Hydrological conditions and water quality assessment during construction and operation of the Lowari tunnel in Pakistan

Jehanzeb Khan[1, 2*], Waqas Ahmed[1], Muhammad Waseem[3], Wajid Ali[1], Inayat ur Rehman[4]

[1] *National Centre of Excellence in Geology, University of Peshawar, Peshawar, 25120, Pakistan*
[2] *Department of Geology, University of Malakand, Chakdara, Dir (L), 18800, Pakistan*
[3] *University of Engineering and Technology, Peshawar, Peshawar, 25120, Pakistan*
[4] *Pakistan Council of Scientific and Industrial Research, Peshawar, 25120, Pakistan*
[*]jehanzebgeology@gmail.com

This study outlines the hydrological conditions that were encountered during the construction and operation stages of the Lowari Tunnel in Pakistan. The study analyzes the water conditions inside the tunnel during its construction, evaluates the dewatering rate, and assesses the water inflow after the completion of the tunnel. The study also examines the suitability of the tunnel water for drinking and irrigation purposes and its impact on the tunnel support systems. The tunnel was constructed in a challenging area characterized by heavy snowfall, landslides, and rockfalls. The water ingress in the tunnel was significant during the excavation and operation stages, and the study assesses various factors such as water source, quantity, color, and odor. The tunnel was divided into dry, damp, dripping, and flowing sections, and the dewatering rate was recorded during excavation. The study found that the water was appropriate for utilization in the support systems of the tunnel, such as concrete and steel installations. However, the water discharged from the southern portal of the tunnel was deemed unsuitable for drinking, owing to its low pH value. The findings of the research offer significant implications for comprehending the hydrological characteristics of the Lowari Tunnel, as well as for the sustainable utilization and management of water resources in future tunnel construction projects in the region.

Keywords: Lowari Tunnel; Drinking Water