UNIVERSITI TEKNOLOGI MARA

RISK MANAGEMENT PLAN FOR SLOPE REPAIR USING TERRALINK CONSTRUCTION METHOD ALLIGNING SUSTAINABLE ENVIRONMENT

MUHAMAD AFIQ AL – AMIN BIN MOHD KABRI

MSc

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ABSTRACT

Risk management plays a pivotal role in safeguarding the success and safety of construction projects, particularly for slope repair works involving innovative methods. In Malaysia, the Terralink Construction Method was the new method used for the slope repair project at Simpang Pulai-Blue Valley Road. However, there is no existing risk management plan for the Terralink Construction Method. Hence, this study focuses on the Terralink Construction Method, a newly adopted technique in Malaysia, and aims to develop a risk management plan for slope repair using the Terralink Construction Method. The research objectives include identifying hazards inherent to this method, analysing associated risks, and developing a risk management plan that aligns with regulatory directives under Arahan KPKR 29/2023. This directive emphasizes the necessity of detailed risk planning for tender projects. The current risk management plan for this project, developed prior to the application of the Terralink method, lacks the specificity required to address the unique challenges posed by this innovative technique, underscoring the importance of this study. Primary data were gathered through semi-structured interviews with key stakeholders, comprising representatives from the Public Works Department (PWD), contractors, consultants, as well as safety and environmental officers. This qualitative approach was complemented by the review of secondary sources, such as Occupational Safety and Health Administration (OSHA) reports and environmental assessments, to provide a broader perspective. The findings highlighted 42 hazards categorized into 8 main groups, including slope collapse risks from soil instability, underground water, and heavy rainfall, as well as machinery accidents, worker falls, unstable ground conditions, and procedural inefficiencies. Unique hazards, such as defective pressure hoses and vehicle toppling, further underscored the need for tailored safety measures. Mitigation strategies were developed to address these challenges, focusing on erosion control, early warning systems, regular machinery inspections, and proper workspace management. This study is highly significant as it contributes crucial knowledge to the field of construction risk management, especially for projects using the Terralink Construction Method in slope repair. By providing detailed and proven information on risk identification and mitigation, this research enhances understanding of how to effectively address risks associated with innovative construction techniques. It also supports sustainability in construction by optimizing the impact of risk management plans, aligning with RMK-12's advocacy for value management (VM) and promoting green, resilient infrastructure through sustainable methods, erosion control, and climate-resilient designs. Through this research, a comprehensive risk management plan was developed, emphasizing the importance of addressing overlapping risks while providing new insights specific to the Terralink Construction Method. The proposed plan offers a strategic framework to mitigate identified risks effectively, ensures compliance with regulatory standards, and enhances safety and efficiency. Furthermore, this research supports compliance with Arahan KPKR 29/2023, serving as a critical resource for government and industry stakeholders. It establishes a robust framework for sustainable project management, fostering a proactive approach to infrastructure development that conserves resources and promotes long-term resilience.

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Thank you.

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CHAPTER 1
BACKGROUND OF STUDY

1.1 Introduction

Landslides are frequent and widespread geohazards that cause casualties and alteration to properties (Reichenbach et al., 2018; Segoni et al., 2018; Gong et al., 2021). For lesson,many than 230,000 landslides know been reportable in mainland China from 2004 to 2019,exploit hundreds of deaths and a blunt scheme release of billions of U.S. dollars (NBSC,2019). As population growth accelerates and land resources become limited, human settlements are increasingly encroaching on mountainous areas prone to landslides (van Steijn, 1996; Van Den Eeckhaut et al., 2007; Gong et al., 2021). The negative impacts of human activities, combined with extreme weather events (Gariano and Guzzetti, 2016), may further increase the global risk of landslides (Nadim et al., 2006; Huggel et al., 2012).

Consequently, predicting and forecasting landslides has become a vital focus in applied earth science, aimed at reducing risks and enhancing disaster resilience. The evolution of a landslide from a stable state to an unstable state is a very complex geological, hydrological, and geotechnical process (Lacroix et al., 2020; Dille et al., 2022). The transition of a landslide from a state of stability to one of instability involves a highly intricate geological, hydrological, and geotechnical process, as noted by Lacroix et al. (2020) and Dille et al. (2022). The anticipation and projection of landslides have always been a crucial focus in the field of applied earth science, aiming to minimize risk and improve disaster preparedness.

Landslides are a serious geologic hazard common to many parts of the world. Globally, landslides cause billions of ringgits in property damage and thousands of deaths and injuries each year. In Malaysia, the earliest recorded landslide in Malaysia occurred on 7 December 1919 which claimed 12 lives (Jaapar A. R., 2006). From 1973 to 2007, some 440 landslides were reported. There have been slightly less than 600 deaths due to landslides in Malaysia since 1973(National Slope Master Plan 2009-2023). In addition, there are thousands more ‘unreported’ minor slope failures and landslides. Although Malaysia is not a precipitous country (Hills and mountains make up less than 25% of the total terrain.), slope failures and landslides have occurred