

**INVESTIGATION OF GROUND CONDITIONS FOR THE UTLA DAM PROJECT,
GADOON REGION, NORTHERN WESTERN PAKISTAN**
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Abstract

The detailed investigations of ground conditions prior to the construction of dam or any other large engineering structure is the prime aim of engineering geological studies. An adequate assessment of geological and geotechnical conditions of dam-site is one of the most important aspects of a dam safety evaluation. The ground conditions of a Utlā Dam have been examined in the current study. The Utlā dam is a small-scale dam, proposed by Government of Khyber Pakhtunkhwa in Gadoon region, Swabi district, NW Pakistan mainly for the water storage for drinking and irrigation purposes. The feasibility of the Utlā Dam site has been established through various field tests and site exploration and assessment. The site exploration of the case study has been conducted through boreholes where in-situ testing has been conducted. The data of the two boreholes, coded as BH1 (35m) and BH2 (20m) have been accessed which were drilled along the axis of the proposed dam sites. The detailed borehole logging indicates that majorly the over-burden is underlain by felsic rocks i.e. Utlā granites. The overburden is largely comprised of compacted soil, gravels and boulders of plutonic nature. The geological investigation for ground conditions have been done via different in-situ testing procedures including field permeability test and water pressure test. These procedures determine the water loss in the overburden and bedrock. The granites which constitutes largely the bedrock are physically and mechanically hard enough to bear the capacity of the proposed dam foundation. The smaller values of the field permeability tests conclude that natural permeabilities barriers are present in the over-burden. The over-burden of the study area consists of clasts of igneous origin, finer sand, silt and clayey materials that fills the pore spaces and resist the channel flow, hence cause subtle water loss. Such conditions are always sound to the construction of small- or large-scale engineering structure. The lugeon values, obtained from the water pressure test in the boreholes are varying greatly with increasing depth. These values are low at shallow depth which points towards the well grouted conditions of the shallower log units. The leaching of finer material from the over-burden into the shallower units has been the most probable reason of joints filling at shallower depth. The higher values of Lugeon tests at greater depth suggests open jointing of bedrocks at certain depth. Grouting has been suggested for thorough filling of joints and reducing the water loss under controlled conditions.