

THE IMPACT OF ROAD PAVEMENT ON URBAN HEAT ISLAND (UHI) PHENOMENON

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ABSTRACT

An urban heat island (UHI) is a climatic phenomenon caused by modifications to the climate due to changes in the form and composition of the land surface and atmosphere. The aim of this study is to investigate the impact of road pavement types for mitigating or intensifying UHI. This study was conducted in the Kota Samarahan area. Since Kota Samarahan is classified as a suburban area, it is still a developing district. Hence, there is still an opportunity for proper planning, such as choosing the most suitable type of pavement, before this area becomes a UHI. Data was collected by studying four types of pavements (asphalt, concrete, permeable, and industrialised building system (IBS) StormPav) in terms of their characteristics, performance, and maintenance costs. Additionally, their surface temperatures were investigated using ThermaCam and then plotted against the surrounding air temperature. Interview sessions were also conducted with the personnel of Jabatan Kerja Raya to obtain valuable information for this research. As a result, this study found that the construction of asphalt pavement can produce numerous potential impacts on the environment, which further contribute to air pollution and the UHI effect. Concrete, permeable, and IBS StormPav pavements retained less heat compared to asphalt, and can be implemented to mitigate the UHI phenomenon. Furthermore, the implementation of green walls, cool roofs, vegetation and trees, and altering the properties and construction of asphalt pavement can help in mitigating this phenomenon.

Keywords: Air temperature; Pavement; Surface temperature; Urban heat island (UHI)

1. INTRODUCTION

The phenomenon known as an urban heat island (UHI) often forms in urban and suburban areas where the surface temperature and air are hotter than the rural surroundings. A heat island is also known as a reverse oasis. This phenomenon has been found in many cities worldwide and is growing. In 1818, Luke Howard's study of London's climate was the first documented UHI (Gartland, 2012). He found that the city had artificial heat in comparison to the country. Similar discoveries were made by Emilien Renou about Paris during the second half of the 19th century.

This phenomenon is seen as a negative factor in thermal comfort. The UHI phenomenon is

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