

Hydrogeological Characterisation of the Shingwedzi and Mphongolo River Basins in Kruger National Park, South Africa

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ABSTRACT

A hydrogeological study has been undertaken as part of linking groundwater to ecosystem in the northern part of the Kruger National Park along Shingwedzi and Mphongolo River basins, in South Africa. This has been conducted as a basis of understanding the condition of groundwater resources. Geophysical investigation, borehole drilling, borehole pumping, and groundwater monitoring was carried in the area. Eight boreholes were drilled along the geophysical lines to obtain a detailed geology of the area and also for monitoring purposes. Rainfall data was obtained from the South African Weather Services to obtain the general cause of groundwater fluctuation in different times of the year. The study established that groundwater occurs in alluvial aquifers in those boreholes drilled along the river banks, basalt aquifers with alluvial material as overburden in deep boreholes (>22m) and also granite gneiss aquifers for those boreholes drilled in granite lineaments and bare patches. The study reveals that groundwater occurs in unconfined alluvial aquifers and semi-confined aquifers dominated by weathered basalts and granite gneiss. Groundwater within the study area shows some response to the occurrence of precipitation (rainfall). During each rainfall event, water level rises sharply in some of the boreholes located close to the river as a result of flow of water in the rivers due to rainfall events. In time of no rainfall event in the area, groundwater levels drops gradually. The hydraulic conductivity (K) in the area as obtained from grain-size analysis shows that the overburden alluvial materials of sand and gravel have high permeability as compared to the overburden material of loamy-clay. Borehole pumping data, as pumped by DWAF, provided the preliminary values for transmissivity (T) and storativity (S). High transmissivity values were obtained in alluvial boreholes and low values were obtained in granite gneiss boreholes and basalt boreholes. Groundwater quality is characterised into two major groundwater types dominated by sodium and chloride. The TDS values shows that groundwater within the study area is characterised as fresh water. By comparing the water quality results to the SANS 241:2005 and the SAWQG (DWAF 1996) for livestock watering, the results show that water quality in the area is suitable for both domestic and livestock use even though some of the elements are elevated above the guidelines.