

**INVESTIGATION ON THE POTENTIAL  
APPLICATION OF HYBRID ALUM  
SLUDGE AND NON-BIODEGRADABLE  
PLASTIC WASTE (FOOD PLASTIC  
PACKAGING) AS AN ALTERNATIVE  
MATERIALS IN SUSTAINABLE  
LANDFILL INFRASTRUCTURE MODEL**

By

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This report is submitted as a  
partial requirement for the degree of  
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## AUTHOR'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 results 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 degree or qualification.

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

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## ABSTARCT

The abundance of Alum Sludge (AS) has been directed to the reduction of storage capacity for keeping of waste, as well as the increment of Non-Biodegradable Plastic Waste (N-BPW) in the landfill is reflected to the limited spaces, thus require more spaces to be constructed. In addition, the uncontrolled waste dumping into the landfill caused environmental problem. However, clay liner, which used as the conventional final impoundment is depleting and a high in cost. Therefore, AS and N-BPW (FPP) need to be recycled and reused to reduce the burden in the landfill and environmental problem such as contaminant of underground soil by leachate. In this study, hybrid AS and N-BPW (FPP) were investigates on the potential as a sustainable landfill liner materials in term of its ability to react toward some pollutants. The hybrid models was prepared in a ratio of 2:3:2 (AS:KC:Mixed AS and KC). In this study, N- BPW (FPP) is fabricated using the application of hot pressing method. N-BPW (FPP) Liner were fabricated in term of two thickness namely 2mm and 5mm. In this research, AS and N-BPW (FPP) Liner were investigated and compared with the conventional geomembrane and kaolin clay (KC) in terms of physical, chemical and geotechnical characteristics. Finding shows that N- BPW (FPP) liner have high tensile strength which is 488.011 N and 1724.07 N respectively, while geomembrane only reaches 230.598 N. N-BPW (FPP) have 70% similarity of chemical composition to geomembrane. The AS and KC have high permeability value which is  $4.79 \times 10^{-6}$  m/s and  $3.94 \times 10^{-7}$  m/s. Moreover, the concentration of TSS shows the reduction value when subjected to the hybrid AS and N- BPW (FPP) as an adsorption media. Obtained result shows that the proposed AS and N- BPW (FPP) liner can be used as an alternative materials for landfill.

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