

9

WATER SERVICES REGULATION



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9.1 The Green Drop Programme

In 2008, the Department of Water and Sanitation introduced a Green Drop Programme, which is an incentive-based, risk management approach to address the design and operating capacity of WWTWs, compliance of the effluent to agreed standards, local regulation (by-laws implementation) and infrastructure management and condition, (i.e., asset management practices). Since its inception, this programme has sought to identify and develop the core competencies that, if strengthened, would gradually and sustainably improve the standard of wastewater management in South Africa (DWS, 2022a).

Consequently, the Green Drop certification process recognises and rewards progressive improvement and excellent performance. The process measures and compares the results of the performance of water services institutions and subsequently rewards or reprimands the institution upon evidence of their excellence or failures according to the minimum standards or requirements that has been defined.

9.1.1 The 2021 Green Drop Assessment

The first Green Drop Report was issued in 2009, and the latest report for the audit period 01 July 2020 to 30 June 2021 was issued in May 2022. A total of 144 municipalities were audited during the 2021 Green Drop certification process, as shown in Table 9-2, which was a decline when compared to the 2013 assessment period, where 152 municipalities were assessed. The decrease in the number of municipalities audited in 2021 is a result of Local Government reforms, which have resulted in the merging of some municipalities, combined with several name changes. A total of 850 systems were assessed in 2021 compared to 824 in 2013. The increase in the number of assessed systems is mostly a result of new treatment works constructed since 2013 or existing systems registered on the Department's IRIS system.

The Department reported a 100% audit coverage of all identified Water Services Institutions for this audit period (DWS,2022a). The Green Drop Report stated that many rural municipalities struggle to score more than 50%, and only 5% of rural municipalities (Free State and Limpopo) achieved this score in comparison to 75% of systems in Gauteng (DWS, 2022a). The high scores in urban municipalities often correspond to the availability of relevant skills, which are more prevalent in these areas (DWS, 2022a). **In the recent report, 39% of systems were identified as in a critical state compared to 29% of the systems in 2013**, as shown in Table 9-1. This indicates that there has been a regress in the state of wastewater systems. The Green Drop audit process also established that WSIs (Water Services Institutions) with low

levels of investment in infrastructure, and low capacity in respect of skilled personnel, were more likely to have wastewater systems in a critical state. Figure 9.1 shows the national performance overview of municipal wastewater management.

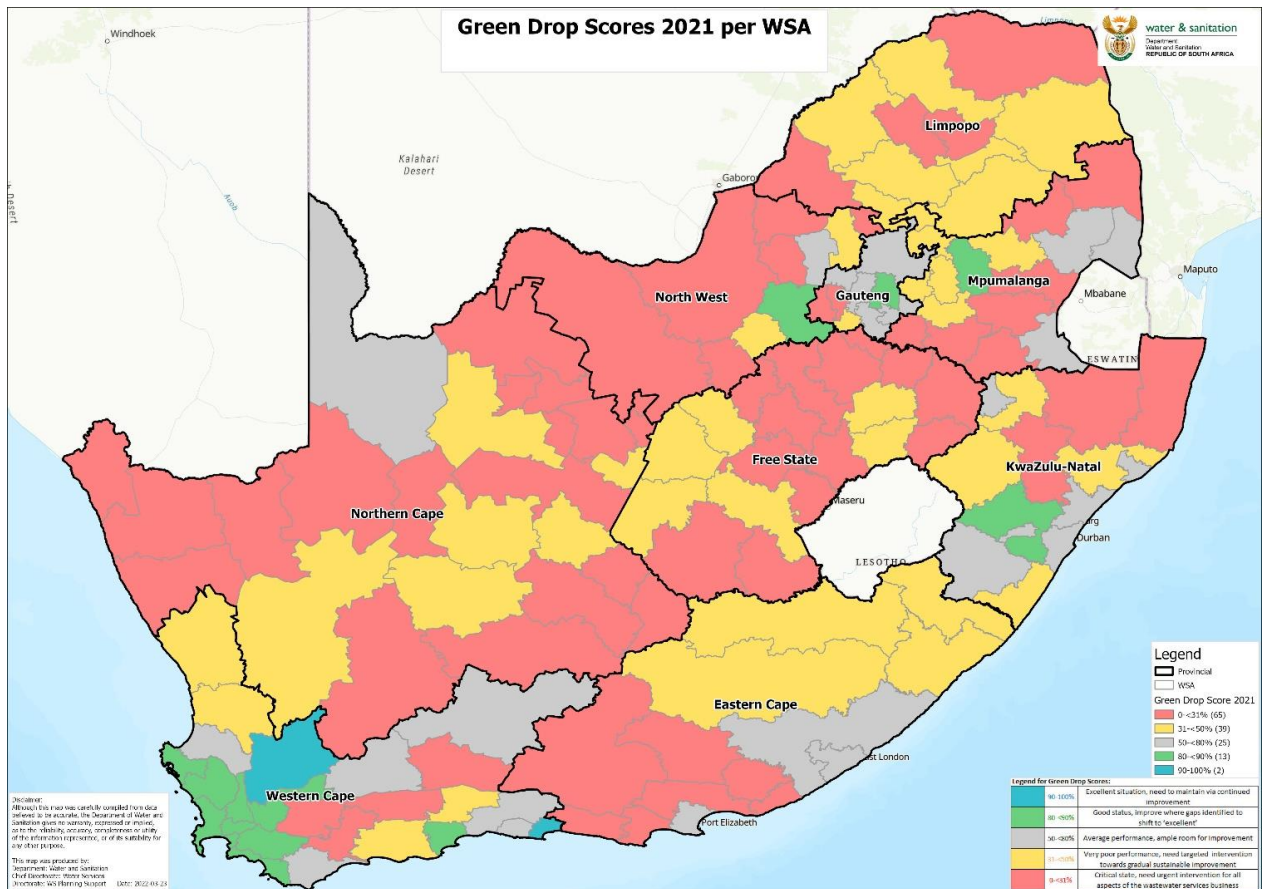


Figure 9.1: National compliance of municipal wastewater management.

The Department determined that 23 wastewater systems scored a minimum of 90% when measured against the Green Drop standards and thus qualified for a Green Drop Certification, this compares lower than the 60 systems awarded Green Drop Status in 2013. The comparative analysis of the green drop results since inception, and the 2021 GD performance highlights are outlined in Table 9-1.

The Water Services Institutions that were Green Drop certified include the City of Ekurhuleni, Lesedi LM, iLembe DM, uMgungundlovu DM, Witzenberg LM, Bitou LM, Drakenstein LM, City of Cape Town, Saldanha Bay LM, Mosselbay LM, and Sasol Sasolburg. A further 30 Green Drop Contender systems were identified with audit

regressed from medium risk to high risk, while the Department of Public Works (DPW) plants regressed from 80% to 88% (critical risk). All private- and state-owned works are in low- or medium-risk positions. The most prominent risks were observed at the treatment level and pointed to works that exceeded their design capacity, dysfunctional processes and equipment (especially disinfection), lack of flow monitoring, and effluent and sludge non-compliance. This reflects the increased demand placed on existing collection and treatment infrastructure due to expansion driven by population and economic growth. The overall observations from the 2021 Green Drop assessments are as follows:

- Several institutions have invested in infrastructure upgrades but still fail the regulatory standards, mostly not meeting effluent quality limits and engineering and workmanship standards.
- Infrastructure is often being upgraded with the full system being taken out of commission, allowing untreated wastewater to bypass the plant discharging directly to the resource.
- There is a concern about the overall sub-standard quality of final effluent and biosolids that are being discharged to the receiving environments.
- Institutions with lower technical skills ratios were generally associated with lower Green Drop scores.
- Several wastewater systems are operating close to or beyond their hydraulic capacity.
- Severe deficiencies were found in the monitoring of operational and compliance parameters.

9.1.3 Wastewater Discharge Physical Compliance

Wastewater physical compliance measures compliance against physical variables of wastewater such as temperature (risk to aquatic life), suspended solids, and pH levels of wastewater. The physical wastewater compliance of WSA within each Province from **1 October 2021 – 30 September 2022** is presented in Figure 9.2. A total of 144 WSAs were monitored. According to data uploaded on IRIS, more than 60 percent of the WSAs achieved good to excellent physical compliance performance. Only one WSA in the Eastern Cape Province had poor wastewater physical compliance performance.

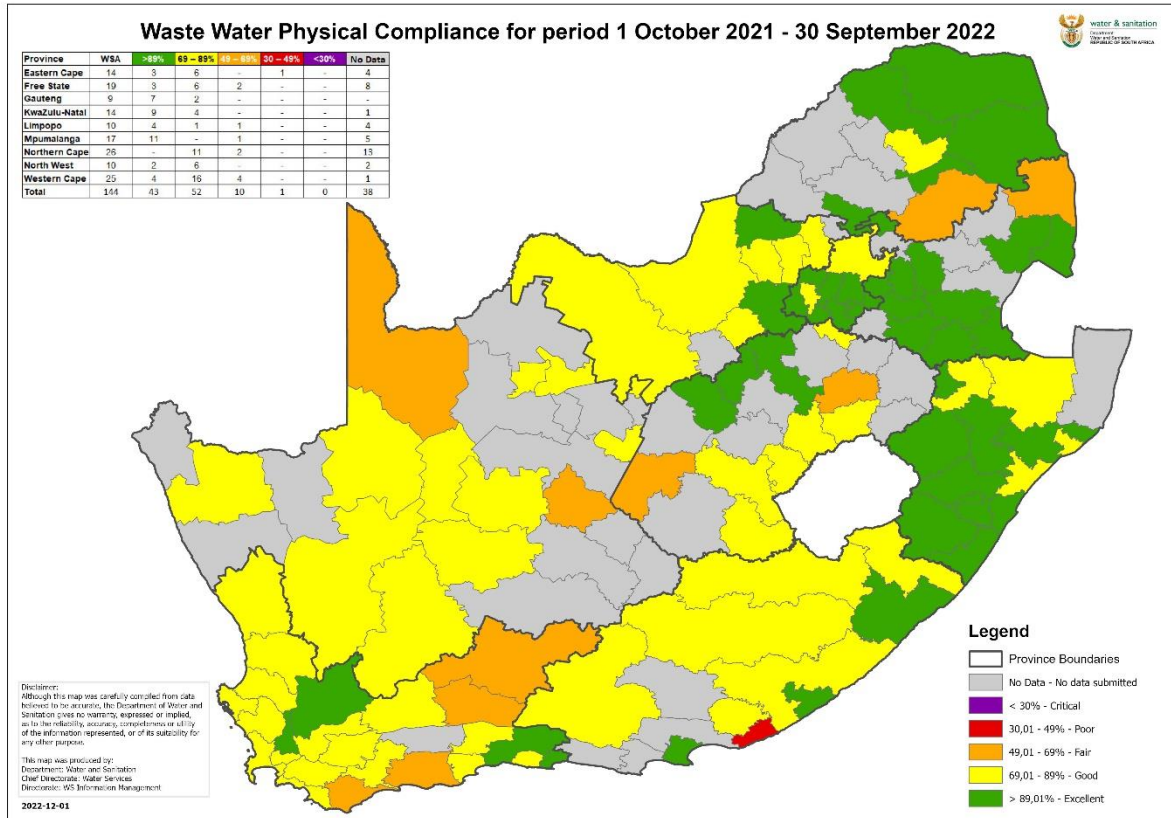


Figure 9.2: Wastewater physical compliance.

9.1.4 Wastewater Discharge Chemical Compliance

Wastewater chemical compliance monitoring is undertaken for wastewater treatment works in terms of soluble organic and inorganic pollutants that may be present in wastewater. Compliance is assessed against the water use authorisation issued to the Water Services Authority for the WWTW. Figure 9.3 presents the chemical compliance by WSAs per Province for the 2021/22 hydrological year. The typical chemical determinants in wastewater effluent are chemical oxygen demand (COD), ortho-phosphate, Nitrates, Nitrites, as well as Ammonia.

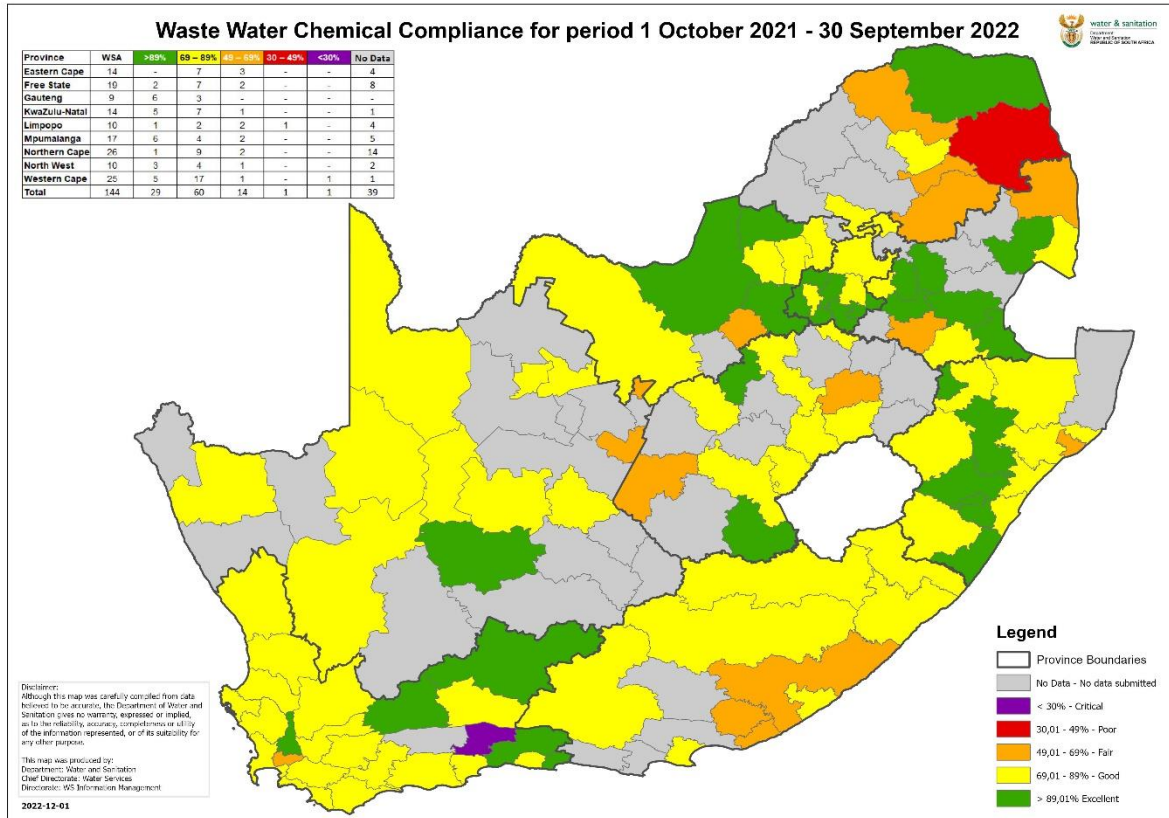


Figure 9.3: Wastewater chemical compliance.

One WSA in the Western Cape Province and one in the Limpopo Province were found to be in a critical and poor state respectively of wastewater chemical compliance. The Department should monitor this critical and poor performance on chemical compliance to ensure compliance as it poses a risk to the water resources.

9.1.5 Wastewater Discharge Microbial Compliance

Wastewater microbiological compliance monitoring is undertaken for wastewater treatment works in terms of microbial variables such as *E.coli* or Faecal Coliforms. These microbial variables indicate the level of faecal pollution but also the treatment efficiency of the WWTWs. The microbial compliance performance for effluent in WSAs per Province is presented in Figure 9.4.

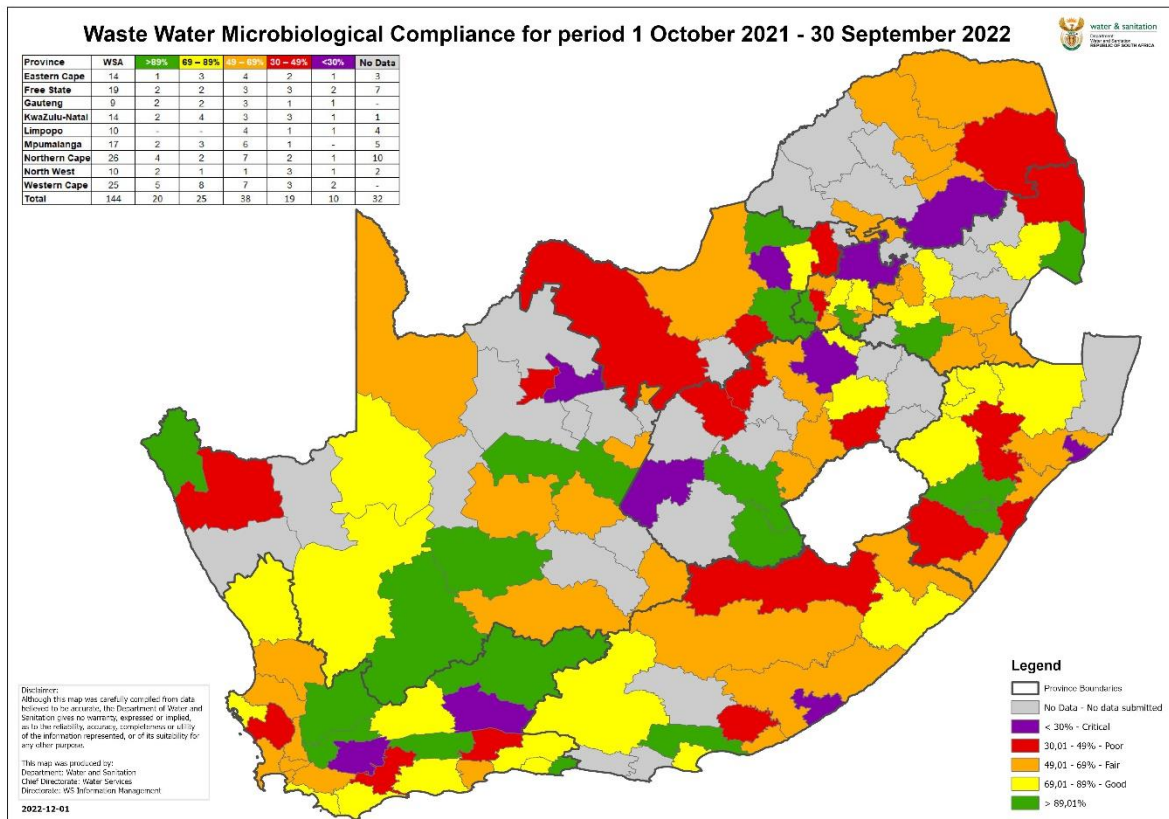


Figure 9.4: Wastewater microbial compliance.

In terms of microbiological compliance, ten WSAs were found to be in a critical state with less than 30% compliance during the current reporting period. About 14% of the WSAs monitored in the country achieved more than 89% (excellent compliance). The overall national picture shows a negative trend, as most wastewater treatment plants are non-compliant with effluent standards. Additionally, more than 20% of the WSAs across the country had no data, and therefore, their statuses could not be assessed.

9.2 The Blue Drop Programme

Incentive-based regulation was introduced in 2008 in the form of the Blue Drop Certification programme, whereby the Department of Water and Sanitation (DWS) measures all aspects contributing to a sustainable Water Services Business and provision of safe water to the citizens of South Africa. This programme gives prominence to the World Health Organisation's (WHO) Water Safety Planning concept as the basis for a proactive, risk-based approach to drinking water quality management from catchment to consumer. Since then, DWS has been monitoring the risk of each water supply system based on the performance against Blue Drop Certification criteria. The Blue Drop results create an enabling environment whereby the Water Services Authority (WSA) and DWS identify, prioritise and implement targeted and specific interventions to improve performance.

The Water Services Act (Act No. 108 of 1997) prescribes the legislative duty of Water Service Providers (WSPs) to provide water and sanitation services according to national norms and standards. The National Water Act (No.36 of 1998) further compels the Minister to establish and maintain a national information system and monitor all water service institutions' performance. Based on this, the Department of Water and Sanitation established the Integrated Regulatory Information System (IRIS) to monitor drinking water quality. This is a system available to the public at <http://ws.dwa.gov.za/IRIS/documents.aspx>. The South African National Standard for drinking water (SANS:241) prescribes the minimum numerical limits that must be met for drinking water quality to be deemed safe for human consumption.

In South Africa, there are over 1 300 drinking Water Treatment Works (WTWs) owned by municipalities, water boards as well as privately owned WTWs. The Blue Drop assessment process is mainly championed by DWS regional offices, where drinking water quality compliance, plant, and process controller registration are thoroughly assessed to calculate the Blue Drop Risk Rating (BDRR) for each system. There are several determinants that are taken into consideration in determining compliance which are mainly grouped into microbiological (acute), chemical (acute) and chemical (chronic). In addition, physical and aesthetic determinants are also investigated. Compliance with drinking water standards must address the entire value chain in the water supply system, including sampling and testing of water at the treatment works intake and outflow points, in the distribution pipelines, reservoirs, and at the point of use as prescribed by the South African National Standard (SANS 241).

9.2.1 The 2021 Blue Drop Assessment

The Department conducted a Blue Drop assessment from 1 July 2020 to 30 June 2021, where 144 Water Services Authorities in South Africa comprising 1186 water supply systems were assessed, as shown in Figure 9.5. It is evident from Figure 9.5 that the Gauteng Province has the least number of supply systems (29). The Eastern Cape, KwaZulu-Natal, and North West Provinces have numerous supply systems with a low number of WSA's. This is indicative of district municipalities who provide water to bulk water to rural schemes either directly as WSA or managing water service provision through local municipalities which operate as WSP.

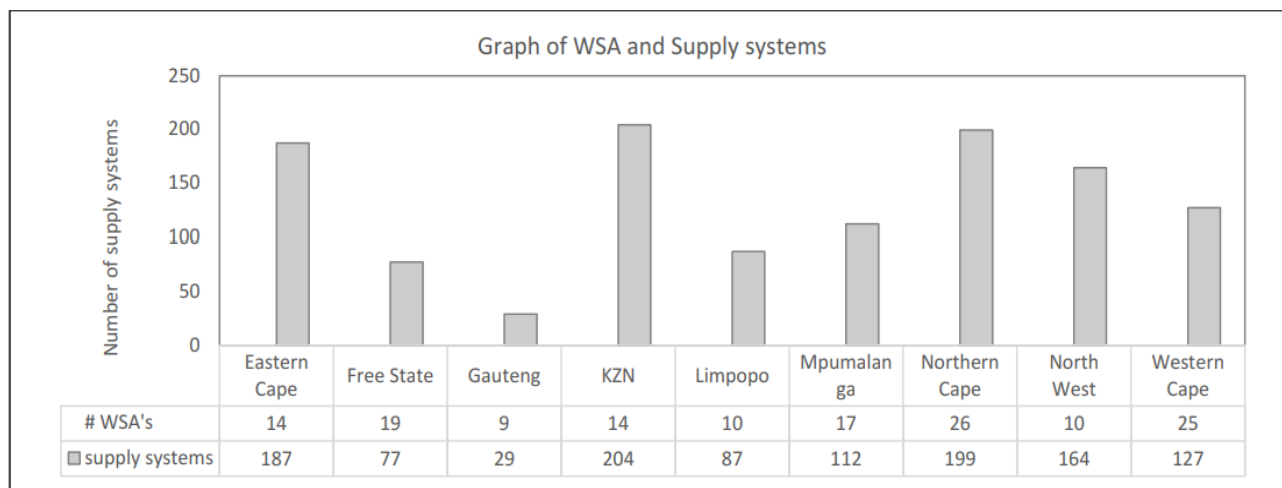


Figure 9.5: Graph of Number of WSA's and Supply systems for 2021 (Blue Drop Progress Assessment Tool) BDPAT assessments (Source: DWS, 2022b)

The Blue Drop assessment of 2021 established that 48% of supply systems are in the *low-risk* category, while 34% of systems reside in the *high-risk* and *critical risk* categories. This is of concern to the Department as it presents a potential risk to consumers who are supplied by these supply systems (DWS, 2022b). The large proportion of low-risk supply systems in the Gauteng and Western Cape Provinces is a positive trend that the rest of the country must follow to ensure effective risk management of water services provided for all citizens in the country.

DWS (2022b) recommends that the 2021 BDRR score be used as a tool to implement strategic, targeted actions that will result in improved risk rating and sustainable water services delivery. The WSA must critically evaluate the individual components of the BDRR score to understand the reason for the current risk rating and the desired risk category for the delivery of safe drinking water. The 2021 Blue Drop assessment outcomes demonstrated in Figure 9.6 can be summarised as follows:

- 48% of supply systems are in low-risk category;
- 18% are in the medium-risk category;
- 11% are in the high-risk category; and
- 23% are in the critical risk category.

To use the BDRR score as a tool to implement strategic, targeted actions that will result in an improved risk rating and sustainable water services delivery, WSA's must critically evaluate the individual components of the BDRR score to understand the reason for the current risk rating and the desired risk category for delivery of safe drinking water.

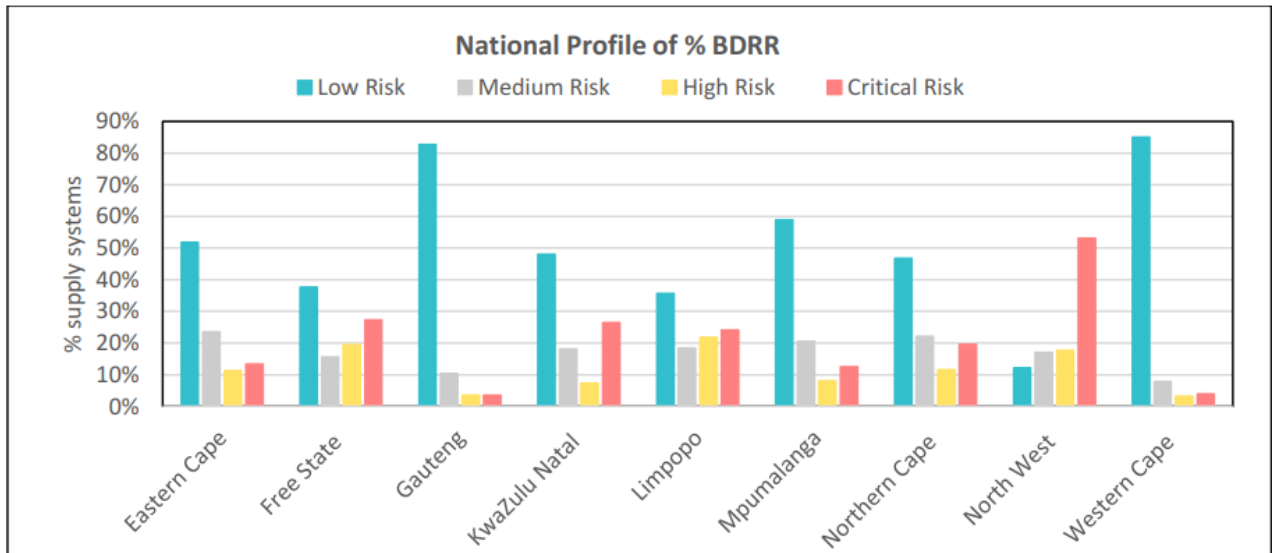


Figure 9.6: Breakdown of % BDRR scores per category (Source: DWS, 2022b).

9.2.2 Assessment of Blue Drop Risk Indicators

Risk Indicator A: Design Capacity, and Risk Indicator B: Operational Capacity, are important indicators to determine the plant's capability to provide sufficient and safe drinking water continuously. Once daily production approaches 90% of design capacity, the WSA must plan, budget, and implement projects to increase the treatment plant's capacity to ensure a sufficient supply for human consumption and economic activities. The 2021 BD assessment results indicated that 62% of plants are categorised as small plants (<2 Ml/d). Many of the supply systems did not provide daily operational flow data, which presents a serious risk.

Risk Indicator C: Water Quality Compliance is critical to ensure delivery of safe drinking water that does not present a health risk to consumers. This indicator reports on both water quality compliance and monitoring compliance which reports on enough sample points to verify the water quality at all points in the distribution network as outlined in SANS 241:2015. The results for Indicator C for the period January to December 2020 are summarised as follows:

- 40% of water supply systems achieved microbiological water quality compliance, and 23% have achieved chemical water quality compliance.
- 66% of water supply systems have adequate microbiological monitoring compliance, and 17% have adequate chemical monitoring compliance.

DWS noted poor water quality compliance results, which are of serious concern as most supply systems present a potential health risk to consumers (DWS, 2022b).

Risk Indicator D: Technical Skills evaluates the required technical skills to ensure effective operations and maintenance of water treatment plants and distribution networks. The assessment revealed that the availability of technical skills is poor

throughout the country, with 12% of supply systems in low-risk category (90-100% compliance), 27% of supply systems with enough suitably classified process controllers per shift, 52% of supply systems with qualified supervisors, and 28% of systems with full maintenance teams in place, i.e., civil, mechanical and electrical personnel.

Risk Indicator E: Water Safety Plans is a measure of risk management procedures as outlined in SANS 241:2015 and World Health Organisation (WHO) guidelines. The results indicated that only 33% of supply systems in the country have Water Safety Plans, and 9% have comprehensive Water Safety Plans with all required components, including management approval, risk assessment, a risk-based monitoring program, and the implementation of corrective measures.

9.2.3 Chemical Drinking Water Compliance

The chemical water quality is determined by determinants which may be acute or chronic health, with specific health risks associated with each determinant. Acute health risks can result in death if the limit is exceeded, while chronic limits provide maximum limits that can be ingested over a period of time before health effects are observed. Chemical determinants contrary to microbiological determinants may be monitored at least once per annum for drinking water, if risk to consumers has not been identified prior. In compliance monitoring, all WSAs are required to perform a full SANS 241 as prescribed by the standard. At a minimum, for the supply system to be considered safe, drinking water must achieve a 95% chemical compliance status.

A total of 144 WSAs were assessed for the 2021/22 hydrological year, as shown in Figure 9.7 below. However, 45 of the 144 WSAs did not upload water quality data on the Integrated Regulatory Information System (IRIS) and could not be assessed. The results of the water supply systems compliance in terms of chemical drinking water quality: acute health determinants and chemical: chronic health from October 2021 to September 2022 are presented in Figure 9.7 and Figure 9.8, respectively.

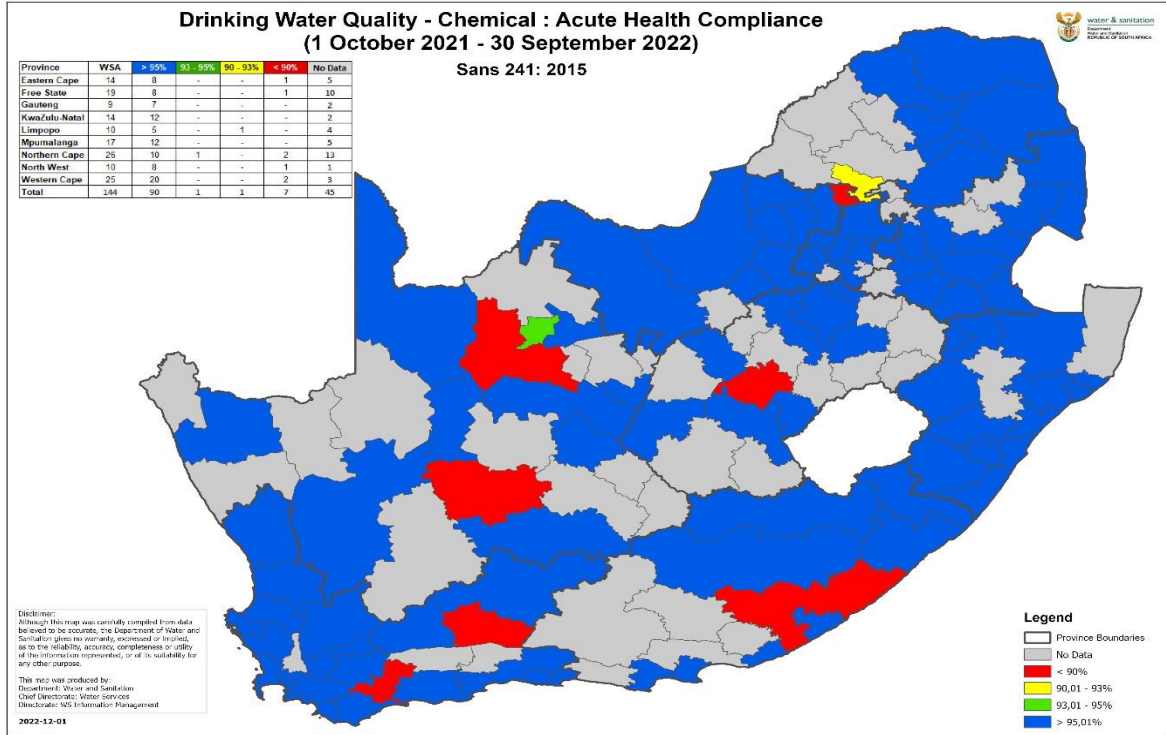


Figure 9.7: Status of drinking water chemical quality compliance: acute health.

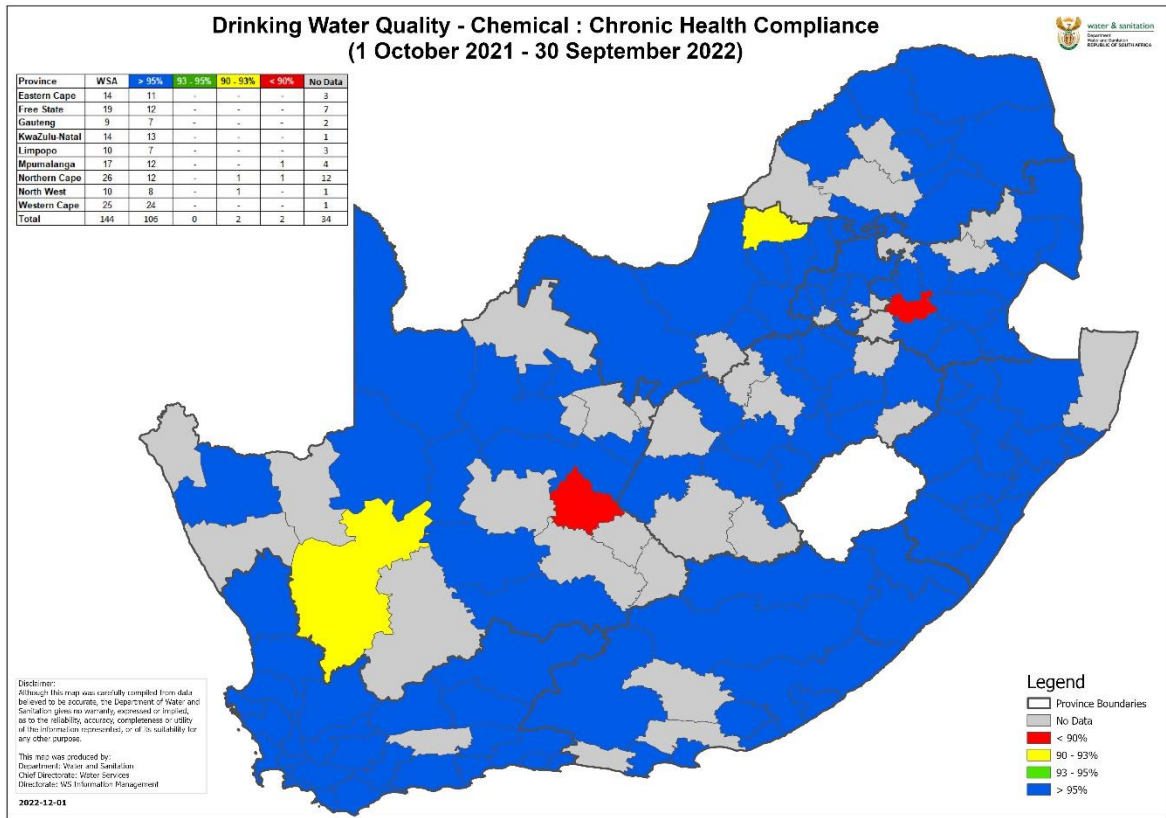


Figure 9.8: Status of drinking water chemical quality compliance: chronic health.

It is evident from the results presented that 62% of the systems demonstrated good to excellent compliance in terms of chemical quality compliance: acute health, while more than 73% achieved good to excellent compliance in terms of chemical quality compliance: chronic health. The Department will continuously investigate and monitor WSAs where:

- (i) There were no reports uploaded on the IRIS; and
- (ii) Non-compliance was observed (< 90%).

9.2.4 Microbial Drinking Water Compliance

Microbiological compliance reflects the actual compliance of the final water for the 2021/22 hydrological year against microbiological determinants. The presence of these determinants in water indicates sewage or animal waste contamination, which raises a potential risk of contracting diseases from pathogens. Therefore, WSAs are expected to be compliant 99% of the time for all microbial indicators analysed. The results for the drinking water microbial compliance for the reporting period are presented in Figure 9.9 below. For the reporting period (October 2021 – September 2022), a few WSAs achieved a 99% compliance level. **Most of the WSPs assessed had a compliance level below the acceptable 99% threshold.** It was also noted that 23 WSAs did not submit their data, thus impacting the national outlook as these WSAs could not be assessed in the absence of data submission to the Department.

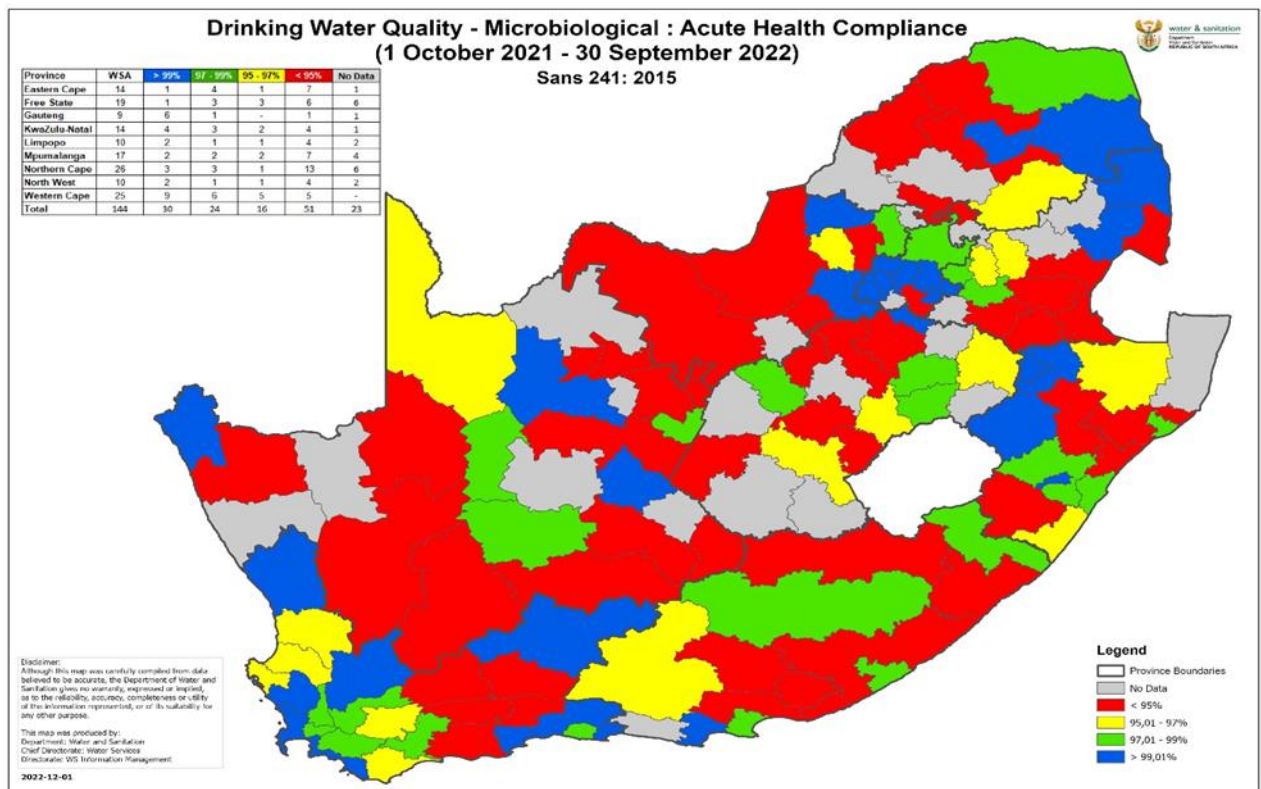


Figure 9.9: Status of drinking water microbial quality compliance: | acute health.

In terms of microbiological compliance, 35% of the water supply systems in the country fell under *critical risk* category for the reporting period (1 October 2021- 30 September 2022), and only 20% of the water supply systems achieved an excellent status. The overall low compliance results are of serious concern to the Department as most of the water supply systems present a potential health risk to the consumers.

The Department, through its provincial offices, is continuously monitoring and engaging with the WSAs whose microbiological compliance is below 99%, including those that are not submitting water quality results to the Department.