5

SURFACE WATER STORAGE

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5.1 National Storage

The national dam's water storage trends for the previous four hydrological years and the trend for the current hydrological year (2023/24) are presented in Figure 5.1. At the end of September 2024, the national dam levels were at **79.7%** of Full Supply Capacity (FSC). This level is lower than the last two hydrological years, at the same time of reporting when national storage levels were greater than 90% of FSC. **16%** of the national dams were **above 100% of FSC** (either full or spilling), **70%** were between 50 and 100% of FSC, **11.72%** were between 10 and 50% of FSC, and at least **1.4%** were below 10% of FSC (critically low).

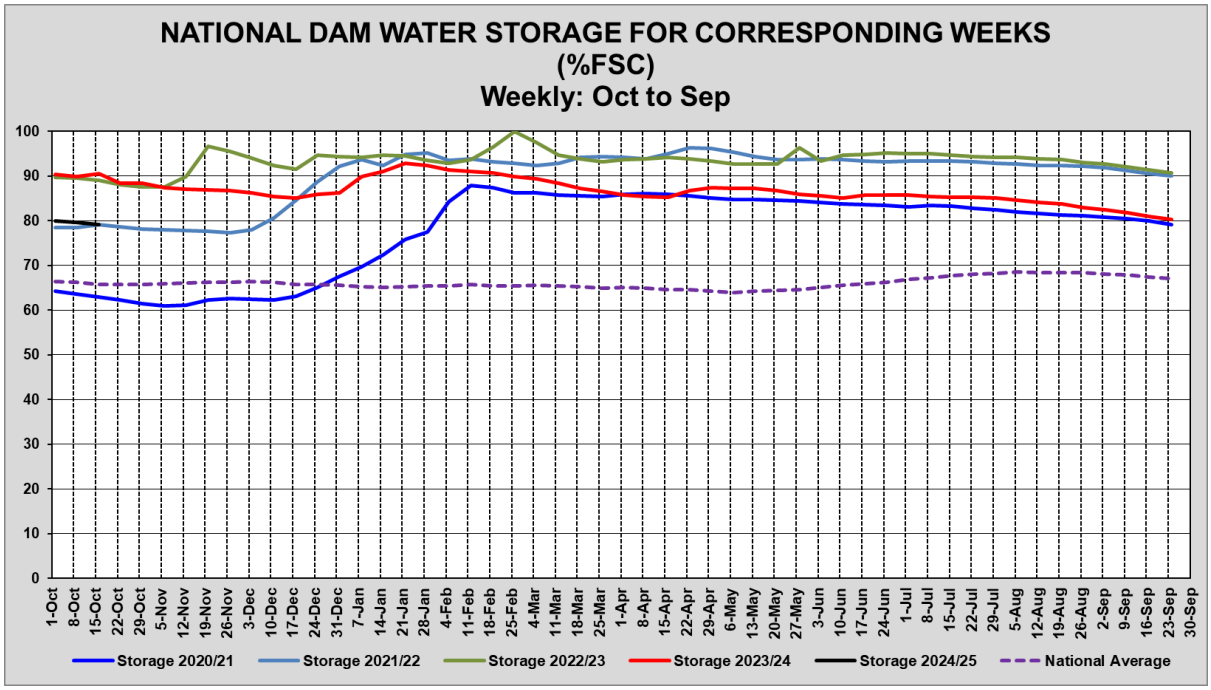


Figure 5.1: National Dam Storage end September 2024

The comparison between September 2023 and September 2024 of the country's five largest dam storage (% of FSC) is presented in Table 5-2. Due to the drier and warmer conditions experienced this spring compared to 2023, the Vaal Dam and Gariep Dam storage levels have declined by -39.5% and -16.8%, respectively.

The dams in critical storage conditions at the end of the reporting period were each from Eastern Cape and Limpopo. The list of dams at critical low storage levels (<10% of FSC) is given in Table 5-3.

Table 5-1 Surface storage at the end of September 2024

Provinces/Countries sharing Water Resources with RSA	Full Supply Capacity (FSC) million m^3	Total No. of Dams	Number of Dams per Province/Country				% of Full capacity		
			<10 (% of FSC)	10 - <50 (% of FSC)	50 - <100 (% of FSC)	>=100 (% of FSC)	Last Year 30/09/2023	Last Week 23/09/2024	This Week 30/09/2024
Kingdom of Eswatini	333.75	1			1		96.3	84.2	81.7 ↓
Eastern Cape	1730.13	46		6	39	1	83.8	77	77.3 ↑
Free State	15656.73	21		2	17	2	91.7	77.6	77.5 ↓
Gauteng	128.08	5			3	2	96	89.7	89.3 ↓
KwaZulu-Natal	4909.66	19			18	1	85.8	84.9	84.6 ↓
Kingdom of Lesotho	2362.63	2			1	1	89	77.4	77.7 ↑
Limpopo	1484.64	29	2	4	20	3	84	74.4	73.7 ↓
Mpumalanga	2538.57	22		3	19		93.2	85.1	84.0 ↓
Northern Cape	149.28	5		1	2	2	86.7	79	76.6 ↓
North West	867.29	28	1	9	14	4	83	65.7	65.7 =
Western Cape - Other Rainfall	269.55	22		1	12	9	86	92	92.2 ↑
Western Cape - Winter Rainfall	1596.8	22			11	11	97.1	94.6	95.0 ↑
Western Cape - Total	1866.35	44	0	1	23	20	95.5	94.2	94.6 ↑
Grand Total:	**32027.11**	**222**	**3**	**26**	**157**	**36**	**90**	**79.9**	**79.7 ↓**

Table 5-2: Storage Levels comparison for the Five Largest storage dams (by volume) to last year

Reservoir	River	Province/ Country	WMA/Country	FSC	30 September 2024	30 September 2024	Diff. between %Full
Gariep Dam	Orange River	Free State	Orange	4903.45	87.8	71	-16.8
Vanderkloof Dam	Orange River	Free State	Orange	3136.93	97.8	97.5	-0.3
Sterkfontein Dam	Nuwejaarspruit River	Free State	Vaal Major	2616.9	99.7	98	-1.7
Vaal Dam	Vaal River	Free State	Vaal Major	2560.97	80.5	41	-39.5
Pongolapoort Dam	Phongolo River	Kwazulu-Natal	Pongola-Mtamvuna	2395.24	83.1	82.6	-0.5

Table 5-3: Dams below 10% of Full Supply Capacity compared to last year

Reservoir	River	Province	30 September 2023 (%FSC)	30 September 2024 (%FSC)	% Change (-/+)
Middle-Letaba Dam	Middel-Letaba River	Limpopo	4.3	0.7	-3.6
Glen Alpine Dam	Mogalakwena River	Limpopo	62	28	-34

The spatial distribution of the dams with a classified range of their storage levels on 30 September 2024 is presented in Figure 5.2. An observation can be made that most of the dams in the Western Cape province were above 100% of FSC (either full or spilling), while the majority of national dams across the country were at storage levels of between 50-100% of FSC.

Figure 5.3 presents the 24-month Standardised Precipitation Index (SPI) for August 2024, indicating that the Namakwa District in the Northern Cape, is the only district that had areas experiencing extreme drought with some of its areas having severe to moderate drought in the last 24 months. Several District Municipalities (DM) also had some areas experiencing severe drought in the last 24 Months including the Thabo

Mafutsanyane DM in the Free State, the Sarah Baartman DM in the Eastern Cape, the Capricorn, and the Mopani DM in Limpopo. Moreover, district municipalities such as the Zululand DM in KwaZulu-Natal, Gert Sibande DM in Mpumalanga, Bojanala and Ngaka Modiri DM Molema in North-West, Sekhukhune DM in Limpopo, Ekurhuleni and Sedibeng DM in Gauteng only experienced moderate drought. These areas are experiencing drought as a result of below-normal rainfall received during the previous summer rainfall season.

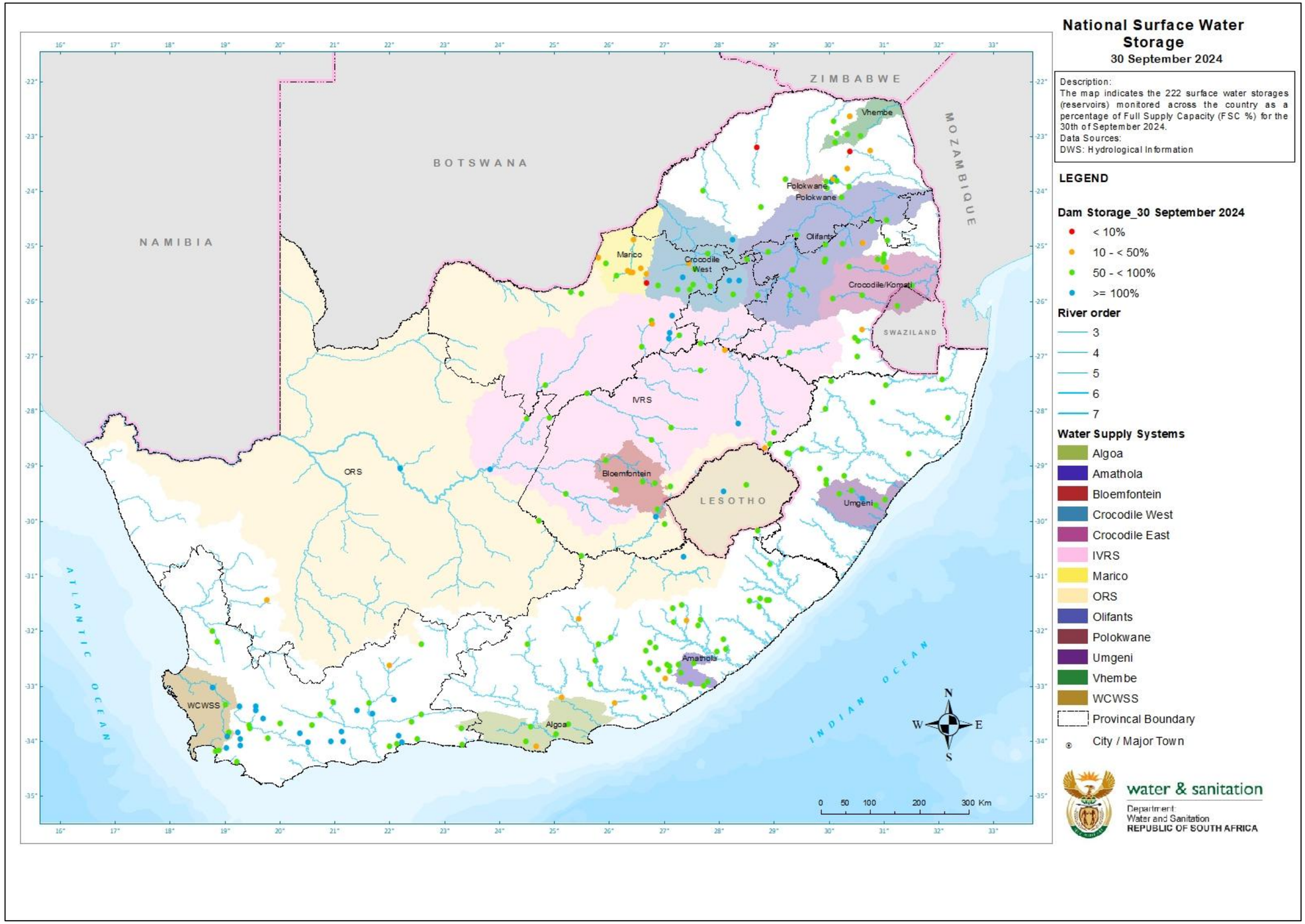


Figure 5.2: Surface Water Storage Levels - September 2024

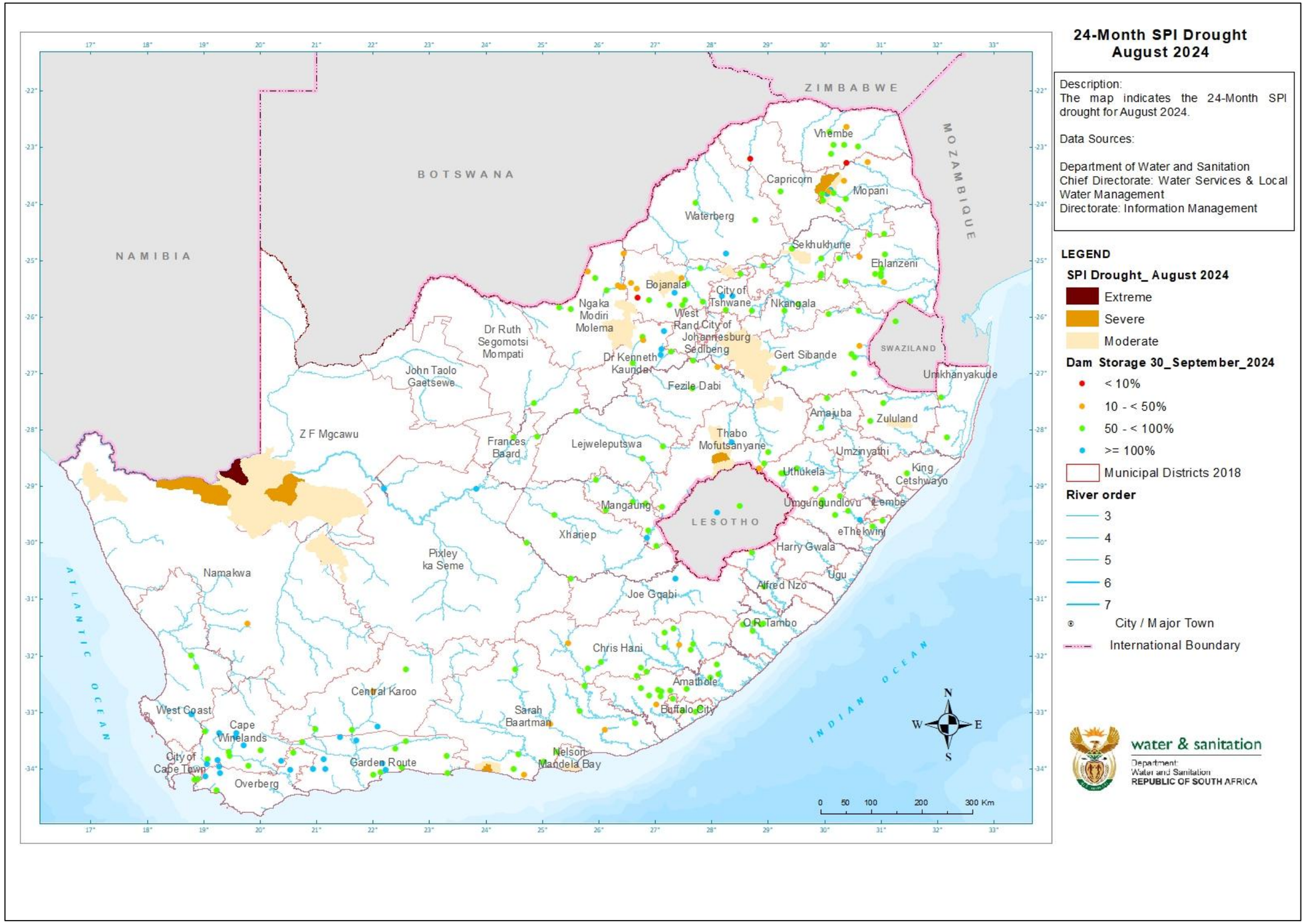
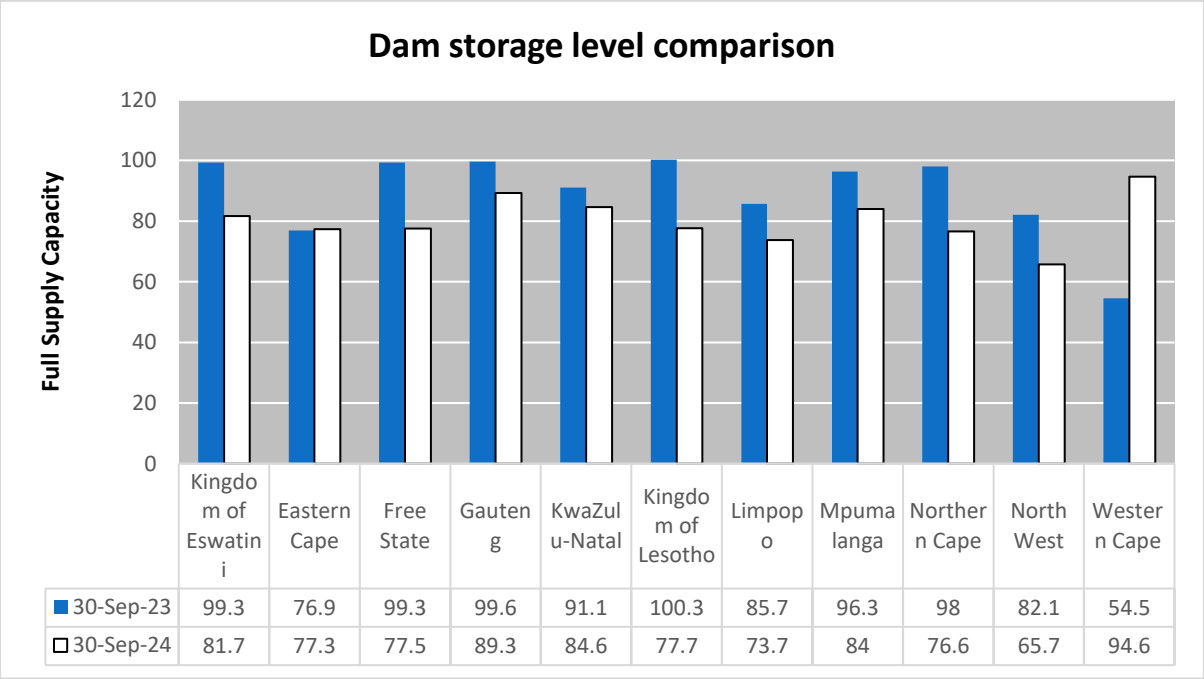


Figure 5.3: 24-month Standardised Precipitation Index (SPI) and dam levels

The comparison of the storage levels per province and international areas for September 2024 to the same time last year is presented in Figure 5.4. Free State (-14.2%), North West (-17.5%), Limpopo (-10.3%), and Northern Cape (-10.1%) showed significant declines in dam storage levels compared to the previous year. Meanwhile, Western Cape (+49.6%) showed substantial increases year-on-year.



	Kingdom of Eswatini	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Kingdom of Lesotho	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape
30-Sep-23	99.3	76.9	99.3	99.6	91.1	100.3	85.7	96.3	98	82.1	54.5
30-Sep-24	81.7	77.3	77.5	89.3	84.6	77.7	73.7	84	76.6	65.7	94.6

Figure 5.4: Water Storage Levels September 2023 vs. September 2024

The comparison of the long-term median storage for each province during the 2022/23 hydrological year, compared with the previous hydrological year, is presented in Figure 5.5.

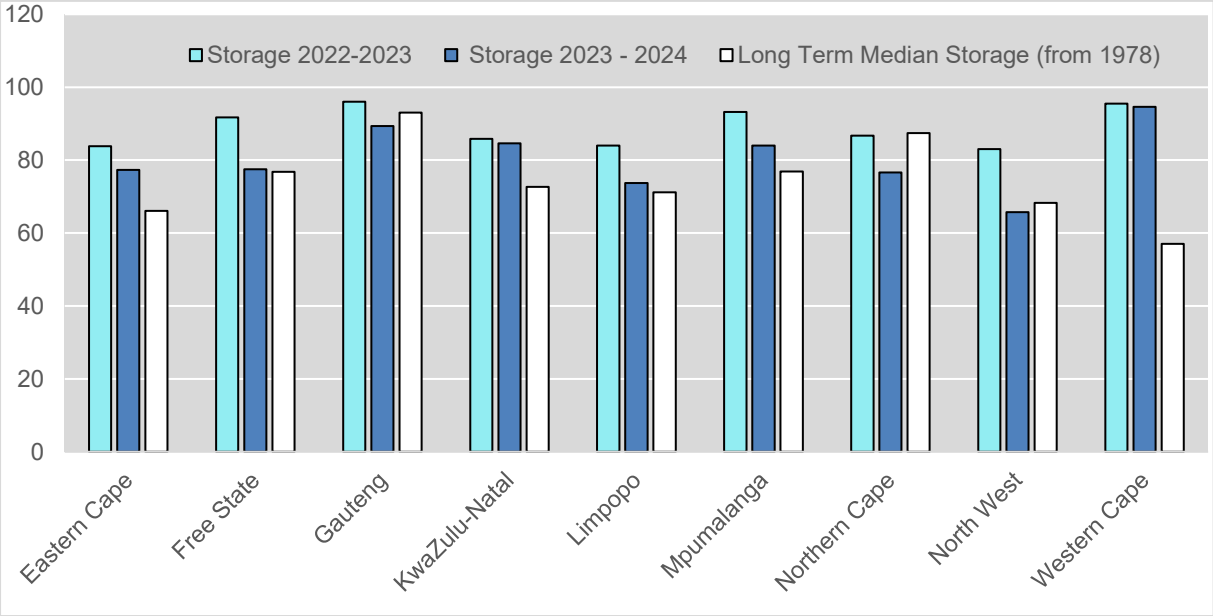


Figure 5.5 The storage situation in each Province during 2023/2024, compared with the previous hydrological year and the median.

For the hydrological year 2023/24, the dam levels for most of the provinces were above the long-term median storage levels. Notably, all median storages for the 2023/24 hydrological year were lower than the previous hydrological year.

5.2 Water Management Area storage

The comparison of the long-term historical median storage levels (2016-2022) of WMAs and the past two hydrological years' median storage is presented in Figure 5.6

The 2023/24 storages have been above the historical median for all water management areas, indicative of a hydrological year characterised by above-normal rainfall for almost all parts of the country with major dams. A similar pattern was observed for the previous hydrological year (2022/23) for all WMAs.

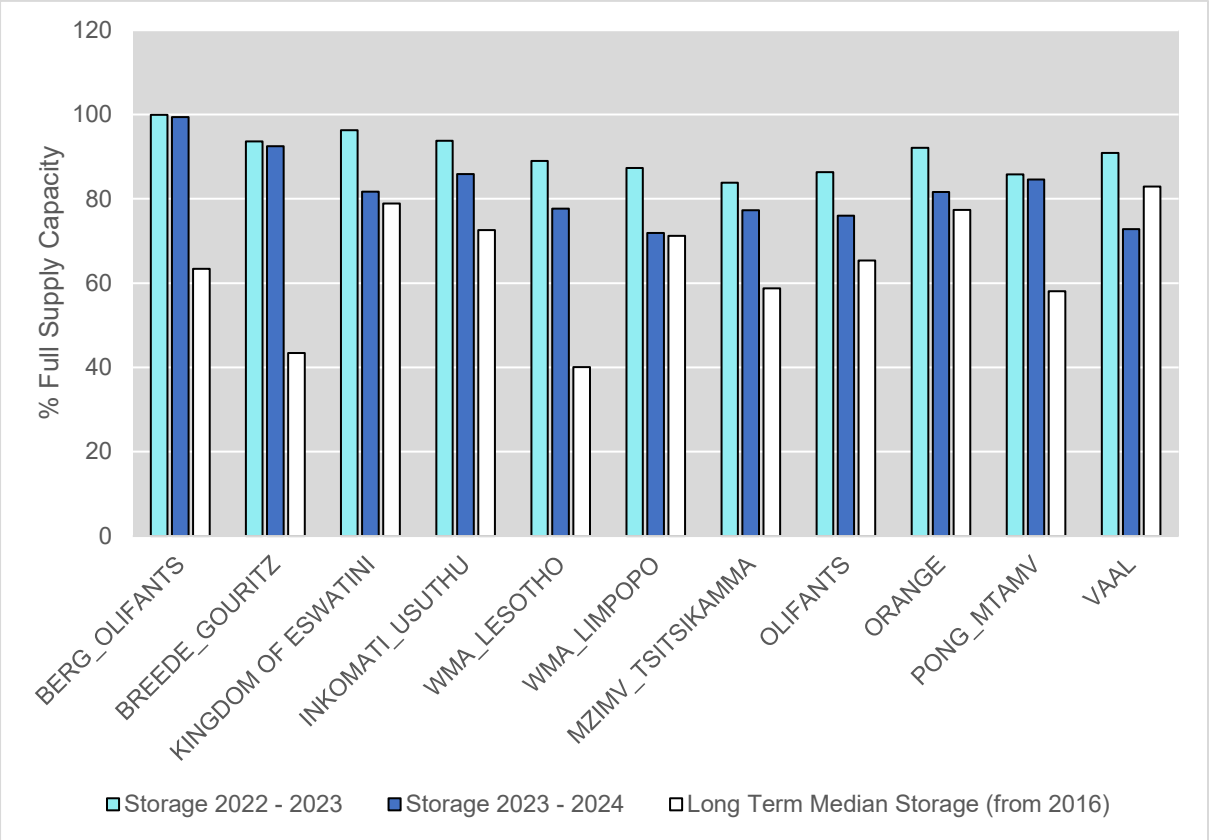


Figure 5.6 The storage situation in each WMA during 2023/24, compared with the previous hydrological year and the median.

Notably, all median storages for the 2023/24 hydrological year are lower than the previous year for all WMAs, apart from the Inkomati-Usuthu, Orange and Vaal WMAs. However, the dam storage levels in these three WMAs remained higher than the long-term median dam levels.

5.3 District Municipalities

The year-on-year comparison of water storage levels per District Municipality (DM) is presented in Figure 5.7. Garden Route DM experienced significant increases (>+20%) in dam storage levels compared to last year. But, Capricorn DM and Namakwa DM experienced significant declines (>-40%) in dam levels compared to last year.

The dam storage levels in water supply systems (WSSs) and applicable restrictions are presented in Table 5-4. The Algoa WSS decision date was changed from 1 June to 1 November, and a new annual operating analysis for the decision date was performed, resulting in an update of water restrictions which were in effect from 1 November 2023 to 31 October 2024. However, these restrictions are yet to be gazetted. ***Due to infrastructure limitations, permanent restrictions are applicable for the Polokwane and Bloemfontein WSSs.***

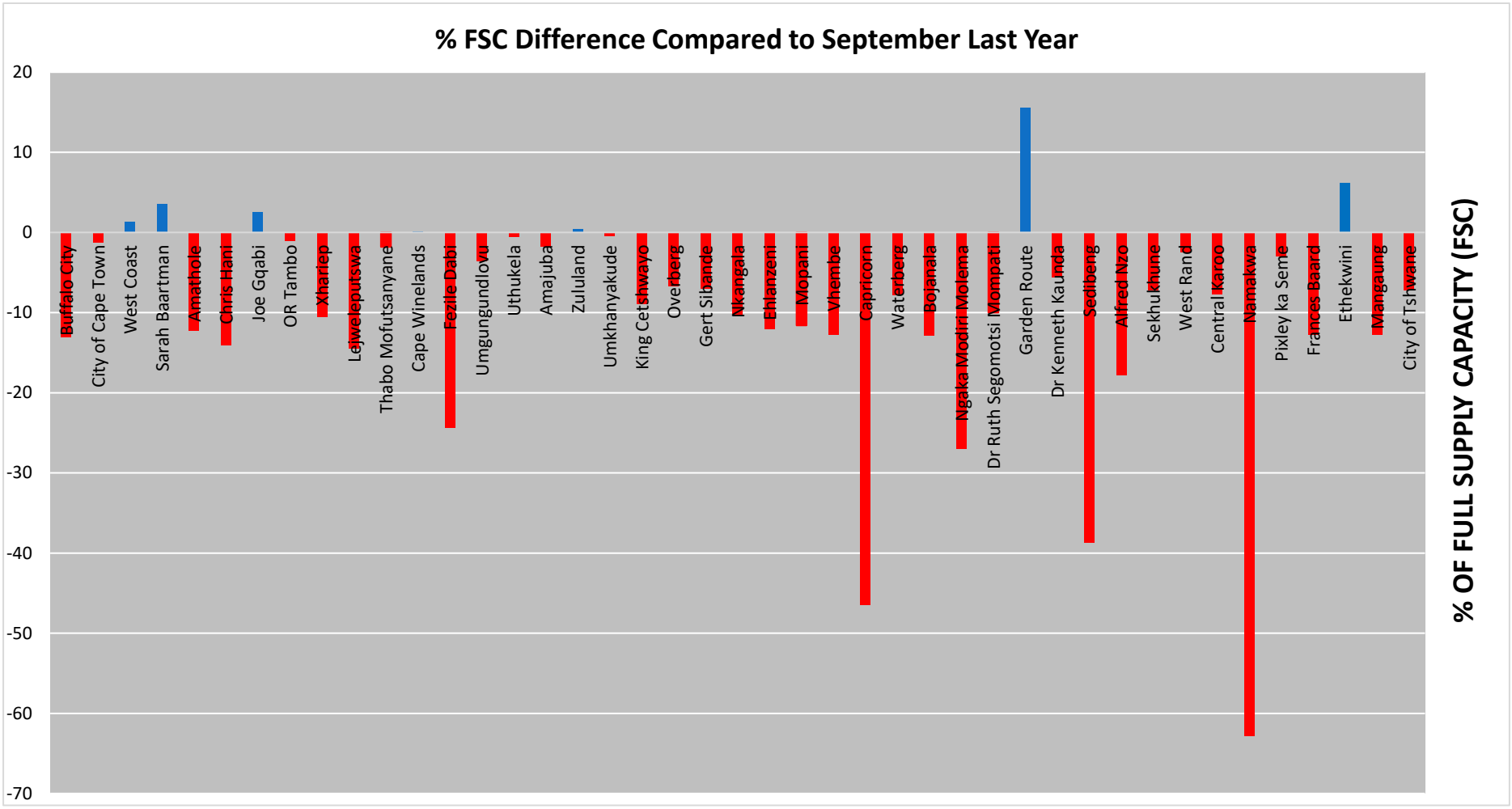


Figure 5.7 Comparison of water storage levels per District Municipality September 2023 vs September 2024

Table 5-4: Water Supply Systems storage levels

Water Supply Systems/clusters	Capacity in 10^6m^3	30 September 2023 (% FSC)	30 September 2024 (% FSC)	System Description
Algoa WSS	282	71.5	75.9	The following 5 dams serve the Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: Kromrivier Dam, Impofu Dam, Kouga Dam, Loerie Dam, Groendal Dam
Amathole WSS	241	100.6	91.4	The following 6 dams serve Bisho & Buffalo City, East London: Laing Dam, Rooikrans Dam, Bridle Drift Dam, Nahoon Dam, Gubu Dam, Wriggleswade Dam
Klipplaat WSS	57	100.8	94.6	The following 3 dams serve Queenstown (Chris Hani DM, Enoch Ngijima LM): Boesmanskrantz Dam, Waterdown Dam, Oxkraal Dam
Luvuvhu WSS	225	98.3	92.4	The following 3 dams serve Thohoyandou etc: Albasini Dam, Vondo Dam, Nandoni Dam
Bloemfontein WSS	219	94.3	81.2	The following 4 dams serve Bloemfontein, Botshabelo and Thaba Nchu: Rustfontein Dam, Groothoek Dam, Welbedacht Dam, Knellpoort Dam
Butterworth WSS	14	100.2	77.6	Xilinxa Dam and Gcuwa weirs serve Butterworth
Integrated Vaal River WSS	10 546	90.9	75.9	The following 14 dams serve Gauteng, Sasol, and Eskom: Vaal Dam, Grootdraai Dam, Sterkfontein Dam, Bloemhof Dam, Katse Dam, Mohale Dam, Woodstock Dam, Zaaihoek Dam, Jericho Dam, Westoe Dam, Morgenstond Dam, Heyshope Dam, Nooitgedacht Dam, Vygeboom Dam

Water Supply Systems/clusters	Capacity in 10^6m^3	30 September 2023 (% FSC)	30 September 2024 (% FSC)	System Description
Polokwane WSS	254.27	96.5	85.1	The following 2 dams serve Polokwane: Flag Boshielo Dam, Ebenezer Dam
Crocodile West WSS	444	94.5	86.3	The following 7 dams serve Tshwane up to Rustenburg: Hartbeespoort Dam, Rietvlei Dam, Bospoort Dam, Roodeplaat Dam, Klipvoor Dam, Vaalkop Dam, and Roodekopjes Dam
uMgeni WSS	923	87.1	85.2	The following 5 dams serve Ethekwini, iLembe & Msunduzi: Midmar Dam, Nagle Dam, Albert Falls Dam, Inanda Dam, and Spring Grove Dam
Cape Town WSS	889	104.6	100.2	The following 6 dams serve the City of Cape Town: Voelvlei Dam, Wemmershoek Dam, Berg River Dam, Steenbras-Lower Dam, Steenbras-Upper Dam, and Theewaterskloof Dam
Crocodile East WSS	159	92.5	77.4	Kwena Dam supplies Nelspruit, KaNyamazane, Matsulu, Malelane, and Komatipoort areas and surroundings
Orange WSS	7 996	91.7	81.3	The following two dams service parts of the Free State, Northern, and Eastern Cape provinces: Gariep Dam, and Vanderkloof Dam
uMhlathuze WSS	301	98.4	89.5	Goedertrouw Dam supplies Richards Bay, Empangeni small towns surrounding rural areas, industries, and irrigators, supported by lakes and transfer from Thukela River

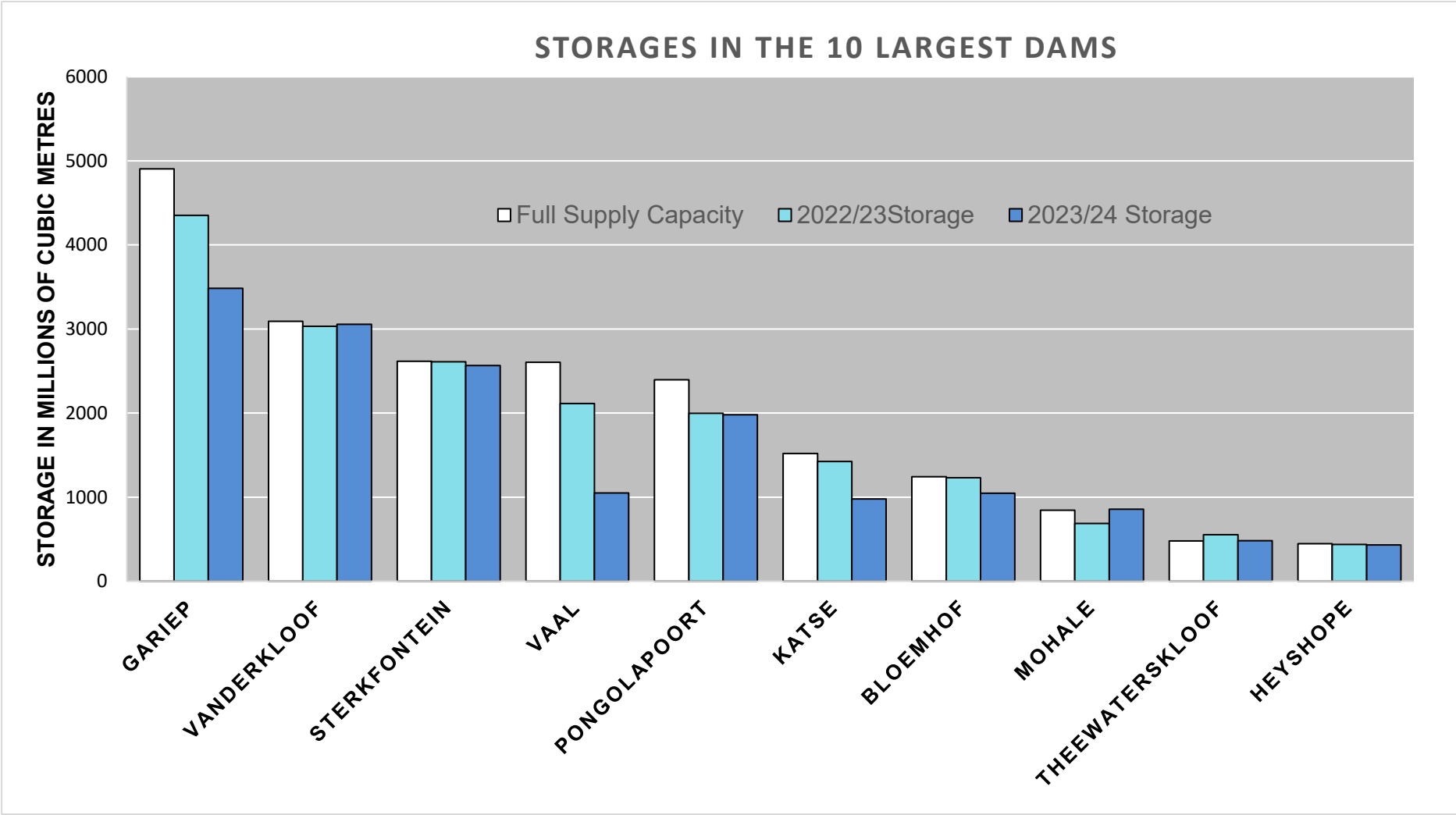


Figure 5.8: Storage volume comparison 2022/23 & 2023/24 of the ten largest dams at the end of September 2024.

5.4 Performance of Water Resources Systems Operation

The Department of Water and Sanitation developed guidelines for managing water supply systems during normal, drought, and flood conditions. These guidelines help ensure that the country's water resources are protected and used sustainably. As per the guidelines, formal operating rules have also been developed for the main water supply systems (WSS) in the country - such as the Algoa, Amathole, Greater Bloemfontein, Crocodile West, Integrated Vaal River (IVRS), Orange River System (ORS), Olifants, Polokwane, Umgeni, Umhlathuze and Western Cape.

An operating rule is a procedural guide for governing the regulation of water resources for a particular system/dam to reconcile expected water requirements with availability. The purpose of operating rules is to manage abstractions, transfers, releases, and restrictions to enhance sustainable and equitable water supply and mitigate the risk of failure to supply water during drought periods. The department conducts system and dam performance monitoring against the operating rules to serve as an early warning against failure to supply water from the systems.

Results of the monitoring of the water supply systems' performance during 2024-2025 can be summarised as follows:

Algoa System: Comprises of five (5) dams namely Kouga, Churchill, Impofu, Groendal and the Orange-Fish- Sundays Transfer, serving the Nelson Mandela Bay Metro and surrounding areas. There was significant improvement in the system total storage in the year 2024 which saw all 4 out of 5 dams in the system full and spilling, the exception being Impofu Dam in the Kromme subsystem. The Algoa water supply system is not fully integrated and as a result, some restrictions remained in place in the Kromme subsystem. Restrictions of 23% for domestic and industrial use and 43% on irrigation use were recommended for the 2024/2025 water operating year within the Kromme system. No water restrictions are imposed on the Groendal, Old Dams, Kouga, Orange Fish- Sundays and Groundwater systems.

Amathole System: comprises of six (6) dams serving the Buffalo City; and some parts of Amathole Districts Municipality. On the decision date of 1 May 2024 all dams were at almost full capacity. No water restrictions were required for the system from a water resources point of view in the 2024/2025 period due to sufficiently high storage at the decision date. The system remained in a good state in 2024.

Crocodile West System: Major dams in the Crocodile West system are Hartbeespoort, Roodeplaat, Vaalkop, Roodekopjes and Klipvoor. This system supplies water to Tshwane, Madibeng and Rustenburg areas. The system storage volume on the 1st of May 2024 decision date was on an average storage level of 91.56%. No restrictions were imposed on major dams in the system

Greater Bloemfontein System: Comprises of four (4 dams) namely Rustfontein, Knellpoort, Welbedacht and Mockes dams. The Annual Operating Analyses (AOA) was clear that the Greater Bloemfontein Water Supply System (GBWSS) is in deficit. As the water requirements continue to exceed the yield of the system water restrictions are required when the total system storage at the start of the operating year is below 95%.

The system storage was below 91% on 1 May 2024 decision date indicating restrictions needed to be imposed. 25% restrictions are required as recommended by the Annual Operating Analysis adopted at the Stakeholders Operating Forum (SOF) Preparations for the lifting of the restrictions for the operating year can start when the total system storage starts to exceed 95% and the Rustfontein dams starts to spill. The combined system storage was recorded at 96.08% as of January 2025. Hence, restrictions of 25% will continue until the system recovers to above 95%.

Integrated Vaal River System: The system comprises of fourteen (14) dams that serve mainly Gauteng Rand Water, Sasol and Eskom. The system storage was at a good state on the decision date of 1 May 2024. There were no restriction recommended for the system during 2024/2025 period form the water resources perspective. An analysis was undertaken in May 2024 to assess the risk to the IVRS performance because of the Lesotho Highlands Water Project tunnel outage and to determine the impact of the shutdown on water availability to users in South Africa.

The analysis indicated the impact of the outage on the overall IVRS will be insignificant considering that dams in the IVRS such as Sterkfontein Dam and others were relatively full. This meant that the closure of the tunnel for maintenance would not result in any disruption of water to supply Rand Water, and to the municipalities in Gauteng and other provinces which are customers of Rand Water

The Standard operating rule is that Sterkfontein Dam releases water to the Vaal Dam when the Vaal Dam reaches its minimum operating level of 18%. The analysis indicated a 5% risk of this to occur in the 2024-2025 operating year (1 May 2024 - 30 April 2025). Hence releases from Sterkfontein Dam to support the Vaal Dam were not envisaged during the 2024-2025 operating year and Sterkfontein Dam remains full to date. The Vaal Dam has also experienced a recovery, reaching 50% as a result of the recent rainfall in January.

Olifants system: The system consists of ten (10 dams supplying water to Sekhukhune District Municipality (DM) in Limpopo and Nkangala DM. The major dams Bronkhorstspruit, Middelburg, Witbank, Flag Boshielo, Loskop, Mkhombo and Blyderivierspoort. These dams are operated as 5 subsystems instead of one system because the model is not fully integrated yet. The combined storage volume for the dams in the May 2024 decision date was 93.7%. Based on the annual operating analysis conducted, no water restrictions were required during the 2024/2025 period.

Orange River System: The system consists of Katse and Mohale Dams of the Lesotho Highlands Water Project as well as Gariep and Vanderkloof Dams of the Orange River Project supplying water for irrigation and Eskom Hydropower generation.

The Orange River System storage was at 90.6% at the decision date of 1 May 2024. Restrictions were thus not required for the 2024-25 period as confirmed through the Annual Operating Analysis (AOA) and adopted at the Stakeholders Operating Forum (SOF).

Polokwane System: The system comprises of nine (9) dams supplying Polokwane and surrounding areas. The combined storage of the dams was above 83.4% with the major dams namely, Flag Boshielo and Ebenezer at 100% of their full supply capacity at the decision date of 1 May 2024. Allocable resources based on the AOA 2024/2025 were 44.32 million m^3/a compared to the target requirement of 61.34 million m^3/a. Due to the deficit in supply versus demand, an overall water restriction of 17.02 million m^3/a (~ 30%) was recommended on the system to bring the system into balance.

Umgeni system: The Umgeni system consist of six (6 Dams) namely Spring Grove Dam, Mearns Weir, Midmar Dam, Albert Falls, Nagle Damand Inanda Dam. The Umgeni WS system is augmented from the Mooi River System using the Mooi-Mgeni Transfer Scheme (MMTS). The annual Operating analysis for the system for the 2024/2025 period was conducted in May 2024. The analysis showed no restrictions for the 2024/2025 operating year. However, the risks associated with the current over-abstraction of the resource above the licensed water allocation to supply the ever growing demand is a concern to sustainable water supply from the system un the short to medium term. The analysis recommended a gradual reduction in water usage through water conservation strategies and water demand management measures, to mitigate risks and prevent exceeding the licensed water allocation.

Umhlathuze System: The UMhlathuze system comprises of Goedertrouw Dam and several lakes within the KwaZulu-Natal (KZN) northern coastline. The Umhlathuze system supplies water for irrigation, domestic, and industrial use within the King Cetshwayo District Municipality. Goedertrouw Dam storage was at 97% at the decision date on 1 May 2024. All lakes were full, and farm dams were assumed to be full as well. It was agreed through the Annual Operating Analysis (AOA) and adopted at the Stakeholders Operating Forum (SOF) that there would be no water restrictions for the 2024/24 operating year, considering the good storage level in the system

Western Cape Water Supply system (WCWSS): Comprises of the six 6 dams namely Wemmershoek, Upper and Lower Steenbras, Theewaterskloof, Berg river and Voelvlei dams serving mainly the City of Cape Town and some irrigation users/ Water Users Associations.

The system was at a combined storage level of 100% at the decision date of 1 November 2024. There are no restrictions imposed on the system for the current water operating year 2024/2025.

In summary, the main water supply systems have been gradually recovering due to favourable rainfall in December 2024 and January 2025. It is anticipated that these water supply systems will be full restored by the end of the rainy season in time for the annual operating analysis, typically conducted in May for most water supply systems. The annual operating analysis for the period of 2024-2025 was conducted for all the main water supply systems, with no restrictions necessary for the majority. The following systems in Table 5-5, however, have restrictions.

Table 5-5:Water supply system and restrictions imposed

Water supply system	Restrictions Imposed
Greater Bloemfontein Water Supply System	Restrictions of 25% for domestic and industrial water use
Algoa Water Supply System (Kromme Sub-system)	Restrictions of 23% for domestic and industrial water use and 43% for irrigation.
Polokwane Water Supply System	Restrictions of 30% for domestic and industrial use.