UNIVERSITI TEKNOLOGI MARA

SLOPE RISK ASSESSMENT USING GIS TECHNIQUE: STUDY AREA – SECTION U10 SHAH ALAM, SELANGOR

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CANDIDATE'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any other or qualification.

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ABSTRACT

There are many factors that cause slope failures such as rock mass discontinuities, weathering, mass stratification, water seepage, surface cover and erosion. The existing legislations and guidelines on residential development either on or near hilly terrain are defective to produce an acceptable and reasonable safety measures. The aim of this study is to innovate a georisk management system which is capable of mitigating risk to life and economic loss due to slope failures. The main objectives of this research are, firstly to identify and determine slope risk rating parameters. Secondly to produce georisk map for the selected site as case study and finally produce Real Time Georisk Slope Management System (RTG-SMS) using GIS technique. Most practitioners still prefer and are accustomed to conventional approach of slope stability analysis which is inadequate to guarantee zero risk to slope failure. A comprehensive literature study concluded that none of the previous studies in Malaysia focused on the consequences of the risk elements due to slope hazards such as residential areas and public roads. Therefore, this study proceed the alternative solution through three phases of methodologies: (i) literature review, (ii) produce georisk map, (iii) develop Real Time Georisk Slope Management System (RTG-SMS). This study focuses on the general physical of sedimentary ground formation and slope rating system approach modified from Slope Management and Risk Tracking (SMART). However, comparison studies with other slope rating systems do not constrain with this study. This study has also revealed that residents in Section U10, Shah Alam were almost exposed to slope failures. Through RTG-SMS, Section U10, Shah Alam requires further monitoring and proper slopes management bound to the residential area in the near future to prevent any loss of life and property damages. This study successfully proved that RTG-SMS is a useful system to be used for slope maintenance and suitable for engineers, planners, geologist and local authorities to determine the safety level of the slope. The system created also can be used to monitor the existing, current or future hilly terrain development areas which absolutely will benefit the local authorities as a decision maker supporter to approve any future hilly terrain developments that have been proposed.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Nowadays, development on hilly terrains is being gazette as way of a life style in urban area. However, public tend to be subjected to safety and risk of geohazard related to slope failure. Slope failure is commonly triggered by natural environment causes such as rain, flood and loss of vegetation due to wildlife or by human activities (i.e. terrain cutting and filling, grading, irrigation, septic system and changes in drainage) (Westen, 1994).

Residential area development near or on hilly terrains most likely is subjected to high risk to slope failure hazards especially to the loss of lives and economic lost. The urban development near or on hilly terrains requires sound knowledge and experience on slope engineering in order to mitigate and ensure public safety. To quantify the prime parameters such as site topography, geology, rock to soil mass characteristic and ground water condition are the challenges. Besides that, climate change is reported as one of the factors, which has been a norm during the monsoon weather. Scientifically, it is reported that such failure is due to strength deterioration of rock or soil mass from continuous rainfall (Floris & Bozzano, 2007; Tohari & Rahardjo, 2006).

Malaysia has advanced her physical infrastructure development from near to on highland for the past 20 years due to depleted flat land especially in Klang Valley. Table 1.1 shows the reported slope failure incidences in some states in Malaysia. The state of Penang, Pahang, Perak, Selangor, Sarawak, Sabah, Johor and Kuala Lumpur