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Overview of Groundwater in Central Highveld Region, South Africa

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South Africa has been demarcated into 64 groundwater regions on the basis of hydrogeological settings. Central Highveld Region is Region 17 which, with a total area size of 16918 km², spans Gauteng, North West, Mpumalanga and Free State provinces as a wide south-easterly trending belt. The Region covers the majority of Witwatersrand Basin Goldfield, where groundwater has been extracted on a daily basis due to the mining activity. The region also covers South Africa's most urbanized area with high population and lower abundance in natural water resources. Malmani dolomites constitute the major aquifer system in the region. Groundwater also occurs within the weathered regolith and transported material of the Witwatersrand quartzite and shale, Transvaal dolomite, Ventersdorp lavas and the basement rocks. According to National Groundwater Archive (NGA), 30.2% and 64.3% of boreholes in the region have yields less than 0.1 l/s and 1.0 l/s, respectively. ~28.5% of these boreholes were dry due to the poor borehole siting. 90.5% of boreholes were drilled to the depth of less than 100 m, which is consistent with the maximum depth of weathered zone; 83% of water strikes were observed to be shallower than 50 m below surface; and 90.9% of water strikes are shallower than 40 m below water level. The total dissolved solids of groundwater ranges from 12 mg/l to 5175 mg/l. The dominant groundwater types are Ca-Cl and Mg-Cl. In the mine areas, 86% of the sites are featured by high sulphate concentration. 77.3% sites produce groundwater of good quality, whilst 22.3% of the sites yield undrinkable water due to the harmful ions and cations from mining. The anomalies of ammonia (as NH₃) and nitrate (as NO₃) are common in urban areas whereas sites with high nitrate concentrations largely occur in farming areas.

