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General overview and adverse geological conditions related to the presence of high water inflows and harmful gases (H_2S)

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ABSTRACT

The Nosud Lot 1B is a project for the construction of a water conveyance tunnel excavated with a Double Shield Universal TBM (Tunnel Boring Machine) and represents a part of a project in the Kermanshah province, which includes other tunnel lots currently excavated with Tunnel Boring Machine. The full conveyance tunnel will serve to transmit water from the Kermanshah Province to the semi-arid area in the south of Iran. The tunnel will divert about 36-50 m^3/s of water from the Hirvi Diversion Dam to the Sirvan River.

From the geological point of view the tunnel is in the core of the Zagros Mountains, formed at the boundary between the Arabian and Eurasian lithospheric plates. In response to the collision phenomena between the two plates and related tectonic stress an high fractured rock mass spring out, this characteristic added to the boring activity under the ground water load produce a constant inflow inside the tunnel with variable intensity depending to the local joint condition of the rock mass.

The tunnel is 9km long and is under construction by using a TBM with excavation Diameter of 6,12m. The tunnel is lined with precast concrete rings with honeycomb/hexagonal segments system. Since the beginning of the excavation adverse geological conditions were faced. Some of them present special characteristics mainly related to:

- High water inflow with the following consequences
  - Washing out of pea-gravel and lining segments instability
  - Flooding of the working places and damaging of components
  - Transport of fines and mud in the shield area with long debris removal activities and cleaning (invert segment area and telescopic area)
- Presence of toxic gases (mainly Hydrogen Sulphide H_2S) detected by the already equipped TBM and faced by the use of the appropriate ventilation system, procedures and special personnel safety equipment.