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## Safety Risk Assessment for Drill & Blast Tunnel Construction in Sri Lanka

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### ABSTRACT

Construction industry has been responsible for a significant amount of accidents, injuries and other safety related issues at work place, of which the consequences can be fatal or severe. Tunnel construction is one of the most advanced fields of subsurface constructions in the world. However, the tunnel construction works lead to serious safety challenges due to their semi enclosed environment. Hence, continuous improvement of safety provisions at tunnelling work is vital for preventing hazards. This research study is aimed at conducting a safety risk assessment for drill & blast tunnel construction which is the commonly used tunnelling method in Sri Lanka. Tunnel Construction in Broadlands Hydropower Project is taken as the main study area. A questionnaire survey is conducted with tunnel experts in order to identify the most critical hazardous events. It uses hazard severity and hazard likelihood rating categories developed for the drill & blast tunnelling method to come up with a risk score for each hazard. The risk score value for a hazardous event is calculated multiplying the hazard severity and hazard likelihood ratings. Based on the resultant risk score values, critical hazardous events are identified. Here 'being exposed to noxious dust' and 'direct spraying of concrete on eyes or skin' have been identified as critical hazardous events. A detailed risk assessment which specifically addresses what are sources/causes of the hazard, their preventive measures (prior to event), recovery measures (post- event) and the consequences is conducted and graphically represented using a Bow Tie diagram. A probabilistic risk assessment is also planned to conduct via Event Tree Analysis. Finally, using the Bow Tie and Event Tree analysis results, a set of recommendations are presented to develop a proactive safety culture in the drill & blast tunnel construction industry in Sri Lanka.

**Keywords:** *Bow Tie Method, Drill & Blast Method, Safety Risk Assessment, Tunnel Construction*