INVESTIGATION ... OINTS OF MAIN DRAIN FOR TAMAN DESA DARUL NAIM, PASIR TUMBOH

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LIST OF ABBREVIATION & SYMBOL

JPS	:	Jabatan Pengairan Dan Saliran
MPKB	:	Majlis Perbandaran Kota Bharu
I	:	Rainfall Intensity
ARI	:	Average Recurrence Interval
Pd	:	Rainfall Depth
FD	:	Adjustment Factor For Storm Duration
R	:	Average Return Interval (Years)
t	:	Duration

ABSTRACT

Flood disaster is the most problems that always happen in Kelantan, and the situation is commonly happened with monsoon seasons and with occurrence of flash flood. The same situation occured at Taman Desa Darul Naim , where the area that are impact by adjacent development and this caused shortage of land surface area that naturally use to absorb the rain water . Drains were built to collect and channel the surface run off to the main drain which eventually will discharge volume of water to nearby stream. This study will investigate the potential flash flood problem for the study area by using the rainfall data of Kelantan, and the capacity of drain to accommodate the volume of rain water using MASMA. If the main drain are not having enough adequate capacity to accommodate the volume of water, new drain need to be designed using rational method

ABSTRAK

Bencana banjir adalah masalah yang sentiasa berlaku di Kelantan, dan keadaan yang biasanya berlaku dengan musim tengkujuh dan dengan berlakunya banjir kilat. Keadaan yang sama berlaku di Taman Desa Darul Naim, di mana kawasan yang kesan oleh pembangunan bersebelahan dan ini menyebabkan kawasan permukaan tanah yang digunakan untuk menyerap air hujan berkurangan. Longkang telah dibina untuk mengumpul dan menyalurkan larian permukaan ke saliran utama yang akhirnya akan melepaskan isipadu air ke sungai berdekatan. Kajian ini akan menyiasat masalah banjir kilat yang berpotensi untuk kawasan kajian dengan menggunakan data hujan di Kelantan, dan kapasiti parit untuk menampung jumlah air hujan menggunakan MASMA. Jika parit utama tidak mempunyai kapasiti yang mencukupi untuk menampung jumlah air, parit baru perlu direka bentuk dengan menggunakan kaedah rational.

CHAPTER 1

INTRODUCTION

1.1 Research Background

Flood is a condition where the wide area is filled with waters. This condition occurs when an area is facing with non-stop heavy rain. Malaysia is a one of the countries that always facing with this flood problem. It maybe happens because of its position in the equatorial region. As usual, at the monsoon season, Malaysia is always faced with flood problems; there are several countries in Malaysia that always facing with this problem is Terengganu, Kelantan, Pahang, Johor, Sabah and Sarawak. And for the flash flood, it's always happened at urban area and developing urban. Perlis, Kedah, Pulau Pinang, Perak, Selangor, Negeri Sembilan, Melaka and also Wilayah Persekutuan Kuala Lumpur are those examples. Frequency of flood that always happened and factor of erosion of the river because of human action that can make the rivers became shallow, this the main factor why the river not to accommodate the rainwater and then can cause the water will spill out from the river.

Sungai Pengkalan Datu is located near the Pasir Tumbuh. The residential areas around the Taman Desa Darul Naim, Pasir Tumbuh Kelantan, are facing the flood disaster just because of its location. It's located in the valley. Bull 2004, say that, the main factor for the flood occurs is because of the location of the village that located in the valley, the flow of water from the high area will flow to the lower area. And then will submerge the land area. These phenomena are becoming worse with the increasing of developing around the flood location.

Every year, the floods will bring a lot of adverse effect, a lot of damage, and the danger of the flooding is that can cause death. Many cost is needed to accommodate the flood victims needed and for repairing all the damage that caused by flood. To find the safe place to evacuate the flood victims. This also can destroy all the plants and animals. Discharge - The discharge of a stream is the amount of water passing any point in a given time.

$$Q = A \times V$$

Discharge (m^3/Sec) = Cross-sectional Area [width x average depth] (m2) x Average Velocity (m/Sec).

As the amount of water in drains increases, the drain must adjust its velocity and cross sectional area in order to form a balance. Discharge increases as more water is added through rainfall, tributary drains, or from groundwater seeping into the drain. As discharge increases, generally width, depth, and velocity of the drains also increase.

1.2 Problem Statement

In Malaysia, flooding is always occurring, there are two categories of flood that happened in Malaysia, which is flash flood and monsoon flood. According to Jabatan Meteorology, 2011, the cold air as a result of high pressure that forms over Siberia and Northern China have reached at Peninsula's Eastern Coast has resulted in conviction and it caused heavy rainfall in the East Cost of Peninsula and because of the east winds the sea level rose and the wave ups to 3.5 meters along the east coast such as Kelantan, Terengganu and Pahang. The figure 1.1 and figure 1.2 Show the residential area before and after the project.

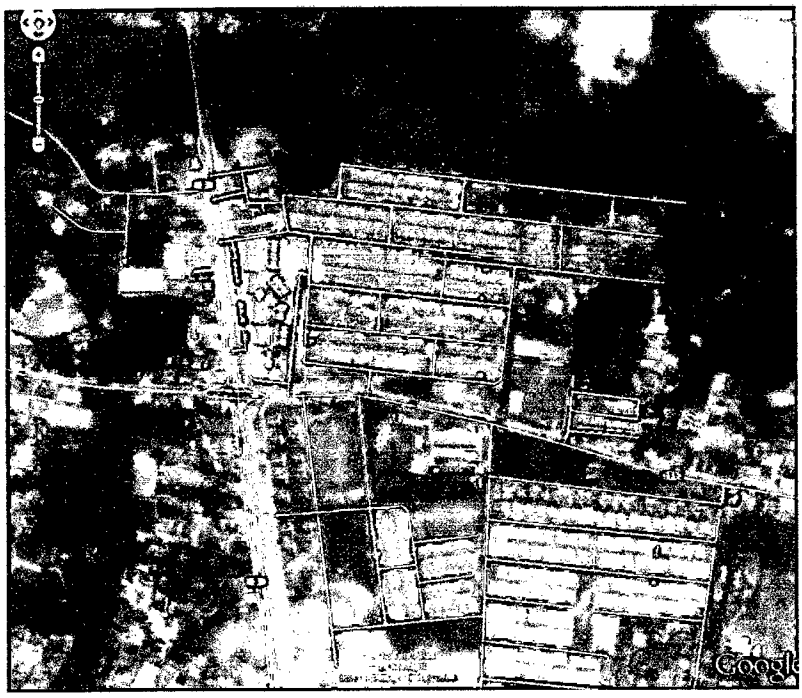

Figure 1.1 Residential area before the project developed

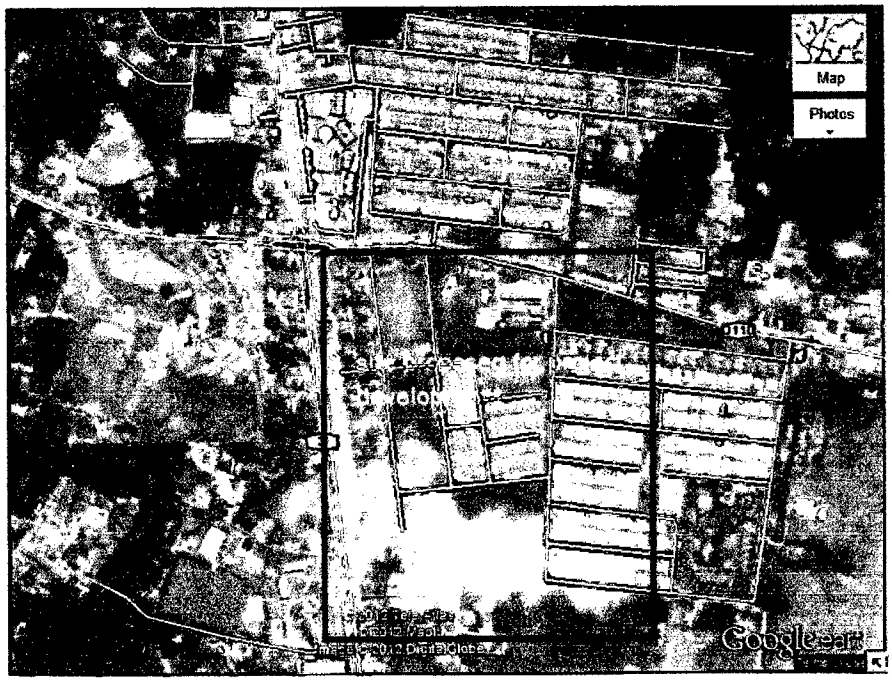

Figure 1.2 Site proposed for project development

The Pengkalan Datu River at Pasir Tumbuh is not going to accommodate the water when the heavy rain occurs. The river location is situated in a vantage position in the low lying areas and can cause water from the high lying area prefer to run into the river and will cause flooding. In addition, that area is developing, more building are built in that area, then a lot of soil around the development area was in plasters. This situation would worsen the situation in that area. In addition, the drainage systems are not properly maintenance and to be upgraded parallel with the increase in development. The drainage system is very important in order to avoid the water from flooding in that area. The drain should be designed to be provide enough capacity to keep large volume of water as stated by Norrudin and Borrudin, 2009, as the land which are previously used to absorb the rainwater has been in plaster, this situation can cause the rain water flow to the river and thus will cause the river rose more than usual and it difficult to accommodate the water and this can cause water to overflow and flooded areas. This situation would be a danger to the resident.

In other of the increasing of the population in the study are will bring effect of increased solid waste. As we know, waste is one of the factors that the flash flood occurs. In addition, this study area is in transition to be developed as new residential growth area. However it is located in a flat terrain zone with a low velocity drainage system which may be blocked by domestic wastes that eventually may cause flash flood such as recently happened in Kajang.

1.3 Research Objective

The objectives of this study are:

1.1.1 To investigate the potential flash flood problem by using rainfall data.
1.1.2 To analyze the factor that can caused of overflow in Pasir Tumbuh, Kelantan.

1.4 Scope Of Research

The scopes of this research are focusing on:

1.3.1 To study the main drain in Taman Desa Darul Naim.

1.3.2 To investigate the effect of the rainfall that can contribute to the overflow.

1.3.3 To analyze the maximum drain capacity and the effect of the development.

1.3.4 To analyze the effect of problem drainage to the water flow.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction of flood

The flood is the situation when the water overflows and submerged the land. That always happens after the heavy rain. In Malaysia there are two types of floods are always happening. There are flash flood and monsoon flood. Flood are among the most frequent and costly natural disasters in terms of human hardship and economic loss (American Red Cross). In geological perspective, the flood was the disaster that occurred as a result of environmental trends changing and flood are expected to occur as long as the water cycle continues to run (Nelson, 2011). Bangladesh is one of the country that always facing with flood disaster , is about one half of that country's land, is at an elevation less than 8 meters above the sea level and is about 200,000 of deaths are recorded in 1991 because of that disaster and associated tropical cyclones (Nelson, 2011).

From a geological perspective, floods are natural consequences of stream flow in a continually changing environment streams receive most of their water input from precipitation, and the amount of precipitation falling in any given drainage basin varies from day to day, year to year, and century to century. (Nelson, 2011).

2.2 Flash Flood

Flash flood is happened by excessive rainstorm in short period of time (less than 6 hours) and could lead to river water rising rapidly (Noorazuan *et al.*, 2011). There are several factors that can contribute the flash flood, such as the intensity the rate of rainfall, duration of the rainfall rate, topography, soil conditions and ground cover that as an important role duration of the rainfall (National Oceanic and Atmospheric Administration., 1992). As reported by Berita Harian, 2011, Kuala Lumpur, after rainstorm about one hour, a few places in around capital city Kuala Lumpur flooded because of water rise to 0.5 meters high and lead to road congestion.

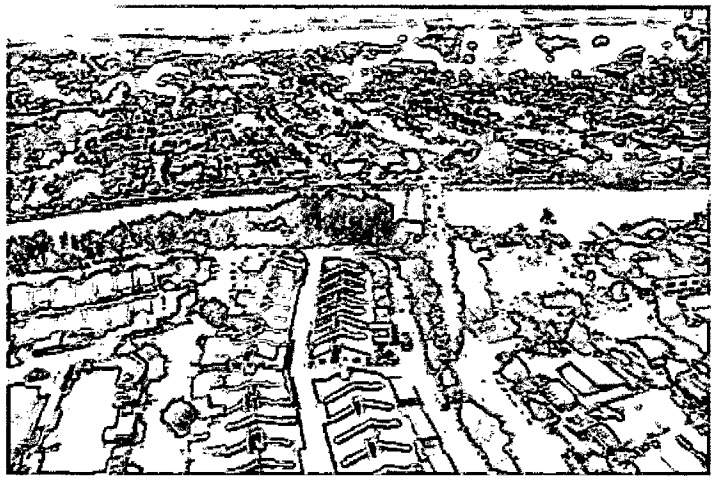

Figure 2.1 Flood causes by developed area

Figure 2.1 shows that the flood caused by the uncontrolled development area. Flash flood is also occurring because of human action changed environment with development that cause soil surface condition change from water permeable became impermeable (Haliza Abdul Rahman, 2007).

2.3 Type of Drainage

Water flowing from the roof and from the streets as a result of rainfall will carry the water to flow into drains, streams and then drain it into the sea. From here we can see that how drainage is very important especially during the rainy season. Most significantly in the developing city to avoid flash floods, as most of the lands in the pavement and cause stagnant rain water because it can't be absorbed by the soil. The drainage system is important to carry water from the street to the rivers and from the river to the ocean .This system is designed to avoid the water.
There four types of drainage systems:

2.3.1 Drainage Basin and Divides

Drainage systems developed in such a way to efficiently remove water from the soil. Each flow in the drainage ditches certain areas, known as drainage basins. In a drainage basin, all water that falls in the basin drains into the same stream. Drainage basins can range in size from a few km2, a small river, a very large area. The gap separates each drainage basin from other drainage basins (Nelson, 2011).

2.3.2 Stream order

The smallest flow in the drainage network has no tributary flow. This is known as first-order flow. Two first order flow together to form a second-order flow. Second-order flow has only first-order flow as a stream. Third order flow has only the second and first order flow as a stream, and so on. As orders increased current, the increase in emissions, the slope decreases, the velocity increases, and the channel dimensions (width and depth) increase to accommodate the increased discharge (Nelson, 2011).

2.3.3 Drainage Patterns

Drainages tend to develop along zones where rock type and structure of the most prone to erosion. Therefore, various types of drainage patterns in the region and these drainage patterns reflect the structure of the rock (Nelson, 2011).

2.3.4 Continental divide

Continent can be divided into large drainage basins that empty into different ocean basins. The lines that separate the major drainage basins called the Continental Divide. Any split is usually carried out along the high mountain peaks formed recently enough that they are not eroded. Thus major continental divides and drainage patterns in the major basins reflect the recent history of geological continents (Nelson, 2011).

2.3.5 Increased Of Drainage Capacity

Size drainage will affect the water flow, when the capacity of drainage was increased, the water will flow smoothly. The figure below shows the size of drainage that can affect the water flow

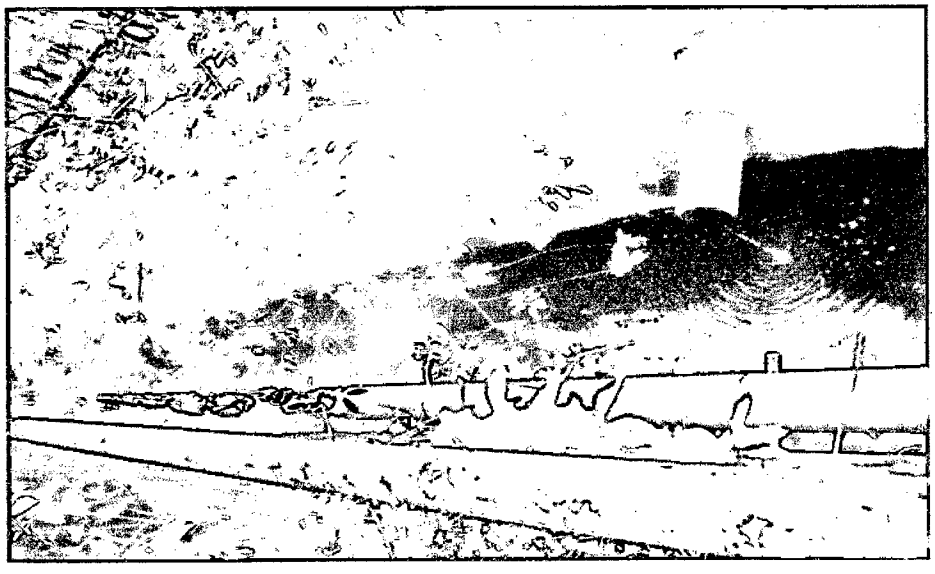

Figure 2.2 Size of drainage can affect the water flow

2.3.6 Soil Water Storage.

Soil water storage is important to accommodate the water. The peak flows were influenced by the types of soils. Surface water soils, such as clays. Which have only a small volume of easily drained pore spaces may increase peak flows (M. Robinson, 1990). In permeable soil, lowering the water table increases the temporary storage capacity of horizon above the water table, also means the lateral water movement takes place through deeper horizons and probably at a slower rate on balances the overall should be to reduce peak flows (M. Robinson, 1990). Impermeable soil as ones where research was necessary particularly where secondary treatment was used (M. Robinson, 1990).

2.3.7 Size And Duration Rainfall

The size and duration of rainfall can influence the capacity of the drainage. When the non-stop raining was occurring, the capacity of water in the drainage is increased immediately. Increasing amount of water will increase the water flow, but if the capacity of drainage is not sufficient to accommodate the water from rain, it will cause the overflows. The effect of soil storage is great at taking care of the runoff from summer or early autumn storms after the soil has been thoroughly dried out, but it may be much less with respect to late winter and early spring flood flows (M. Robinson, 1990).

2.4 Development Area

The drainage system is related to the development. When the area was developed, it will cause the several problems such as, it can decrease the land surface that contributes to the reduction of water absorption of the land surface. This situation can effect to the:

- Drainage capacity will decrease.
- Availability soil water storage capacity will decrease
- To the storm characteristics and antecedent condition will effected.

2.4 Waste Management

The increasing of the population in Kelantan will bring the effect of increased solid waste. We need to find a method to solving this problem, to avoid it becoming worse. As we known here, waste management is not properly managed will give a big impact because it will cause effects on soil pollution. A management measure is essential to avoid this problem led to the contamination. The removal garbage in everywhere and the river will cause water pollution and will lead to more serious problems that blocked drainage and can cause flash flooding. As we known, this situation is always happening in the village, where no rubbish bins provided in the village, so they are using the approach by gathering the garbage in one place in their home areas for the purpose of burning the garbage. They used to burn all the rubbish to avoid it becomes a lot. And sometimes they find an easy ways by throwing it in the river. The solid waste like a plastics, tires, polystyrene, words are included in the type of an organic waste. These types of waste are not easy to degradable. It will cause problems to the river if the waste is placed in the river. The wastes will block the water flow in the drain. In another way to solve this problem to avoid it become worst is by making a campaign to recycle the waste in the village. Figure 2.3 and 2.4 shows the examples of clogged drain in the study area.

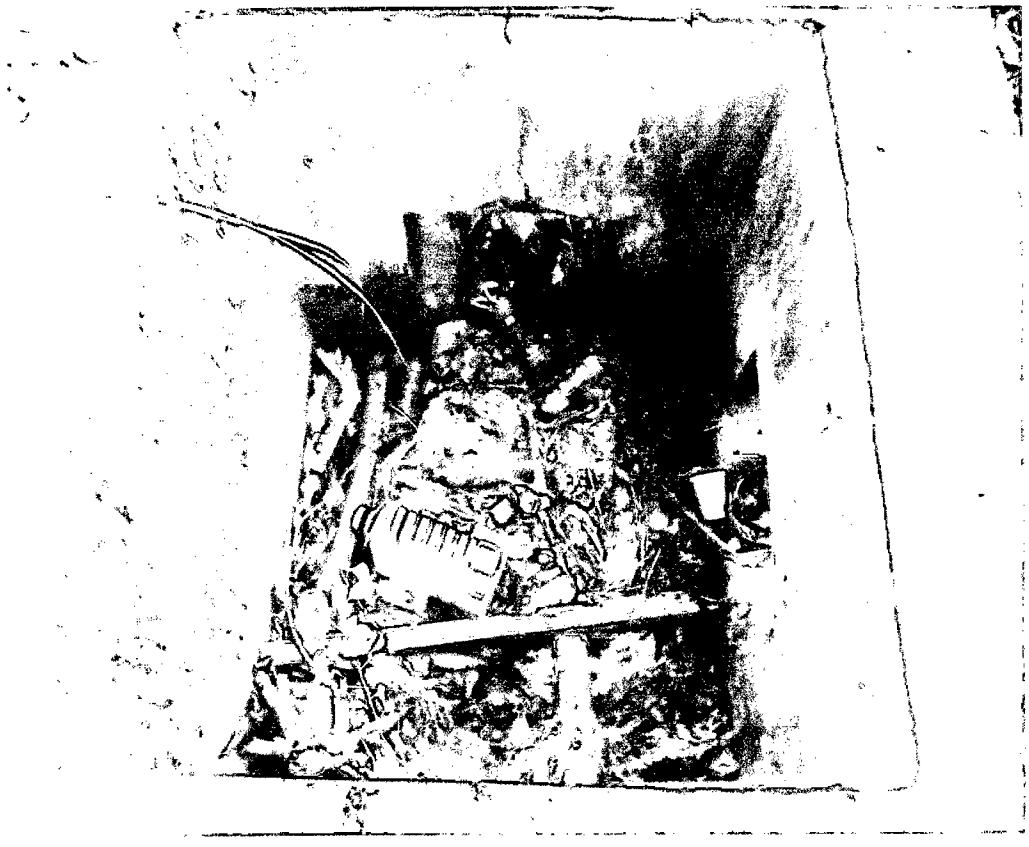

Figure 2.3 Waste by the residents that can block the water flow

Figure 2.4 The condition of main drain with the waste

CHAPTER 3

METHODOLOGY

3.1 Introduction

This study is about to propose the solution to flood disaster by using waste recycling as a costless approach to prevent flash flood in Pasir Tumboh Kelantan. This is considered the number of residential and the estimating the water flow velocity the river in the study area.

3.2 Flow Chart of Study

Based on the Figure 3.1 below; this study starts with literature review and research about the title. The tasks have been done through research on the interview, internet, books, journals and other sources. After all relevant information is found, the project undergoes by collecting data to determine find the developing areas that involve the flooding in the study area. Next, is studying about drainage systems for estimating water flow velocity and do the research in the problem area. Figure 3.1 and 3.2 outlines the flow chart of the methodology.

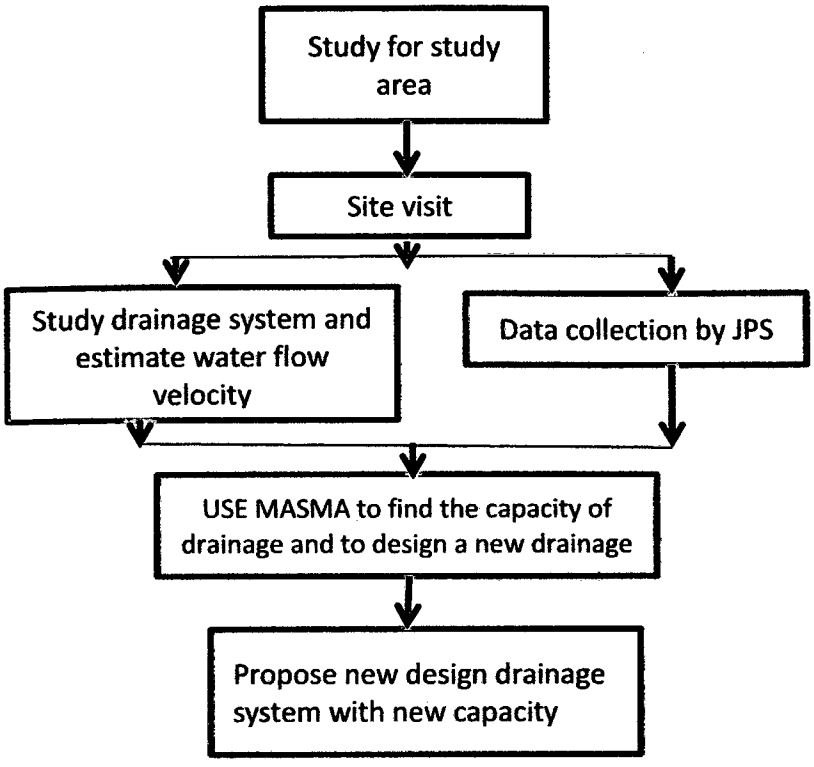

Figure 3.1 Flow chart study drainage system.

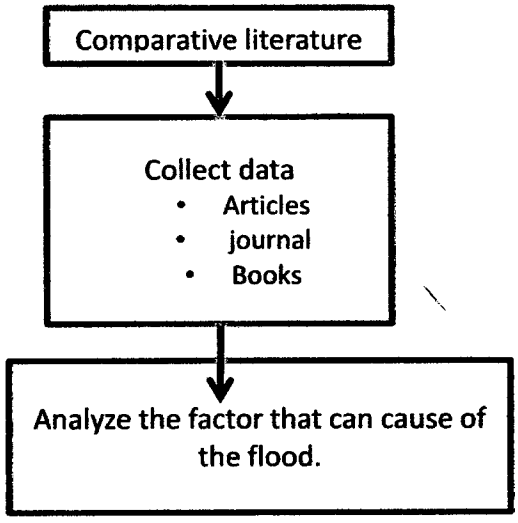

Figure 3.2 Flowchart of comparative literature