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Creating Database and Building 3D Geological Models: A Case Study on Bac Ai Pumped Storage Hydropower Project

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Abstract : This article is the first step to research and outline the structure of the geotechnical database in the geological survey of a power project; in the context of this report creating the database that has been carried out for the Bac Ai pumped storage hydropower project. For the purpose of providing a method of organizing and storing geological and topographic survey data and experimental results in a spatial database, the RockWorks software is used to bring optimal efficiency in the process of exploiting, using, and analyzing data in service of the design work in the power engineering consulting. Three-dimensional (3D) geotechnical models are created from the survey data: such as stratigraphy, lithology, porosity, etc. The results of the 3D geotechnical model in the case of Bac Ai pumped storage hydropower project include six closely stacked stratigraphic formations by Horizons method, whereas modeling of engineering geological parameters is performed by geostatistical methods. The accuracy and reliability assessments are tested through error statistics, empirical evaluation, and expert methods. The three-dimensional model analysis allows better visualization of volumetric calculations, excavation and backfilling of the lake area, tunneling of power pipelines, and calculation of on-site construction material reserves. In general, the application of engineering geological modeling makes the design work more intuitive and comprehensive, helping construction designers better identify and offer the most optimal design solutions for the project. The database always ensures the update and synchronization, as well as enables 3D modeling of geological and topographic data to integrate with the designed data according to the building information modeling. This is also the base platform for BIM & GIS integration.

Keywords : database, engineering geology, 3D Model, RockWorks, Bac Ai pumped storage hydropower project
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