UNIVERSITI TEKNOLOGI MARA

ABILITY AND AN APTNESS GPR FOR COASTAL LAND DESCRIPTION AT KUALA PERLIS

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ABSTRACT

Ground Penetrating Radar (GPR) has been used in a wide range of applications including soil layer thickness measurements and concrete inspections. To conduct a GPR investigation, an electromagnetic microwave is emitted into the matter under inquiry. Objects with differing dielectric characteristics than the medium being studied will reflect the waves and be picked up by the receivers built into the antenna. Malaysia is about 329,293 km square land. As a whole, the coast is about 4,809 km long. There is a lot of social and economic value in Malaysia's coastal area. Most of the people live in this area, and it is the centre of business. This research is to examine the ability and aptness of the GPR to extract the underground data at Kuala Perlis. The main objective is to explore the underground data at Kuala Perlis using GPR. The final output is the 2D image of the underground in the coastal area. The result of ground truth data is process by using Reflex W software and the coordinates was collected. The data after being processed will digitize and the sediment and underground materials was analysed. The diffraction hyperbola was used and the calculation for dielectric constant have been performed to make sure the types of earth materials known.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Ground Penetrating Radar (GPR) is a non-destructive and quick geophysical technique that works by broadcasting electromagnetic waves from an antenna and receiving reflections from buried layers and objects in the ground.

GPR is utilised by a wide range of service providers, including agronomists, archaeologists, criminologists, engineers, environmental experts, foresters, geologists, geophysicists, hydrologists, land use managers, and soil scientists. It has been increasingly popular in recent years to use GPR in the search for terrorists and military threats. GPR service providers are frequently concerned about the technology's ability to reach the appropriate depth of penetration in the soils of a project site. Due to high rates of signal attenuation in many soils, GPR cannot be used for many applications that need significant penetration depths. It is impossible to use GPR in saline soils, where penetration depths of less than 10 inches are common. GPR has limited potential in wet clays, where penetration depths are often less than 40 inches (Doolittle et al., 2007). Most applications in dry sands and gravels are well suited to GPR, where penetration depths of up to 160 feet are possible with low-frequency antennas.

Coastal locations have a higher population density and economic importance than normal, and as the world's population expands, so will human activity along the beaches (Neumann et al., 2015). As a result, many sections of the world's coastline development must struggle with the hazard of storms and tsunamis(Switzer et al., 2014). Numerous recent coastal disasters, including the 2011 Tohoku Tsunami, the 2004 Indian Ocean Tsunami, Hurricane Katrina (2005), Cyclone Nargis (2008), Typhoon Haiyan (2013), and the 2018 Sulawesi Tsunami, have demonstrated that coastal hazards can result in large-scale catastrophic coastal change, resulting in the loss of human life and significant infrastructure damage. As sea levels rise, coastal