

NUMERICAL MODELING TO DETERMINE OPTIMUM DESIGN FACTOR FOR GROUNDWATER DAM CONSTRUCTION

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Abstract

A Groundwater dam is generally designed and installed at the sites where alluvial aquifer is formed widely to store groundwater for the resource of drinking water or agricultural use. The groundwater dam is planned to be constructed at Namwon-Si, Sandong-Myeon in Korea. The 3 installation candidates (site 1, site 2, site 3) are being considered as an appropriate construction site. In this research, numerical modeling was performed to investigate the effect of (1) dam's location, (2) wall thickness, (3) hydraulic conductivity, and (4) wall depth on aquifer storage capacity using conventional groundwater modeling program, Visual MODFLOW. Also, a factor considered most significantly was discussed through sensitivity analysis. Based on the result of sensitivity analysis, optimum installation location, hydraulic conductivity, thickness, and optimum wall depth of groundwater dam were found out. Conclusively, the optimum location is site 3 since it has the widest alluvial distribution among that of other two sites. Also, it was found out that the installation location and wall depth give more significant influence in obtaining large storage quantity than wall thickness and hydraulic conductivity. For wall thickness and hydraulic conductivity, there are critical points where storage shows almost no more increase although the wall thickness and conductivity increase. Finally, when the groundwater dam will be constructed, rather than increasing wall thickness and hydraulic conductivity, it is more important to select the location where alluvial unit has wide distribution and large thickness.

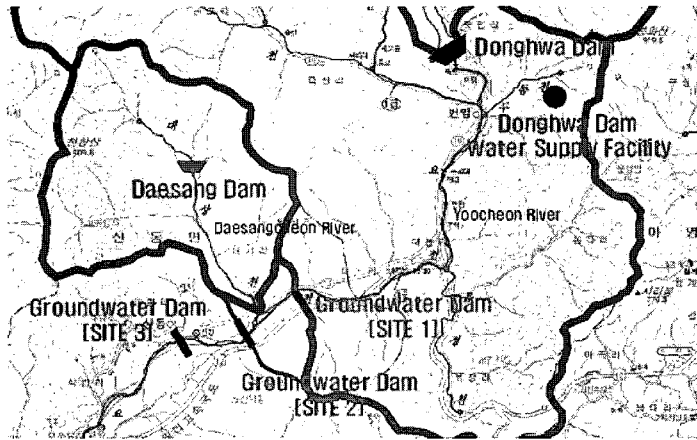


Fig. 1 Geography of planned groundwater dam sites

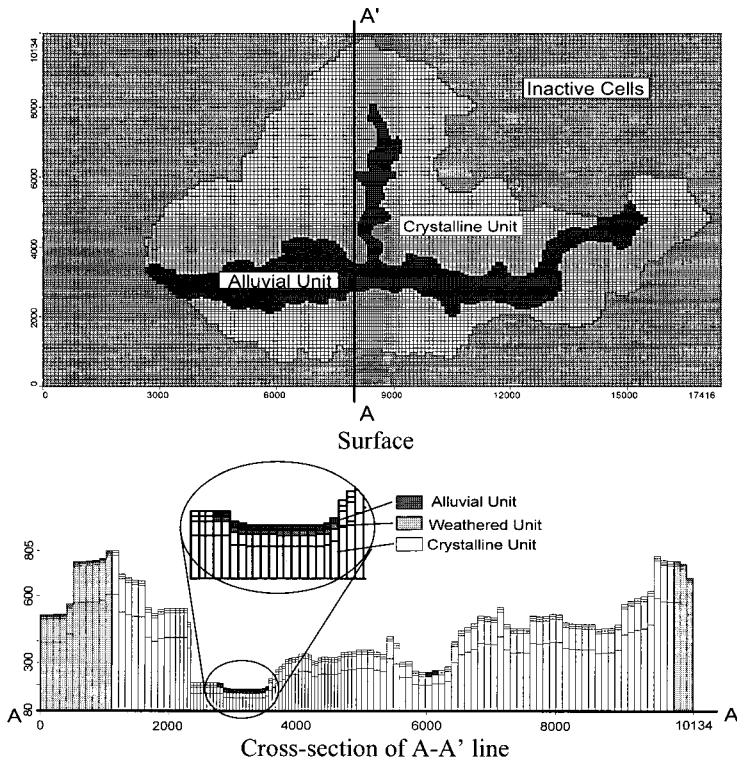


Fig. 2 Surface and cross section of groundwater dam's modeling area