

Costs and benefits of reducing groundwater drawdown risks in tunnelling

Johanna Merisalu^a, Lars Rosen^a

Affiliation in format: ^aDepartment of Architecture and Civil engineering, Chalmers University of Technology, Gothenburg, Sweden, johanna.merisalu@chalmers.se.

With increasing global urbanization follows a land-use conflict which results in a higher demand for locating infrastructure such as roads and rails below the ground surface. However, construction below the ground surface and the groundwater table is often associated with groundwater leakage and decline in groundwater levels in surrounding aquifers. This subsequently results in a wide variety of risks to e.g., human health, buildings, infrastructure, and the environment and thus potential loss of services for human wellbeing. To reduce these risks, risk-mitigation measures can be implemented. There are both costs and benefits of internal (project owner) and external (all other affected stakeholders in society) character associated with implementing measures; benefits constitute the reduced risks of implementing the measure and costs constitute the implementation cost. To use society's limited resources in an efficient manner when implementing measures to reduce hydrogeological risks, these costs and benefits must be balanced. Cost-benefit analysis (CBA) is a widely used method for balancing risks by accounting for positive (i.e., benefits) and negative (i.e., costs) effects on human well-being on a societal level, including present and future generations. A CBA should include all internal and external costs and benefits for all affected stakeholders of implementing a measure. This implies that a thorough and comprehensive identification of cost and benefit items are of importance for the CBA to provide robust decision support. The aim of this contribution is to present two gross-lists of costs and benefit items associated with reducing groundwater drawdown risks in tunnelling. The applicability of the catalogues for identifying cost and benefit items are also exemplified with a case study constituting a railroad tunnel in Sweden.