

# **Construction Stage Geotechnical Evaluation of Sengulam Augmentation Scheme, Idukki District, Kerala**

**S. Chandrasekaran**

*Senior Geologist, State Unit: TN & P., Engineering Geology Division,  
Geological Survey of India, Besant Nagar, Chennai – 600 090*

**K. Aravind**

*Senior Geologist, State Unit: TN & P., Engineering Geology Division, Geological  
Survey of India, Besant Nagar, Chennai – 600 090. Email: gsjaravind@gmail.com*

**Abhishek Kumar**

*Geologist, State Unit: TN & P., Engineering Geology Division,  
Geological Survey of India, Besant Nagar, Chennai – 600 090*

**K. Jayabalan**

*Director, Engineering Geology Division, Geological Survey of India, State Unit: TN  
& P, Besant Nagar, Chennai – 600 090*

## **Abstract**

Sengulam Augmentation scheme was proposed by KSEB, Idukki district, Kerala to augment the power potential at Sengulam Reservoir utilising surplus water from the western Kallar river a tributary of Mudirapuzha River by constructing a 13 m high, 41.5 m long concrete gravity weir across the Western Kallar through 6700m long, 3.5m dia. unlined diversion tunnel to Sengulam reservoir. The diversion tunnel excavation has been completed for face I and face VI. Excavation is under progress for face IV and V through Adit II. Face II and face III are to be excavated through Adit I. Construction stage geotechnical investigation and periodical inspection was carried out for the excavated reaches, assessed the rock mass condition and suggested appropriate support measures based on Q and RMR of the diversion tunnel and large scale geological mapping was carried out at the proposed weir site. Charnockite and hornblende biotite gneiss are the predominant rock type with intrusive of pink pegmatite and quartz vein. In general, the foliation in litho units swerves from N30°-55°W to S30°-55°E, dipping 65°-75° due NE. Besides, the strata's are transacted by 4 sets of prominent joints and 2 sets of random joints. In addition, about 1.5 m thick shear zone with 10-20 cm clay gouge materials play a pivotal role during the construction of tunnelling with the development of 7-9 m cavern formation over the crown, as a result delay in progress of the construction activities. Adverse geological features like shears with clay gouge and open joints filled with secondary materials were well in advance predicted and projected to the project authority for additional precautionary measures. However, due to delay in providing support measures during tunnelling caused heavy damages. The present paper deals with the tunnelling media and adverse geological features encountered during tunnelling with appropriate support measures, suggestion of soft rock tunnelling for poor rock mass, techno-economic and feasibility study for suggestion of an alternate weir for better progress of the project work.