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Engineering geological mapping an application to Outapi, north-central Namibia.

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Engineering geological mapping is one of the most critical requirements inputs any civil engineering project. However this stage of the investigation is often skipped, either because it is deemed unimportant or due to lack of awareness. The concept of engineering geological mapping is not well developed in Namibia, which often leads to structural damage or failure of infrastructure. The sparse geotechnical data that is available is not being used to its full potential. This practice can no longer continue, as Namibia is now faced with a growing population and increased urbanization, which will require infrastructure development in areas that were previously regarded as geologically unfavourable. It is therefore becoming important that this concept is incorporated in all projects, so that geotechnical and engineering geological conditions of every site proposed for development are well understood and taken cognizance of. This will also ensure protection of the huge amounts of money committed to these projects; and will ensure best use of available land, safer structures for the population and a protected environment.

This study focuses on understanding the engineering geological properties of soils covering northern Namibia, with a specific case study from Outapi Town. This was done with the aim of advising the town council on the geotechnical aspects of the town. One of the objectives of the study was to produce as an end product, a geotechnical map of the town, to guide planning of future developments required to expand the town. Terrain analysis and geo-botanical studies were employed during mapping and they showed a good correlation. Study of material, characterization and sampling were done in test pits, open excavations and hand auger holes. Sampled soils were tested to quantify their geotechnical parameters, both performance and index properties.

It was found that the semi-arid conditions with large variations of rainfall present in the area, caused significant changes in soil moisture content hence change in soil behaviour. The area is dominated by aeolian sediments which overlay a calcrete horizon, hard pans of clayey-silty sand with fewer salt pans. Aeolian sediments were found to be highly collapsible, with an ultimate bearing capacity of about 200kPa. The soils have low potential expansiveness and low to medium plasticity. An engineering geological map was produced based on a combination of field observations and laboratory tests, and three engineering geological zones were identified according to Geotechnical Classification for Urban Development criteria devised by Partridge et al. [1]. This study has proved the usefulness of engineering geological mapping, even in low relief, arid environments.

References:

[1] Partridge, T.C., Wood, C.K., and Brink, A.B.A. 1993. Priorities for Urban Expansion within the PWV Metropolitan Region: The Primacy of Geotechnical constraints. *South African Geographical Journal*. Vol 75, pp9-13.