

AUGUST 2024



MONTHLY STATE OF WATER BULLETIN

WATER IS LIFE - SANITATION IS DIGNITY



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



Overview

South Africa experiences winter rainfall in the southwestern parts of the country and summer rainfall in the eastern part. The country's southwestern tip has a Mediterranean climate with hot summers and cool, wet winters. The country is currently in a neutral El Niño-Southern Oscillation (ENSO). However, current SAWS predictions are uncertain whether it will weaken towards a La Niña state during our next summer season.

At the end of September 2024, the national dam levels were **82.5%** of Full Supply Capacity (FSC). This level is lower than last year, at the same time of reporting when national storage was **92.7%** of FSC. Approximately **18%** of the national dams were **above 100% of FSC** (either full or spilling), **71%** were between 50 and 100% of FSC, **9.9%** were between 10 and 50% of FSC, and at least **1%** were below 10% of FSC.

The most recent 24-month Standardised Precipitation Index revealed that the Namakwa DM in the Northern Cape Province, the Thabo Mafutsanyane DM in the Free State, the Sarah Baartman DM in the Eastern Cape, the Capricorn and the Mopani DMs in Limpopo were among the districts that had some areas experiencing severe drought. Other District Municipalities such as the Zululand DM in KwaZulu-Natal, Gert Sibande DM in Mpumalanga, Bojanala and Ngaka Modiri DM in North West, Sekhukhune DM in Limpopo, Ekurhuleni and Sedibeng DM in Gauteng only experienced moderate drought.

The recent rainfalls in Western Cape Province have significantly improved dam storage in the system, with surface water storage in six major dams within the system exceeding 99%. The Western Cape Province reported a 94.7% in storage during the last week of August, while the Cape Town System reported a surface water storage of 102.1% of FSC. A 5-year comparison of Western Cape WSS storage also shows that while most catchments regressed compared to the previous year in terms of storage, the Gouritz catchment showed an improvement of 12.9%.

Rainfall

The country is currently in a neutral El Niño-Southern Oscillation (ENSO). However, current SAWS predictions are uncertain whether it will weaken towards a La Niña state during our next summer season. The monthly rainfall distribution during the current hydrological year for the summer and winter seasons is presented in Figure 1 and Figure 2, respectively. Winter rainfall regions received good rainfall during August. Meanwhile, the summer regions did not receive significant rainfall in August. However, rainfall ranging from 50-100 mm was received over isolated parts of the Northern Cape, Western Cape, and KwaZulu-Natal.

The monthly rainfall anomalies expressed as a percentage of normal rainfall for the summer season and the beginning of the winter season are presented in Figure 3 and Figure 4, respectively. Above-normal rainfalls were received in isolated parts of the Western Cape, Limpopo, Mpumalanga, and KwaZulu Natal provinces. The South African Weather Service (SAWS) multi-model rainfall forecast has indicated mostly below-normal rainfall over most parts of the country during the August-September-October (ASO), September-October-November (SON), and October-November-December (OND) 2024, while there are indications of above-normal rainfall over most of the summer rainfall areas during October-November-December (OND) forecast periods (Figure 5). However, there is an exception for the Limpopo Province, which still indicates below-normal rainfall that can be expected in the early summer period.

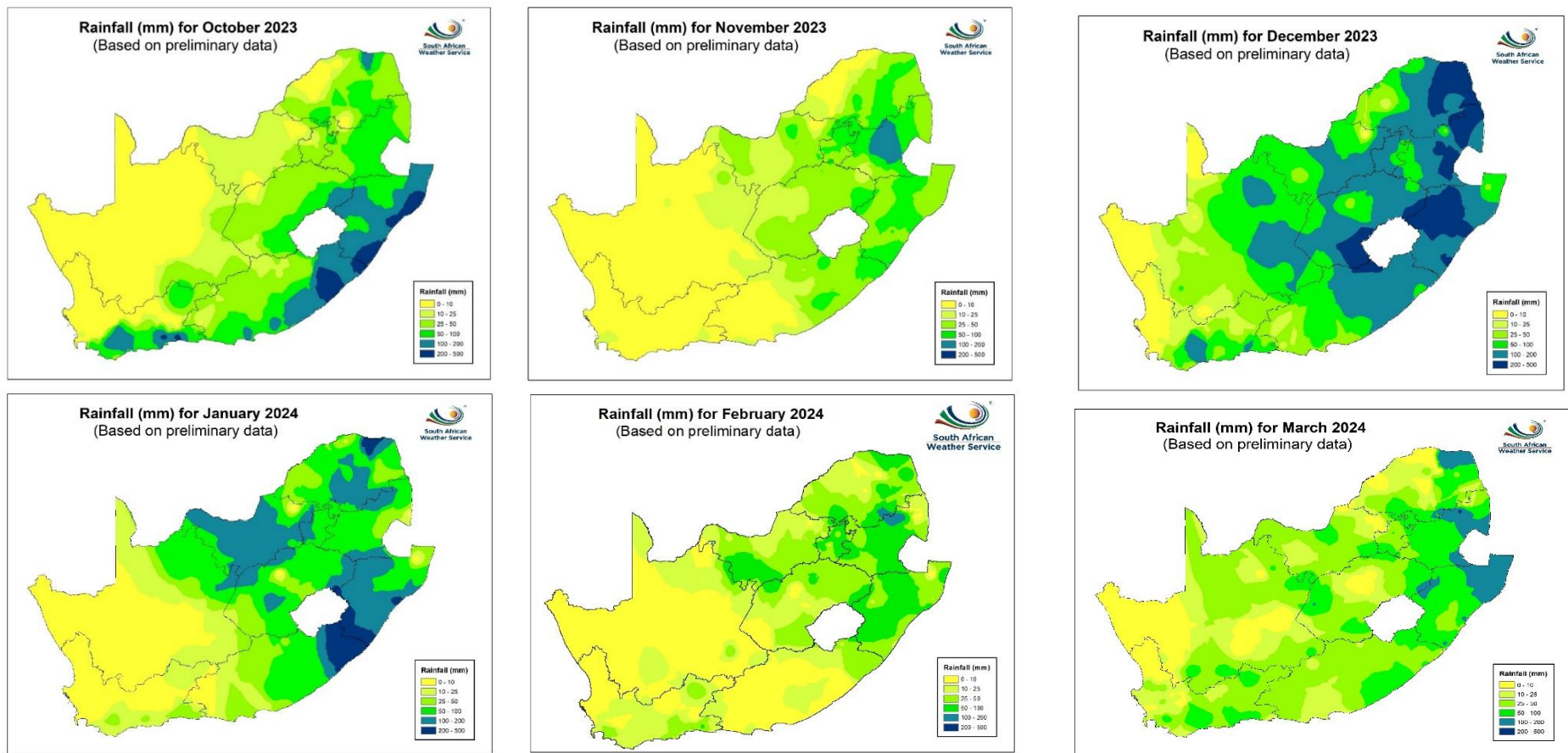


Figure 1: Summer season monthly rainfall distribution for October 2023 to March 2024 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

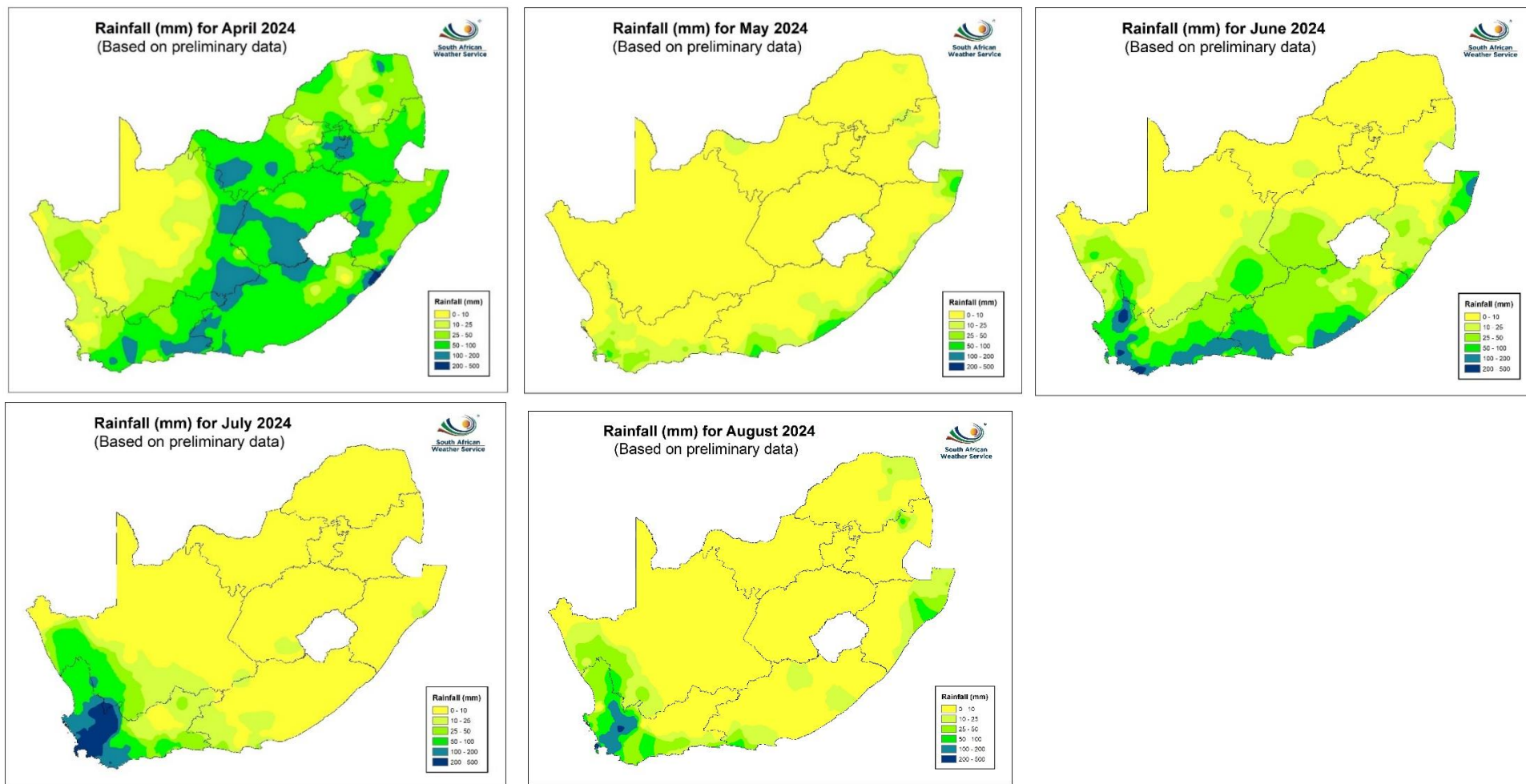


Figure 2: Winter season monthly rainfall distribution for April to August 2024 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain/>)

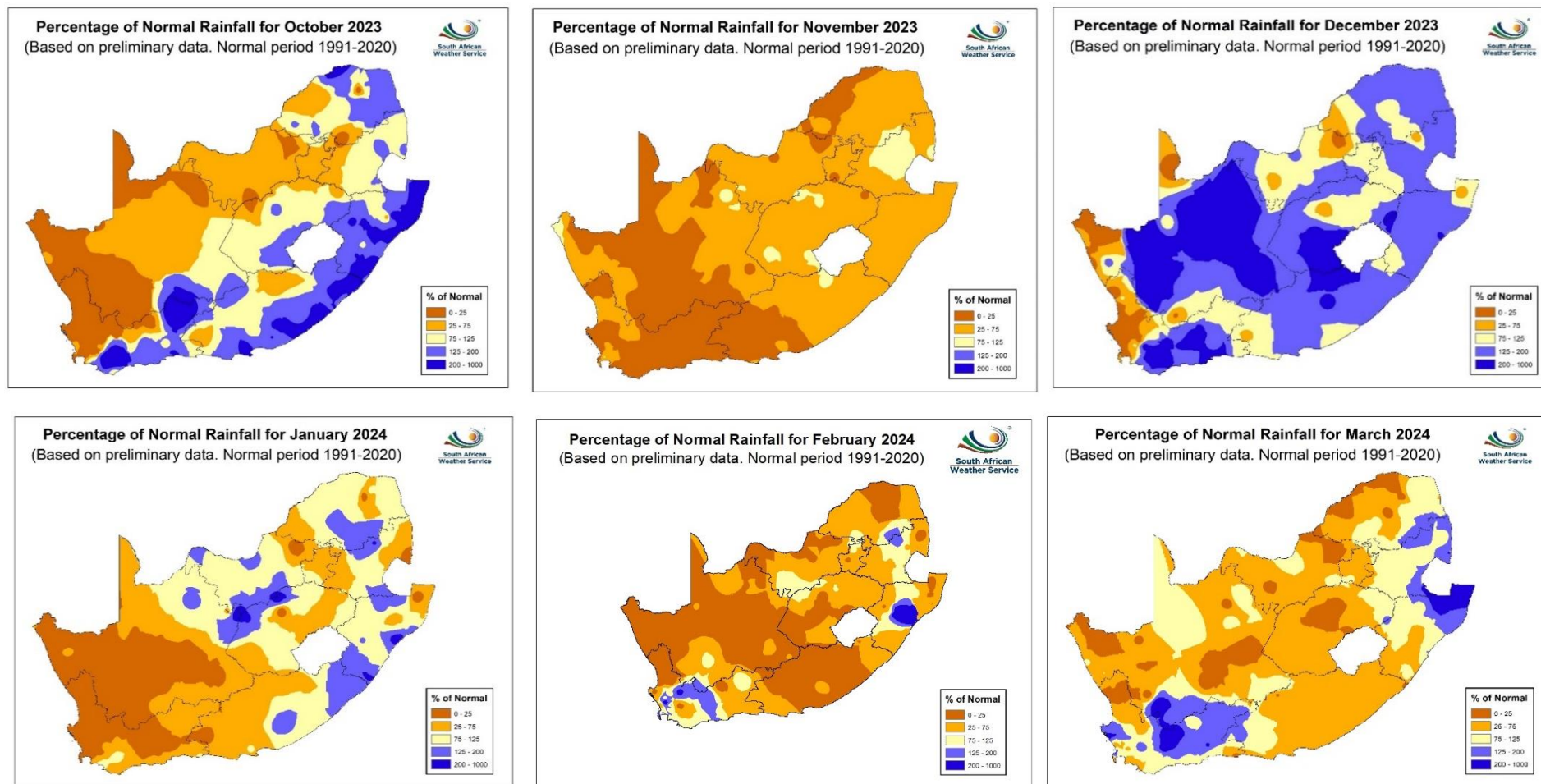


Figure 3: Summer season Percentage of normal rainfall for October 2023 to March 2024. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

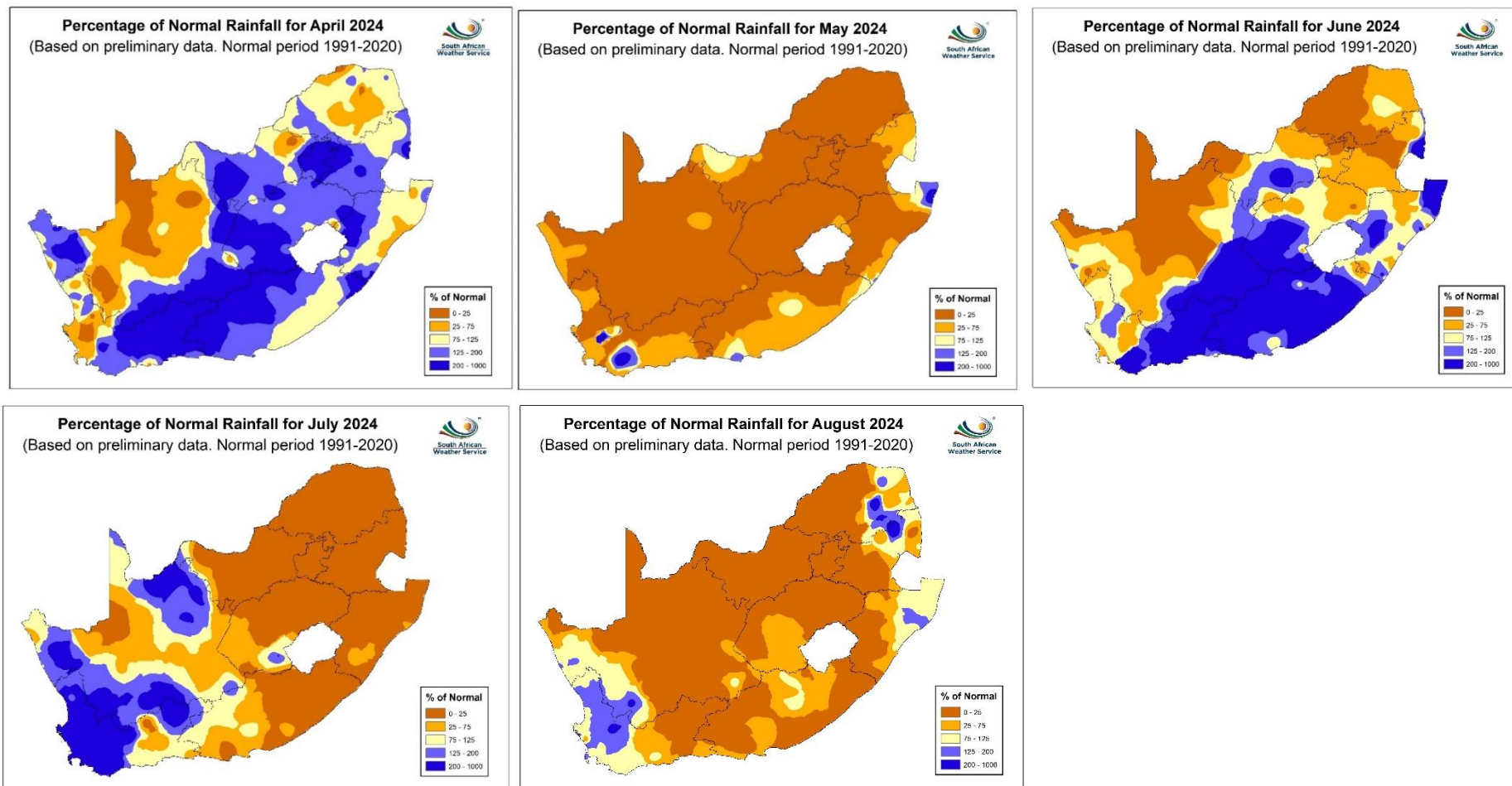


Figure 4: Summer season percentage of normal rainfall for April to August 2024. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

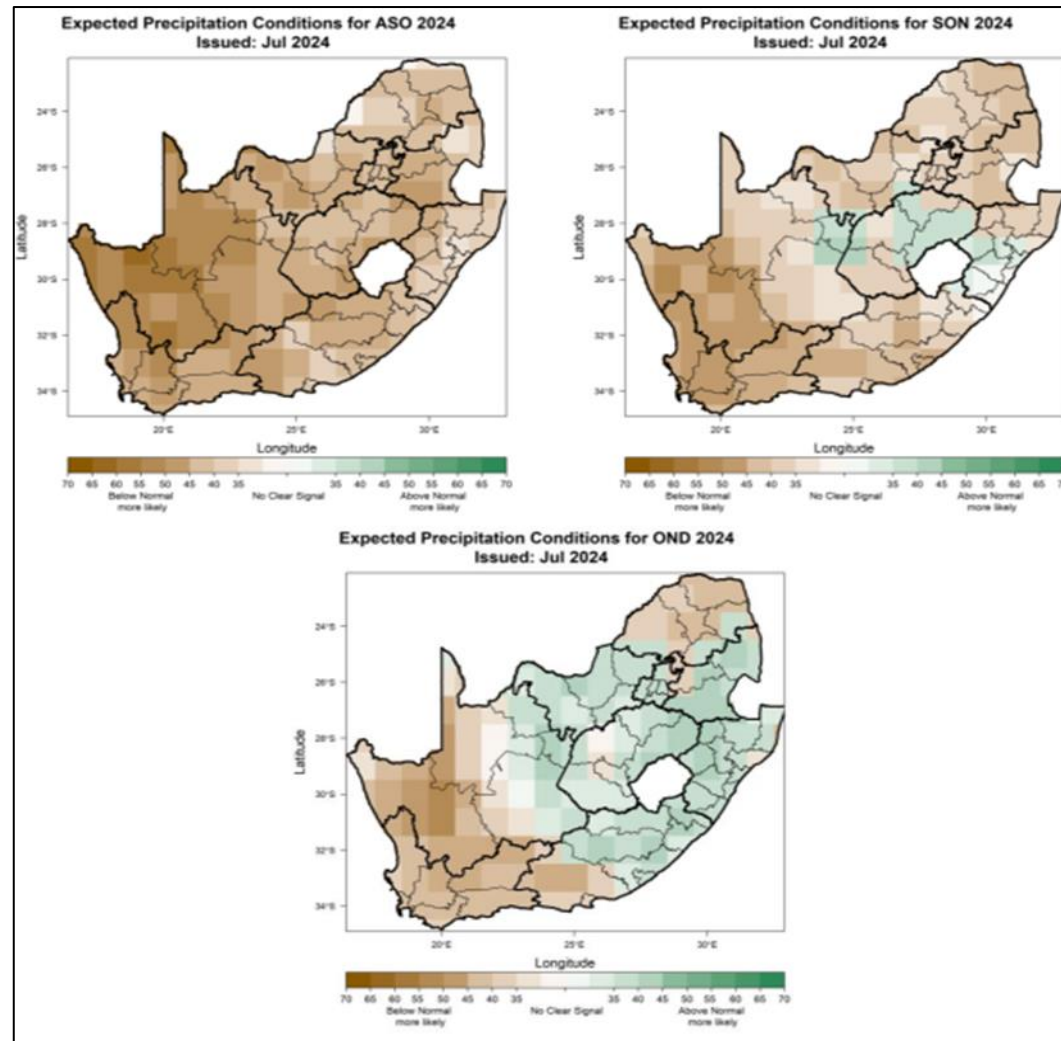


Figure 5: August-September-October 2024 (ASO; top left), September-October-November 2024 (SON; top right), October-November-December 2024 (OND; bottom); seasonal precipitation prediction. Maps indicate the highest probability of the above-normal and below-normal categories (Source: SAWS)

National Dam 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 6 below. At the end of August 2024, the national dam levels were at **82.5%** of Full Supply Capacity (FSC). This level is lower than the last two years, at the same time of reporting when national storage levels were greater than 90% of FSC. Around **18%** of the national dams were **above 100% of FSC** (either full or spilling), **71%** were between 50 and 100% of FSC, **9.9%** were between 10 and 50% of FSC, and at least **1%** were below 10% of FSC (critically low).

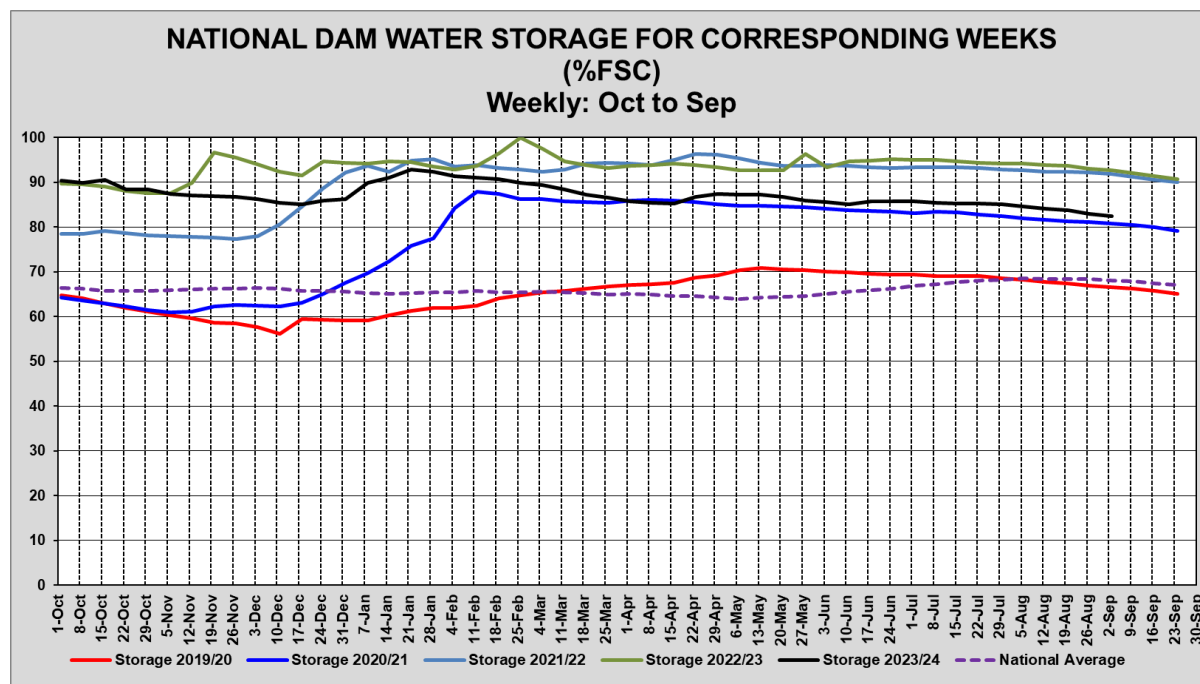


Figure 6: National Dam Storage on 26 August 2024

The comparison between August 2023 and August 2024 of the country's five largest dam storage %FSC is presented in Table 1. Due to the drier and warmer conditions experienced this season compared to 2023, the Vaal Dam and Gariep Dam storage levels have declined by -40.3% and -18.8%, respectively.

The Middle-Letaba and Glen Alpine Dams in Limpopo Province remain the only dams at critical levels, as given in Table 2.

Table 1: Storage Levels comparison for the Five Largest storage dams (by volume) to last year

Reservoir	River	Province	26 August 2023 (%FSC)	26 August 2024 (%FSC)	% Change (-/+)
Gariiep Dam	Orange River	Free State	93.8	75	-18.8
Vanderkloof Dam	Orange River	Free State	99.9	98.3	-0.7
Sterkfontein Dam	Nuwejaarspruit River	Free State	100.2	98.1	-2.1
Vaal Dam	Vaal River	Free State	86.6	46.3	-40.3
Pongolapoort Dam	Phongolo River	KwaZulu-Natal	84.4	83.5	-0.7

Reservoir	River	Province/Country	Responsible Regional Office	Full Supply Capacity	Last Year	This Week	Diff. between %Full
Gariiep Dam	Orange River	Free State	Free State	4903.45	97.5	85.7	-1.6
Vanderkloof Dam	Orange River	Free State	Free State	3092.36	98.5	95.8	-0.7
Sterkfontein Dam	Nuwejaarspruit River	Free State	Free State	2616.9	101.6	99.5	-0.1
Vaal Dam	Vaal River	Free State	Gauteng	2603.45	102.1	63.9	-1
Pongolapoort Dam	Phongolo River	Kwazulu-Natal	KwaZulu Natal	2395.24	83.5	82	0.6

Table 2: Dams below 10% of Full Supply Capacity compared to last year

Reservoir	River	Province	26 August 2023 (%FSC)	26 August 2024 (%FSC)	% Change (-/+)
Middle-Letaba Dam	Middel-Letaba River	Limpopo	4.3	0.9	-3.4
Glen Alpine Dam	Mogalakwena River	Limpopo	62	4.5	-57.5

The spatial distribution of the dams with a classified range of their storage levels on 29 July 2024 is presented in Figure 7. An observation can be made that most of the dams across the country are at storage levels of between 50-100% of FSC.

Figure 8 presents the 24-month Standardised Precipitation Index (SPI) for June 2024, indicating that several District Municipalities (DM) have experienced droughts in the previous 24 months. The Namakwa District in the Northern Cape Province, the Thabo Mafutsanyane DM in the Free State, the Sarah Baartman DM in the Eastern Cape, the Capricorn and the Mopani DM in Limpopo were among the municipal districts that had some areas experiencing severe drought. Moreover, district municipalities such as the Zululand DM in KwaZulu-Natal, Gert Sibande DM in Mpumalanga, Bojanala and Ngaka Modiri DM in North-West, Sekhukhune DM in Limpopo, Ekurhuleni and Sedibeng DM in

Gauteng only experienced moderate drought. These areas received below-normal rainfall during the previous summer rainfall season.

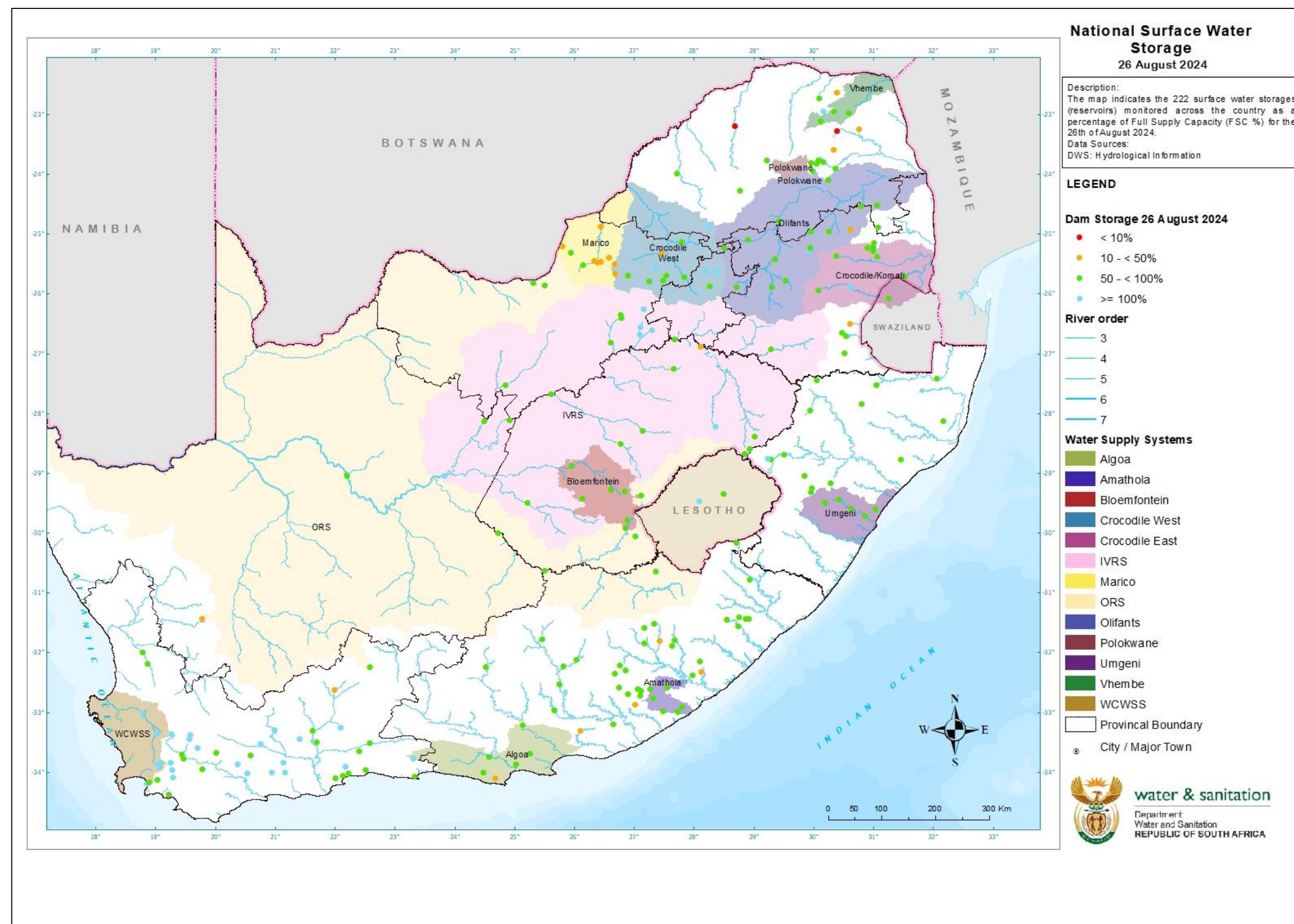


Figure 7: Surface Water Storage Levels - August 2024

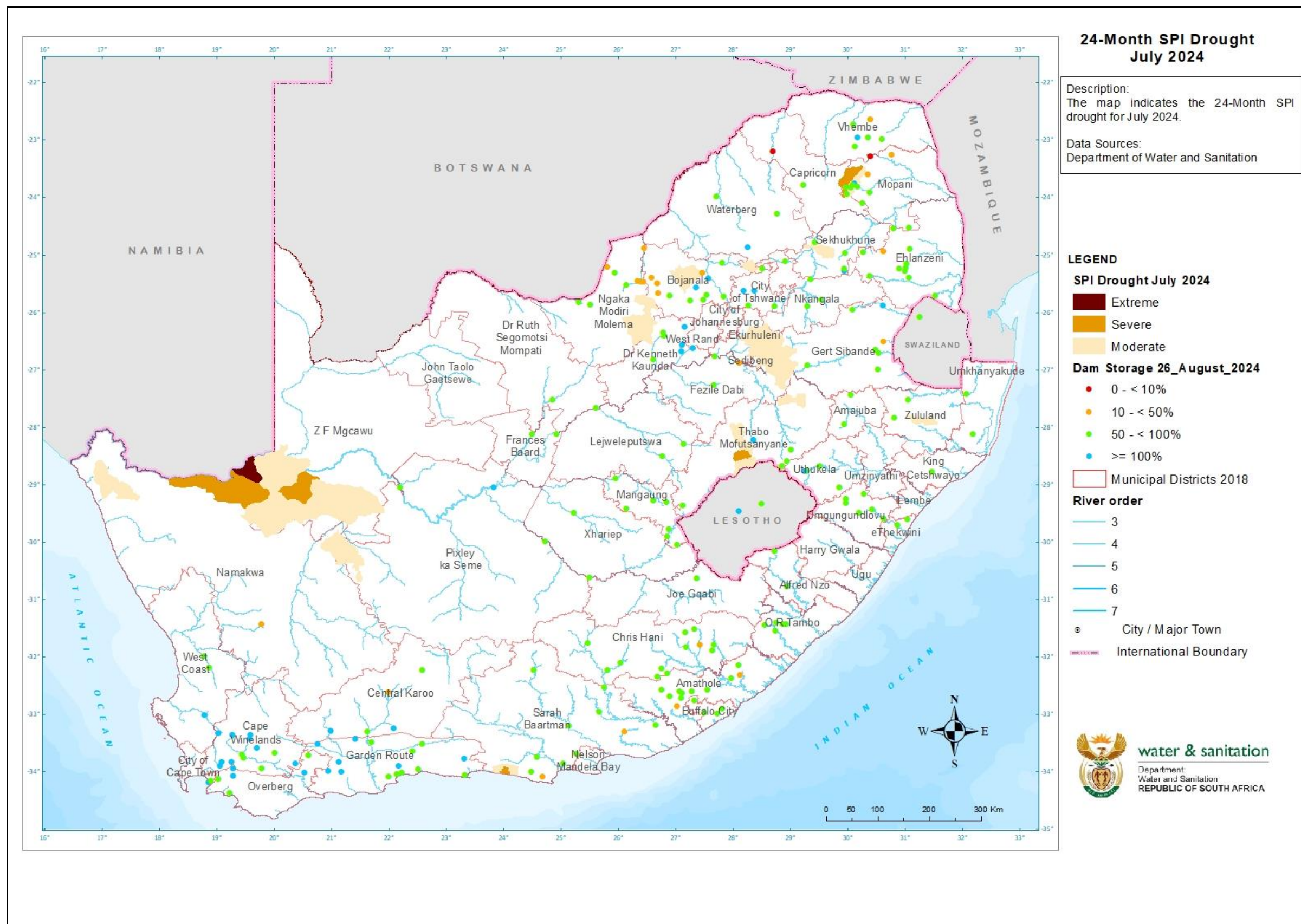


Figure 8: 24-month Standardised Precipitation Index (SPI) and dam levels

The comparison of the storage levels per Province and international areas for August 2024 to the same time last year is presented in Figure 9. Seven of the nine provinces showed a decline in dam storage levels compared to the previous year. The Province with increased dam storage levels was the Western Cape (+3.2% of FSC), while the highest decline was in the North West (-15.1% of FSC).

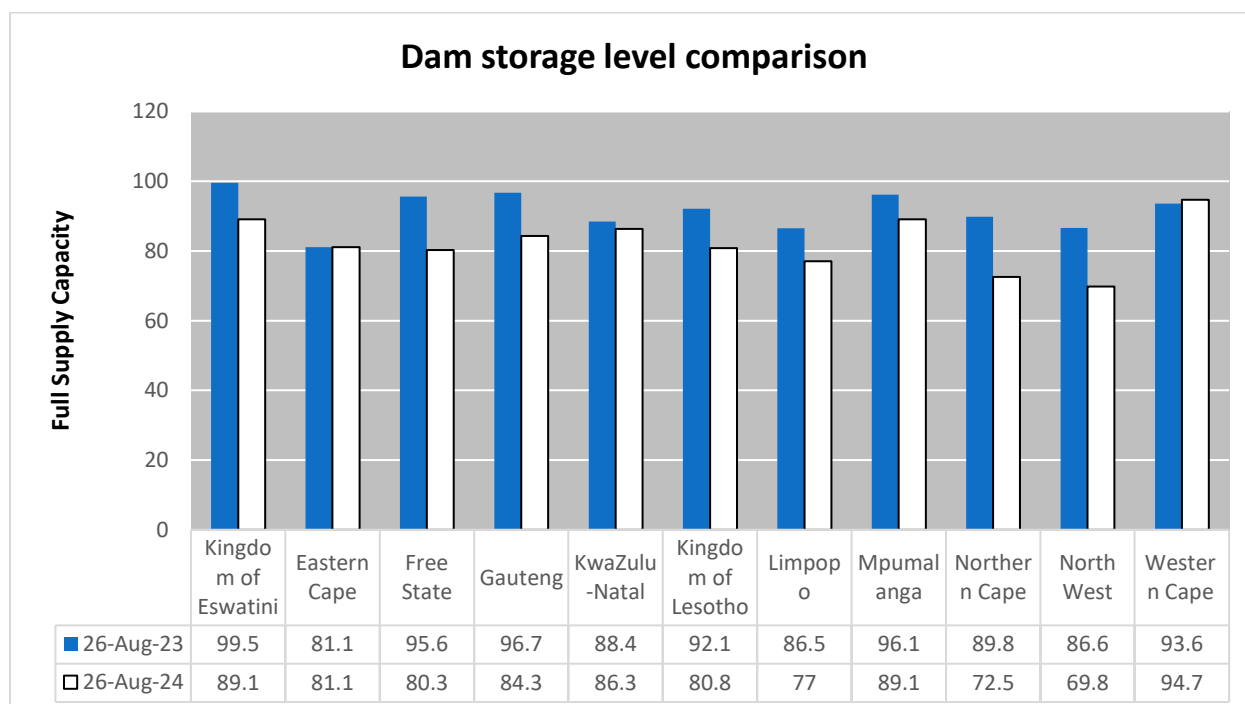


Figure 9: Water Storage Levels August 2023 vs. August 2024

District Municipalities

The year-on-year comparison of water storage levels per District Municipality (DM) is presented in Figure 10. Sarah Baartman DM and Garden Route DM experienced a significant increase (>20%) in dam storage levels compared to last year. In contrast, 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 3. 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.

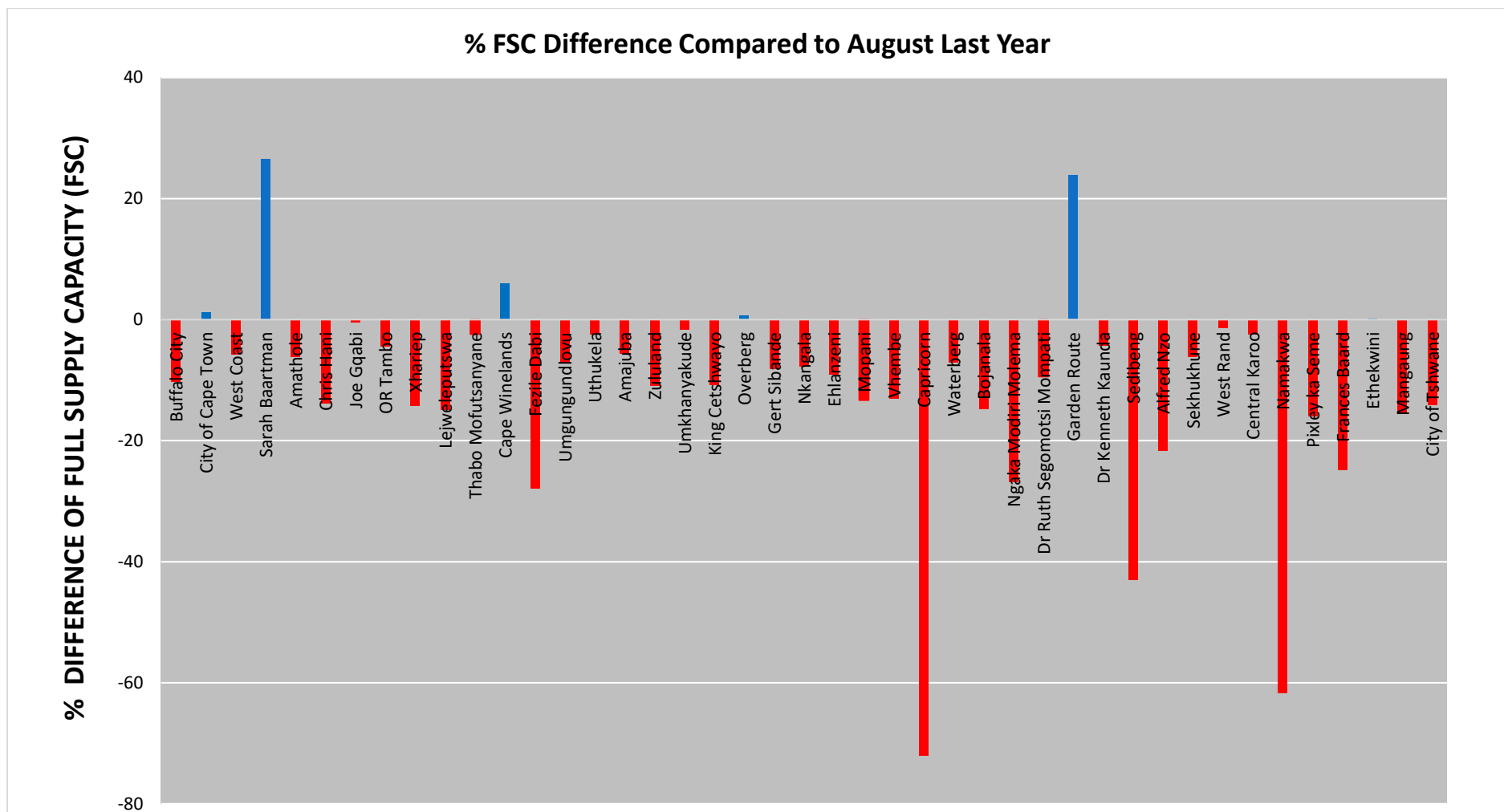


Figure 10: Comparison of water storage levels per District Municipality August 2023 vs August 2024

Table 3: Water Supply Systems storage levels

Water Supply Systems/clusters	Capacity in 10 ⁶ m ³	26 August 2023 (% FSC)	26 August 2024 (% FSC)	System Description
Algoa WSS	282	47.5	76.6	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	99.4	93.6	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	100.1	95.7	The following 3 dams serve Queenstown (Chris Hani DM, Enoch Ngijima LM): Boesmanskrantz Dam, Waterdown Dam, Ockraal Dam
Luvuvhu WSS	225	100.6	94.4	The following 3 dams serve Thohoyandou etc: Albasini Dam, Vondo Dam, Nandoni Dam
Bloemfontein WSS	219	96.3	84	The following 4 dams serve Bloemfontein, Botshabelo and Thaba Nchu: Rustfontein Dam, Groothoek Dam, Welbedacht Dam, Knellpoort Dam
Butterworth WSS	14	97.7	80.5	Xilinx Dam and Gcuwa weirs serve Butterworth
Integrated Vaal River WSS	10 546	94.3	79.1	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
Polokwane WSS	254.27	100.3	89.7	The following 2 dams serve Polokwane: Flag Boshielo Dam, Ebenezer Dam
Crocodile West WSS	444	98.8	90.9	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	91.2	88.4	The following 5 dams serve Ethekewini, iLembe & Msunduzi: Midmar Dam, Nagle Dam, Albert Falls Dam, Inanda Dam, and Spring Grove Dam
Cape Town WSS	889	103.8	102.1	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	99	88.8	Kwena Dam supplies Nelspruit, KaNyamazane, Matsulu, Malelane, and Komatipoort areas and surroundings
Orange WSS	7 996	95.8	84	The following two dams service parts of the Free State, Northern, and Eastern Cape provinces: Gariap Dam, and Vanderkloof Dam
uMhlathuze WSS	301	100.9	90.5	Goedertrouw Dam supplies Richards Bay, Empangeni small towns surrounding rural areas,

Water Supply Systems/clusters	Capacity in 10 ⁶ m ³	26 August 2023 (% FSC)	26 August 2024 (% FSC)	System Description
				industries, and irrigators, supported by lakes and transfer from Thukela River

Table 4: Water Supply Systems with Restrictions

Water Supply Systems/clusters	Restrictions
Algoa WSS	The decision date was changed from 1 June to 1 November, therefore new AOA was conducted, and water restrictions were imposed as from 1 November 2023, Urban (Domestic and Industrial) = 5%, Irrigation = 15% for Kouga Subsystem and Urban (Domestic and Industrial) = 40%, Irrigation = 50% for the Kromme Subsystem, Gazetted on 26 April 2024 (Notice No. 50569)
Bloemfontein WSS	A 15% restriction has been recommended on Domestic and Industrial water supply when the system drops below 95%, notice is yet to be gazetted
Polokwane WSS	20% restrictions on Domestic and Industrial

An Overview of the Western Cape Water Supply System (WCWSS)

The WCWSS is located in a winter rainfall area with wet winters and dry summers, so the dams are filled from May to October when approximately 90% of the annual runoff occurs, and the water requirement is only about 30% of the annual requirement (DWAF, 2007). The WCWSS serves the Greater Cape Town, Stellenbosch, Paarl, and Wellington, as well as towns on the West Coast and in the Swartland region. Cold fronts and cut-off lows are the primary weather systems responsible for heavy rain. The rainfall accumulation in June 2024 was significantly lower below normal; however, the months of July and August saw an enormous change, with a series of cold fronts sweeping through the region, bringing significant rainfall.

In the dry summer months of November to April, dam inflows are limited. Approximately half of the dam storage volumes are required for storage during winter to meet the high-water demand in summer. The remaining 50% of the dam storage volume is needed to provide long-term carry-over storage for dry periods. The dams in the WCWSS are operated in an integrated manner to minimize spillage during wetter years and thus maximize the amount of stored water available for essential uses during droughts (DWAF, 2007).

Recent rainfalls have significantly improved dam storage in the system, with surface water storage in six major dams currently exceeding 99%, as illustrated in Table 5. The Western Cape province reported a 94.7% in storage during the last week of August, while the Cape Town System reported a surface water storage of 102.1%. Figure 11 depicts a 5-year comparison of WCWSS storage; while most catchments regressed when compared to the previous year in terms of storage, the Gouritz catchment showed an improvement of 12.9%. According to DWS (2024) the overall system storage for the WCWSS tracks well above the median projected storage level, and there are no required restrictions on water use for the 2024/2025 operating year.

Table 5: Storage Levels for the Western Cape Water Supply System (WCWSS) dams

WCWSS Dams	Full Storage Capacity (Nett x 10 ⁶ m ³)	Rainfall in the last seven days (mm)	% Full This Week	% Full Last Week	% Full Last Year
Steenbras Upper	31.81	0	99.91	99.4	100.78
Steenbras Lower	33.88	26.9	102.13	103.97	102.13
Voëlvlei	158.59	32.3	103.55	103.74	100.66
Berg River	130.01	69.2	101.13	100.67	101.18
Wemmershoek	58.71	36.5	99.95	100	100
Theewaterskloof	479.26	2.7	102.36	103.88	105.52

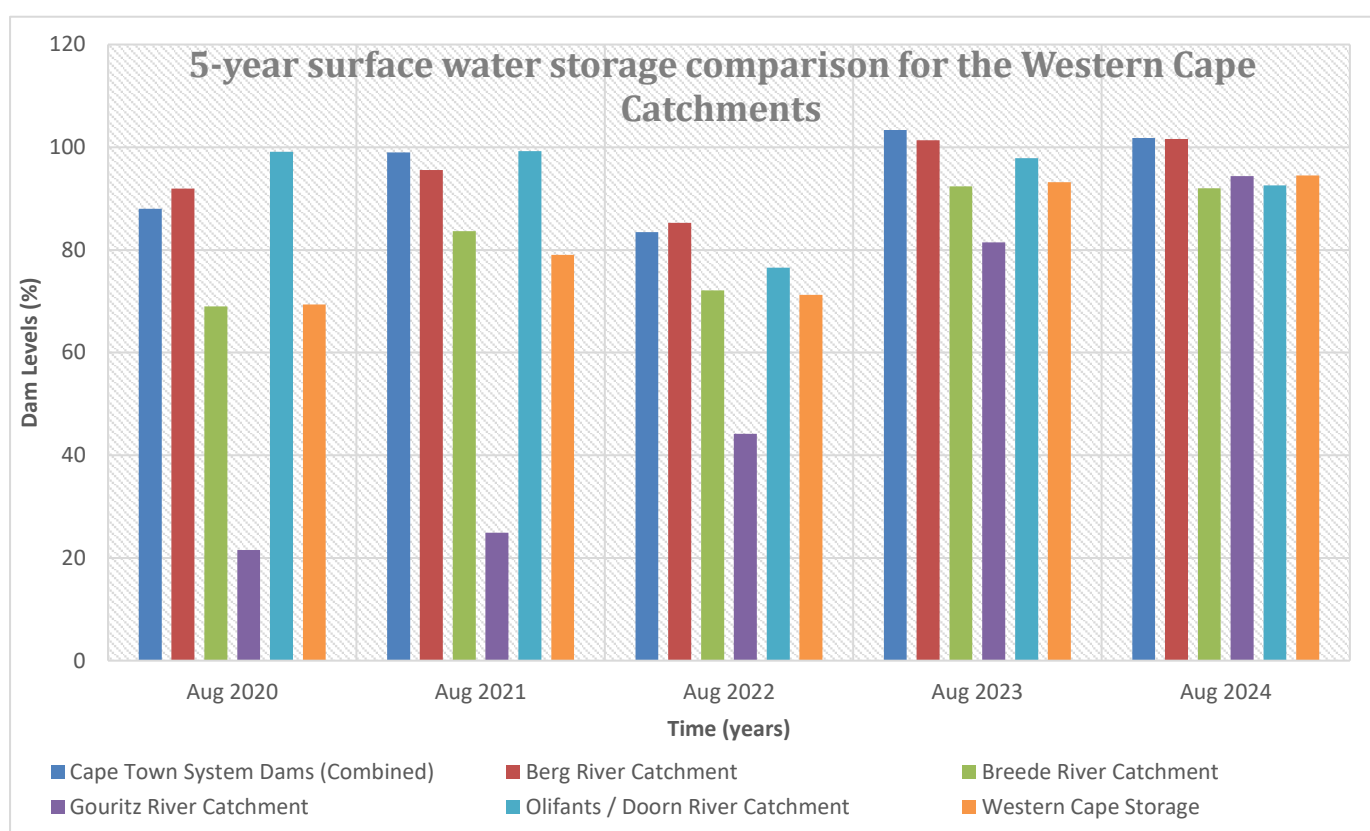


Figure 11: 5-year surface water storage comparison for the WCWSS

Vaal Dam operating rules and its interlinkages with other dams in the system

Vaal River System Operational Considerations

The detailed diagram of the Integrated Vaal River System highlighting various dams and rivers is shown in figure 12 below. The diagram is crucial for understanding how water is stored and managed, which is essential for resource distribution and planning within the Integrated Vaal River System.

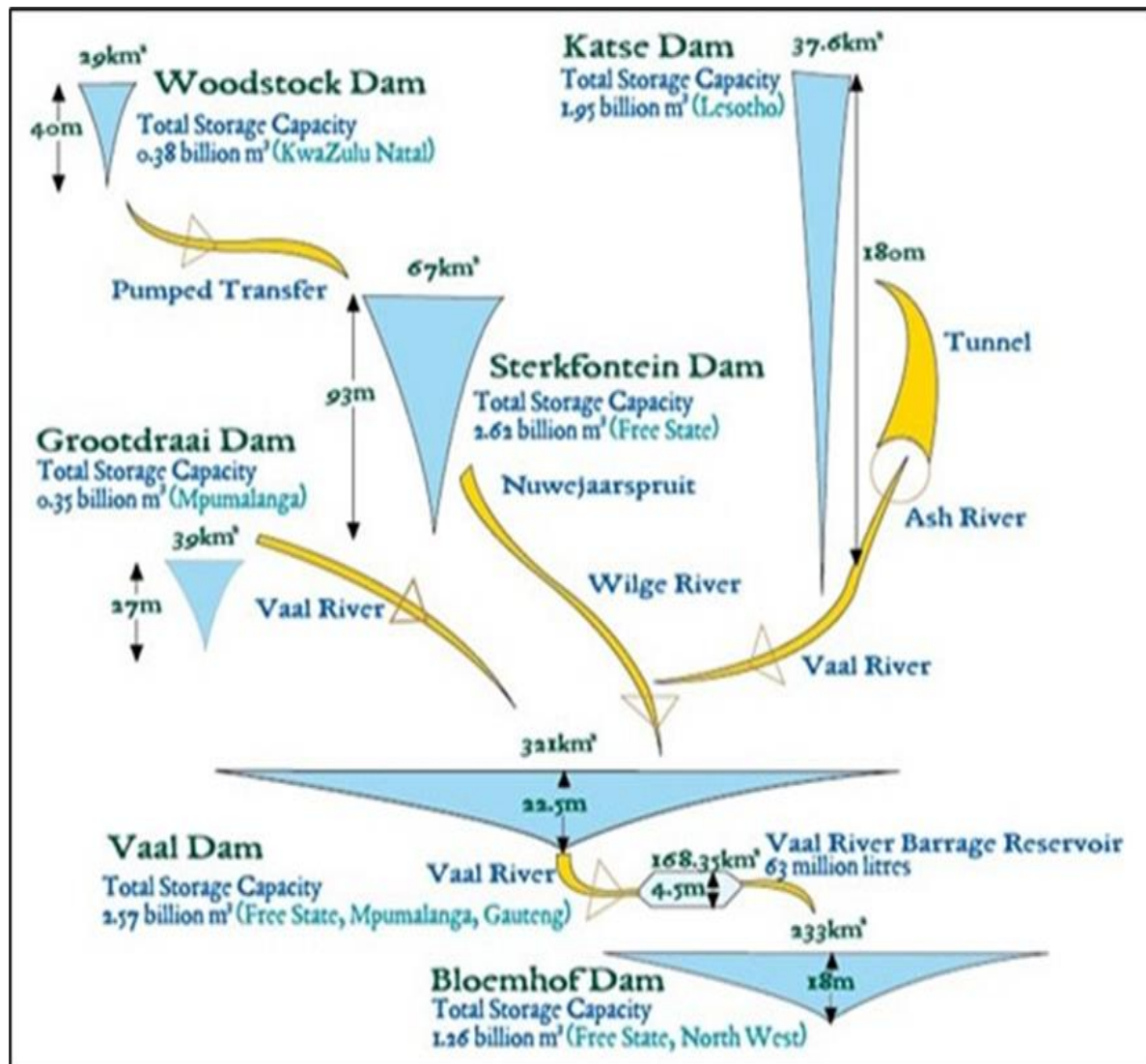


Figure 12 shows the Water Sources of the Vaal River System.

Figure 12 shows several dams, such as Woodstock Dam, Katse Dam, Vaal Dam and Sterkfontein Dam. The structures are crucial for water storage. Each dam storage capacity is measured in billion cubic meters, which indicates the volume of water they can hold. The rivers such as the Vaal River and Nuwejaarspruit are important components that transport water from precipitation upstream sources to downstream reservoirs and ecosystem.

The tunnels and transfers systems facilitate movement of water between different reservoirs and Water Management Areas (WMA). The yellow arrows indicate the direction of water flow and shows the connectivity and the efficiency between different parts of the system.

The Vaal dam serves mostly Gauteng, some of Eskom power stations, and major economic areas in Mpumalanga, Free State, and the Northern Cape. The Vaal Dam is part of the Integrated Vaal River System (IVRS); therefore, its operation is influenced by the state of the other dams within the system and is not operated in isolation.

The Vaal Dam storage was at 49.8% of its Full Supply Capacity (FSC) by 29 July 2024, and it had decreased to an unsettling 48.1% by 12 August 2024. This time last year, the Vaal Dam was at 88.6% of its FSC. According to the latest system performance report by DWS, in 2024, the dam storage was tracking the worst sequence storage projection. According to records, the lowest dam's storage was 28.3% of FSC in November 2020.

Transfer Links (2024-2025)

Table 6 below shows the summarized scenarios analysed as part of the IVRS 2024/2025 AOA .The Vlakfontein canal system from Grootdraai Dam is located between Standerton and Secunda, and it serves as an important strategic connection by providing water to two of the country's largest energy and petrochemical suppliers in the country: Eskom and Sasol, respectively. These are classified as strategic water users. Throughout the operating year of 2024-2025, the canal will be operated as a week dry period and a week wet period with an available capacity of 6.65m³/s therefore the canal will not be operated at full capacity (DWS,2024).

The Vaal River Eastern Subsystem Augmentation Programme (VRESAP), which abstracts water directly from the Vaal Dam, will be utilized as a result of the Vlakfontein Canal closure to transfer up to a maximum available capacity of (2.9m³/s) during the Vlakfontein Rehabilitation to keep Trichardsfontein (Eskom balancing dam) and Bossiespruit Dams (Sasol Secunda balancing dam) full during dry periods at Vlakfontein. This is anticipated to put additional strain on the Vaal Dam.

Additionally, the Lesotho Highlands tunnel is scheduled for a maintenance shutdown from October 2024 to March 2025. This will reduce the amount of water available within the system, specifically the Vaal Dam, as no water will be transferred during this period. The Lesotho Highlands Water Project will transfer a total of approximately 511 million m³ in the 2024-2025 water operating year as per the updated delivery schedule provided by the Lesotho Highlands Development Authority.

The Annual Operating Analysis (AOA) for the Financial Year (FY) 2024-2025 reported that there is a 5% risk of Vaal Dam reaching the Minimum Operating Rule (MOL) set at 18% by February 2025, which could result in releases from Sterkfontein Dam. In the event of releases from Sterkfontein Dam to Vaal Dam, pumping from Woodstock Dam will be necessary to replenish storage at Sterkfontein Dam and keep it full as per the operating rule. This will be achieved via the Thukela - Vaal Transfer, which currently has a pumping capacity of 15.3 m³/s.

Scenario reference & label			Scenario A: Base	Scenario B: Grootdraai	Scenario C: Rand Water Low projection	Scenario D: Extended LHWP Tunnel Outage	Scenario E: Geelhoutboom out for entire operating year
Rand Water Projection			Scenario A: Base	Scenario A: Base	Randwater Project 1600	Scenario A: Base	Scenario A: Base
1	Vlakfontein Canal	2024	From July 2024: 6 weeks dry, 2 weeks wet cycles	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base
2	VRESAP transfer	2024	From July 2024, the transfer from VRESAP: 2 m ³ /s (2 pumps) to keep Trichardsfontein & Bossiespruit Dams full	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base
3	LHWP Tunnel Outage	2024--2025	From 1 October 2024 – 31 March 2025	As per Scenario A: Base	As per Scenario A: Base	D1: 30 June 2025 D2: 30 September 2025	As per Scenario A: Base
4	Thukela-Vaal transfer	2024	For the planning Year 2024, the transfer from the Driel Barrage will be 13.2 m ³ /s available from Driel if required	Determine if Sterkfontein release is required due to Vaal level (LHWP tunnel Outage)			
		2025 onwards	For the planning year 2025, the transfer from Driel: 18m ³ /s, canal 2.1 m ³ /s, Total: 20.1m ³ /s Pump: until Bloemhof is Full	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base	As per Scenario A: Base

Table 6: Scenarios

*D1: 1 month outage

*D2: 2 months outage

Operating Rule Recommendations

- No restrictions for IVRS (2024/2025)
- Thukela Transfer and Sterkfontein Releases- possibility of release from Sterkfontein to Vaal due to low Vaal storage (LHWP Tunnel Outage). To be monitored.
- If release is required, pumping from Thukela should take place to replenish the Sterkfontein Dam and keep it full.
- VRESAP transfer: will need to transfer more than 2m³/s for the entire 2024/2025 water operating year to compensate for Vlakfontein 6 weeks dry, 2 weeks wet cycles.

Compiled by: Hulisani Mafenya, Nokulunga Biyase, Mirrander Ndhlovu, Thandekile Mbili and Joshua Rasifudi

For technical inputs and enquiries:

Sub-Directorate: Integrated Water Resource Studies:

Tel: 012 336 6856

Email: IntegratedWaterStudies@dws.gov.za

Accessible on the Website:

National State of Water Reporting Web page:

<https://www.dws.gov.za/Projects/National%20State%20of%20Water%20Report/default.aspx>

Department of Water and Sanitation

Private Bag X313

Pretoria

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Glossary

Term	Definition
EDCs	Endocrine Disrupting Compounds
ENSO	El Niño-Southern Oscillation
FSC	Full Storage Capacity
HY	Hydrological Year
SAWS	South African Weather Service
SPI	Standardized Precipitation Index (SPI) is a widely used index to characterise meteorological drought on a range of timescales. On short timescales, the SPI is closely related to soil moisture, while at longer timescales, the SPI can be related to groundwater and reservoir storage
WCWSS	Western Cape Water Supply System
WSS	Water Supply System
Water Supply System	A typical town/city water supply system consists of a gravity or pumping-based transmission and distribution system from a local or distant water source with a needed water treatment system

References

Department of Water and Sanitation (DWS), 2024. *Western Cape Water Supply System Operational Analysis 2023–2024: June 2024 Monthly Monitoring Report*. DWS, Pretoria, South Africa.

Department of Water Affairs and Forestry (DWAf), 2007. *Western Cape Water Supply System: Reconciliation Strategy*. DWAf, Pretoria, South Africa.