

**UNIVERSITI TEKNOLOGI MARA**

**DEVELOPMENT OF EROSION  
INDUCED LANDSLIDES  
NOMOGRAPH**

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of the requirements for the degree of  
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## AUTHOR'S DECLARATION

I certify that this thesis and the research entitled “Development of erosion induced landslide nomograph” is the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

Erosion induced landslide is one of the important factor that contribute landslides process and is the most serious geological hazard in many part in the world. Previous landslides tragedy caused billions of money in property damage and thousands of deaths and injuries each year. The negligence of erosion induced landslide as one of the factors governing landslides need to be considered thoroughly. From this problem, the objectives of this research are to establish the erosion induced landslide nomograph and landslide risk level based on nomograph in predicting erosion induced landslide. In this research ,the development of erosion induced landslide risk level nomograph which involve on six factors of Universal Soil Loss Equation (USLE) are performed by data collection and soil sampling from 25 slope which are at Shah Alam and Puncak Alam, Selangor, Ulu Kelang, Ampang Selangor, Cameron Highland, Pahang and Hulu Langat Selangor. The information from the selected slope with regard to soil erodibility, rainfall erosivity index, slope steepness , slope length, cover management and management practices are analyzed to risk level nomograph. All of the factor will be total up in percentage and contributing to the development of the erosion induced landslide risk level nomograph thus producing the landslide risk level. The outcome of this research will help the agencies such as Public Works Department Malaysia ( Slope Branch), Lembaga Lebuh Raya and local authority with new method in predicting with greater accuracy future erosion induced landslide risk level nomograph can be made known easier for citizens.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUNDS

Landslides in Malaysia are serious geologic hazard common to many parts of the world and globally, Landslides has caused billions of ringgits in property damage and thousands of deaths and injuries each year. Most cases in Malaysia involve hillsides areas such as at Precinct 9, Putrajaya in 1997, Bukit Antarabangsa Tragedy in 2008, Sungai Ruil, Cameron Highlands 2011 , Puncak Setiawangsa 2012 and the latest at Puchong, Selangor 2013 stated from Wikipedia Encyclopedia Website based on landslides in Malaysia.

In addition, Majority causes of landslides in Malaysia is due to deforestation and to uncontained development of hill slope areas. There were some instances where the development projects at hill sites were abandoned for a considerable period, affecting the maintenance of the slopes which could cause landslides. Federal government need to take immediate action and plan to help preventing landslides problems in Malaysia. Such actions include in order to prevent landslide by the construction of the retaining wall, plant more trees along hillsides and make sure to build houses on firm ground.

Malamud et al. (2004) stated that erosion based on event and historical landslide inventories are concentrated which can be defined as the area over landslides and erosion in area is dominated by landslide can be assumed.

Roslan (2009) stated that “erosion induced landslide poses enormous threats and over the past years as well as the present scenario has caused severe damages”. In engineering scope, he also stated that the soil erosion includes the process of detachment of soil particles from soil mass can be caused by rainfall erosivity.