lynnwood Glen, Pretoria	Sodium 238 mg/L, excellent microbiology	Chemical failure without bacterial contamination
Florida, Johannesburg	Total Coliforms 62 CFU/100 mL, Faecal Coliforms 12 CFU/100 mL	Chemically clean water can still be microbiologically unsafe
Akasia, Pretoria	Severe microbiology, turbidity 74 NTU, iron, manganese, hardness 576 mg/L	Extreme multi-parameter treatment challenge
Fochville	Iron 1.00 mg/L, manganese 0.33 mg/L, turbidity 14.1 NTU	Metal and solids problem with different treatment needs from disinfection

Noordheuwel, Krugersdorp	pH 4.92 with excellent microbiology	Acidic chemical unsuitability can occur in clean-looking water

15. Pretoria and Tshwane

40 unique sources in the audited evidence set were classified in the Tshwane region. The archive includes microbiological failure, nitrate, fluoride, sodium, manganese, turbidity, very hard water and highly aggressive soft water. That range alone demonstrates why a single "Pretoria borehole profile" is not technically meaningful.

16. Johannesburg and Northern Suburbs

47 unique sources were classified in the Johannesburg group. The evidence includes Linbro Park, Sandton, Randburg, Fourways, Craighall, Greenside, Florida, Bramley Park, Auckland Park and Midrand. Microbiology, nitrate, turbidity, metals and hardness all occur in the wider record set.

17. Ekurhuleni and East Rand

13 unique sources were classified in Ekurhuleni. Records include Benoni, Boksburg, Germiston, Alberton, Kempton Park, Edenvale and Katlehong-area examples. The evidence contains microbiological, nitrate, manganese, turbidity, hardness and salinity-related problems.

18. West Rand

7 unique sources were classified in the West Rand group. Despite the smaller H2OGuru sample density here, the region contains several of the strongest chemical examples, including severe nitrate in Randfontein, metal/turbidity problems in Fochville and low-pH groundwater in Noordheuwel.

19. Why Full Testing Matters

Microbiology-only testing can miss the real problem

A borehole can pass bacteria and still fail because of nitrate, sodium, fluoride, pH or another dissolved chemical.

Chemistry-only testing can miss the real problem

A chemically acceptable borehole can still contain Total Coliforms, Faecal Coliforms or E. coli.

Practical conclusion

For drinking-water use, chemistry and microbiology answer different questions. Neither should be treated as a substitute for the other.

20. Treatment Must Follow the Test

Problem	Typical treatment principle	Common mistake
Microbiological contamination	Source correction, suitable filtration, UV or chlorination as appropriate	Assuming disinfection removes dissolved chemicals
Turbidity / sediment	Purging, clarification, staged sediment or multimedia filtration	Installing fine cartridges on an unstable sediment-loaded source
Iron / manganese	Oxidation and appropriate media filtration	Using carbon as a universal metal-removal solution
Hardness	Softening or suitable scale-management technology	Confusing scale inhibition with hardness removal
Nitrate / sodium / dissolved salts	RO or specialist ion-exchange approaches depending on design objective	Expecting UV or sediment filtration to remove dissolved ions
Low pH / aggressive water	pH correction or remineralisation	Ignoring infrastructure stability after health parameters pass

The correct treatment train depends on contaminant concentration, flow rate, daily demand and intended use.

Related H2OGuru Resources

Use these supporting pages to move from evidence to testing, interpretation and treatment.

Borehole Water Testing

Testing packages for chemistry, microbiology and drinking-water assessment.

Water Purification

Evidence-led remediation and treatment design for borehole and other water sources.

Hard Water and Scale Management

ScaleStop information for hardness-related infrastructure problems.

Water Sampling Guide

How to collect and handle a representative borehole-water sample.

Understanding a Borehole Test

How laboratory results translate into practical water decisions.

SANS 241 Explained

A homeowner-friendly explanation of South Africa's drinking-water standard.

21. Borehole Owner Action Plan

1. Test the raw borehole water before buying treatment.
2. For drinking use, include both chemistry and microbiology.
3. Separate direct health failures from hardness, scaling, corrosivity and irrigation concerns.
4. Design treatment for measured contaminant concentrations and required flow.
5. Retest after treatment to verify performance.
6. Maintain tanks, cartridges, UV lamps, softeners, membranes and dosing systems correctly.
7. Retest after flooding, borehole repairs, long inactivity or noticeable changes in appearance, taste or smell.

22. H2OGuru Gauteng Borehole Evidence Facts

80 sources

Direct microbiological failure tags in the selected unsuitable-source dataset.

52 sources

Direct turbidity-related failure tags.

27 sources

Direct nitrate/nitrite failure tags.

68 sources

Two or more direct failure families.

33 sources

Three or more direct failure families.

23 sources

Manganese failure tags.

24. Where the Project Goes Next

The structured master dataset creates the foundation for an anonymised Gauteng borehole problem map, regional pages for Tshwane, Johannesburg, Ekurhuleni and the West Rand, and contaminant-specific authority pages for nitrate, microbiology, iron, manganese, turbidity, hardness and fluoride.

Future releases can also add year-on-year trends as the archive grows, provided the same deduplication and methodological rules are maintained.

25. Final Conclusion

The final audit confirms a substantial and varied Gauteng evidence base: 123 conservatively deduplicated unsuitable groundwater sources, with microbiological, physical and chemical failures occurring individually and in combination.

The project does not show that every Gauteng borehole is unsafe. It shows something more useful: the actual ways private groundwater can fail, how severe those failures can become, and why no borehole should be declared potable from appearance, neighbourhood or a neighbour's test result.

H2OGuru's evidence-based sequence

Test the raw water. Interpret the complete result. Separate health failures from operational concerns. Design treatment for the actual contaminants. Verify the treated water.

This is what turns individual laboratory reports into a practical Gauteng groundwater knowledge resource.

H2OGuru Sample to Solution

Borehole water testing, professional interpretation and treatment guidance in Gauteng, with nationwide courier sample options available.

The correct treatment system starts with knowing what is actually in the water.

Methodology note: The public statistics above describe a selected H2OGuru archive of unsuitable groundwater sources. They are not prevalence estimates for all Gauteng boreholes. Client identities are intentionally omitted from the public evidence presentation.