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RAINWATER HARVESTING SITE IN KUANTAN, PAHANG

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**HYDROLOGY STUDY TO IDENTIFY POTENTIAL RAINWATER HARVESTING  
SITE IN KUANTAN, PAHANG**

**NORSHILAH BINTI TAMBI CHIK**

**Report submitted in partial fulfillment of the requirements for the award of the degree of  
B.Eng (Hons) Civil Engineering**

**Faculty of Civil Engineering and Earth Resources  
UNIVERSITI MALAYSIA PAHANG**

**JUNE 2016**

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**HYDROLOGY STUDY TO IDENTIFY POTENTIAL RAINWATER HARVESTING  
SITE IN KUANTAN, PAHANG**

**NORSHILAH BINTI TAMBI CHIK**

**Report submitted in partial fulfillment of the requirements for the award of the degree of  
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## ABSTRACT

This research describes experimental studies on the collected data in order to identify the potential site for rainwater harvesting in Kuantan. The collected data be used for research and planning the activities. The rainfall data are collected from Jabatan Pengairan dan Saliran, JPS is used to analysis and calculate the average monthly rainfall for 14 Rainfall Hydrology Station in Kuantan with 7 years duration to get the highest value of rainfall. The Hydrology Station with Station that had highest total rainfall after the analysis are be choose refer to the Hydrology Station in MSMA2. The function of the Hydrology Station is to calculate the Rainfall Intensity of the location with the highest total value of rainfall. Location with highest total rainfall value can be potential to be rainwater harvesting site because it will give a good benefit which is the function of rainwater harvesting its self can help and give various good functions for example, collect, storage and reuse the rainfall for daily life. On the other hand it can help to avoid or reduce flood phenomena at each place that tend to get high total rainfall for every year. Therefore, from the rainfall data analysis, Station Hydrology 3930012 at Sungai Lembing PCCL MILL were choose as the potential area for Rainwater Harvesting this is because Sungai Lembing PCCI MILL has the highest total rainfall compare to the other thirteen Hydrology Station with total rainfall value of 7 years duration 20790.0mm/day.

## ABSTRAK

Kajian ini menerangkan kajian eksperimen pada data yang dikumpul untuk mengenal pasti tapak yang berpotensi untuk penuaian air hujan di Kuantan. Data yang dikumpul akan digunakan untuk penyelidikan dan untuk merancang beberapa aktiviti yang berkaitan. Data hujan dikumpul daripada Jabatan Pengairan dan Saliran, JPS digunakan untuk analisis dan mengira purata jumlah hujan bulanan selama 14 hujan Stesen Hidrologi di Kuantan dengan tempoh selama 7 tahun untuk mendapatkan nilai tertinggi hujan turun. Selain itu, Hidrologi Station yang terdekat dengan Station yang mempunyai paling tinggi jumlah hujan selepas analisis dipilih sebagai Stesen Hidrologi sebagai rujukan berpandukan MSMA2. Fungsi Stesen Hidrologi yang terdekat adalah untuk mengira keamatan hujan bagi lokasi dengan jumlah nilai tertinggi hujan turun. Lokasi dengan nilai hujan tertinggi boleh menjadi potensi untuk menjadi tapak penuaian air hujan kerana ia akan memberi manfaat yang baik yang merupakan fungsi penuaian air hujan itu sendiri yang boleh membantu dan memberi pelbagai fungsi yang baik sebagai contoh, mengumpul, menyimpan dan menggunakan semula hujan untuk kehidupan seharian . Sebaliknya ia boleh membantu untuk mengelakkan atau mengurangkan fenomena banjir di setiap tempat yang cenderung untuk mendapatkan jumlah hujan yang tinggi untuk setiap tahun. Oleh itu, daripada analisis data hujan, Stesen Hidrologi 3930012 di Sungai Lembing PCCL MILL dipilih sebagai kawasan yang berpotensi untuk Pengumpulan Air Hujan ini adalah kerana Sungai Lembing PCCL MILL mempunyai jumlah hujan yang paling tinggi berbanding dengan tiga belas Hidrologi Station yang lain.

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND OF STUDY**

Water is important in all aspect such as transportation, irrigation in agriculture, domestic consumption and for other use purpose. The availability of water in any area is come from rainfall or precipitations. Rainwater harvesting is a technology used for collecting and storing rainwater from rooftops, the land surface or rock catchments using simple techniques such as jars and pots as well as more complex techniques such as underground check dams (Kumar et al., 2014).

Rainwater harvesting can be used for landscape irrigation, cleaning and washing, source of drinking water supply in rural areas and other uses. The hydrologic cycle is a conceptual model that described the storage and movement of water between the biosphere, atmosphere, lithosphere, and the hydrosphere. Water on our planet can be stored in any one of the following major reservoirs such as atmosphere, oceans, lakes, rivers, soils, glaciers, snowfields, and groundwater.

Water moves from one reservoir to another to another by way of processes like evaporation, condensation, precipitation, deposition, runoff, infiltration, sublimation,

transpiration, melting, and groundwater flow. From this evaporated water, only 91% of it is returned to the ocean basins by way of precipitation. The remaining 9% is transported to areas over landmasses where climatological factors induce the formation of precipitation over land and ocean is corrected by runoff and ground water flow to the oceans (Website The Encyclopedia of Earth, <http://www.eoearth.org/view/article>).

Kuantan is the place with 36,000 km<sup>2</sup> immensity (Website Wikipedia, <https://ms.wikipedia.org/wiki/Kuantan>). Kuantan is one of the places that tend to get flood because the amount of rainwater for every year are mostly high, this is shown from the rainfall data information. Therefore, from the rainwater harvesting research, it is can help to reduce the flood problem become worse at Kuantan. Then, caution step and data need to involved must been complete and enough to evaluate the information. Moreover, if the place with high amount of rainwater a year, it is suitable for applied and know the catchment area that has a potential to been a good area with use collection device and the conveyance system for rainwater harvesting.

Kuantan river flows from Hutan Simpan Reman Cereh to Kuantan City before discharge into South China Sea, then four main tributaries discharge into downstream of Kuantan River namely Soi River, Belat River, Pandan River and Pinang River. About 488,409 population of Kuantan by the year 2015, the population living in urban areas has increased to 60% of the population due to the new urban areas and extension of existing administrative (Hui et.al, 2015). Meanwhile, on 2013 and 2014, floods have occurred in Kuantan, is caused by several factors, namely drain that's been made specifically form emergency cases such as flash flood have been blocked and the other factor is there is not enough area that applied rainwater harvesting system. Therefore, it is important to search the potential and capability area to apply this effective system.

## **1.2 PROBLEM STATEMENT**

It is need to collect some of data to search and observe the effective area with high rainfall value to apply a good system which is rainwater harvesting system to reduce the risk of severe flooding. Besides that, rainwater harvesting system, it will provided effective technology to reuse or recycle the rainwater for example it can use agriculture process, washing and cleaning. From that, it can save water, environmentally friendly and the water got is from natural resources without any high cost.

## **1.3 RESEARCH OBJECTIVES**

- i. The main objective is hydrology study to identify potential site for rainwater harvesting in Kuantan, Pahang.
- ii. In order to achieve this objective there are specific objective as follow:
  - a. To analysis the hydrological data at Kuantan catchment.
  - b. To identify the potential site for rainwater harvesting at Kuantan.

## **1.4 SCOPES OF STUDY**

- i. This study will focus to collect and analysis rainfall data from Jabatan Pengairan Malaysia, JPS for 7 years duration from year 2008-2014.
- ii. The rainfall intensity for selected station will be calculated by using MASMA 2<sup>nd</sup> Edition.

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