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Ground movement as a result of dewatering in the Far West Rand area of Johannesburg resulting in the formation of Sinkholes and Dolines

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The discovery of gold at Langlaagte in 1886 led to the development of gold mining in the Far West Rand in 1934. When shafts were sunk, water from the dolomites posed a serious threat to mining. Despite cementation that sealed the many fissures, water still found its way into the underground workings. This led to government issuing a policy which compelled all mines in the Far West Rand to dewater. As the water levels lowered, dolines and sinkholes were formed, posing a serious threat to life and property, particularly in the municipalities of Merafong and Westonaria. When the mines eventually cease to operate, be it due to high working costs, or the declining grade of the ore body, the re-watering of the dolomitic compartments will occur as a natural consequence. When water comes to within six metres of the original water level, ground instability, the formation of dolines and sinkholes, both new and existing, occurred, threatening the important rail link between Pretoria and Cape Town as it passes through Far West Rand, the N12 between Johannesburg and Potchefstroom, as well as the R28 which passes through this area through to the Vaal Industrial area, Figure 1. Human life and infrastructure in the municipalities of Merafong and Westonaria are then in danger. The dewatering of the compartments caused the soil which formed the roof of the aquifers to be dry. Re-watering caused this dry, stable material to become wet and unstable. Where mixtures of slime and/or other material, which is not part of the geological composition of that area was used, the same phenomenon applied. It is argued that large mass of mine tailings over the dolomitic aquifers liquefied as the water levels rose. If the re-watering was not carefully managed the rising water table undoubtedly triggered a rash of new sinkholes, with catastrophic consequences for unsuspecting communities that may have been established in sensitive areas. This paper enlightens the alarming situation to the authorities to the potential dangers if the post mining period is not carefully monitored and there is insufficient provision to deal with any potential contingency. The paper will end with suggesting possible palliative solutions to the situation on how to best address the future management of the above.

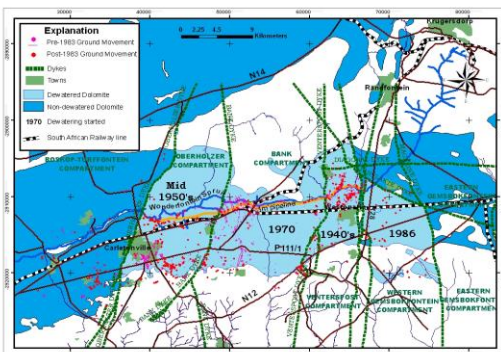


Figure 1: Affected area showing critical infrastructure such as the Railway line, R28 and

