

IMPROVISE PLANNING ELEMENTS IN THE PERSPECTIVE TO REDUCE  
THE RISK OF FLASH FLOOD

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## **DEDICATION**

This report is dedicated

To my understanding and supportive supervisor, who consistently giving guidance  
and support,

To my beloved wife, parents and especially my son and daughter, for the  
encouragement and sacrifice in taking care of my beloved child during my journey to  
complete this report.

Remember, what we learn with pleasure we never forget, so learn and grab the  
knowledge.

Thank you.

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## **ABSTRACT**

This study was conducted to determine the critical challenges faced by Kuala Lumpur City Hall (KLCH) in improving sustainable guidance to overcome flash floods. The existing guidelines of flash flood control are only part of the Department of Irrigation and Drainage (DID) guidelines and lack for the flash flood prevention measures. There are also new challenges that are not taken into account in the existing approaches. This study aims to identify the improvising elements to planning guide in order to overcome the problem of flash floods in Kuala Lumpur. This study managed a set of questionnaires which intended for 67 respondents consisting of individuals in the construction industry from various disciplines. The data collected were analyzed using descriptive statistics in the form of frequency and percentage. The results showed that 70.2% of the respondents agreed that the development order planning guidelines and improvements should be reviewed and 68.8% of respondents also agreed that there is the lack of clear guidelines used for rapid urban development which strongly considered the risk of flash floods. In conclusion, this paper proposed the improvise elements to overcome the flash flood problems. Among the primary method is the establishment of multidisciplinary stakeholders in the development direction planning. The proposed planning team should involve with civil and structural engineers, mechanical and electrical engineers, architects and experts in various disciplines. With views from different angles, a decision can be reached well and collectively. It is hoped that this study can provide a fresh perspective in planning elements and propose as an improvement on existing guideline

## ABSTRAK

Kajian ini dilakukan untuk mengetahui cabaran kritikal yang dihadapi oleh Dewan Bandaraya Kuala Lumpur (DBKL) dalam meningkatkan panduan lestari untuk mengatasi banjir kilat. Garis panduan kawalan banjir kilat yang ada hanyalah sebahagian daripada garis panduan Jabatan Pengairan dan Saliran (JPS) dan kekurangan langkah pencegahan banjir kilat. Terdapat juga cabaran baru yang tidak diambil kira dalam pendekatan yang ada. Kajian ini bertujuan untuk mengenal pasti elemen penambahbaikan kepada panduan perancangan untuk mengatasi masalah banjir kilat di Kuala Lumpur. Kajian ini menguruskan satu set soal selidik yang bertujuan untuk 67 responden yang terdiri daripada individu dalam industri pembinaan dari pelbagai disiplin ilmu. Data yang dikumpulkan dianalisis menggunakan statistik deskriptif dalam bentuk frekuensi dan peratusan. Hasil kajian menunjukkan bahawa 70.2% responden bersetuju bahawa garis panduan dan penambahbaikan perancangan pembangunan perlu dikaji semula dan 68.8% responden juga setuju bahawa terdapat kekurangan garis panduan yang jelas digunakan untuk pembangunan bandar yang pesat yang sangat mempertimbangkan risiko banjir kilat. Kesimpulannya, makalah ini mengemukakan elemen improvisasi untuk mengatasi masalah banjir kilat. Antara kaedah utama adalah penubuhan pihak berkepentingan dari pelbagai disiplin dalam perancangan arah pembangunan. Pasukan perancangan yang dicadangkan harus melibatkan dengan jurutera awam dan struktur, jurutera mekanikal dan elektrik, arkitek dan pakar dalam pelbagai bidang. Dengan pandangan dari pelbagai sudut, keputusan dapat dicapai dengan baik dan kolektif. Diharapkan kajian ini dapat memberikan perspektif baru dalam merancang elemen dan dicadangkan sebagai penambahbaikan kepada garis panduan sedia ada.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction of Study

The rapid development of developing countries such as Malaysia has been very encouraging in this decade, this development is visible in the capital city of Kuala Lumpur. There is a body responsible for the development of all developments in the Kuala Lumpur. Kuala Lumpur City Hall (KLCH) is accountable for public waste elimination and management, town planning, health and sanitation, environmental security and building control, social and economic development and general maintenance functions of urban infrastructure. The goals, vision, policies and proposal in 2020 Kuala Lumpur Structure Plan is to lead the development of Kuala Lumpur for the next 20 years. Preparation of the plan carried out with the belief that the most basic Kuala Lumpur Structure Plan 1984 (KLSP 1984) should be reviewed because of the economic boom of unprecedented and rapid changes in the last 20 years. Table 1.1 indicate the changes in land use in residential, commercial and industrial between 1984 and 2000.

Table 1.1 Land Use Change in Commercial, Industrial and Residential 1984 – 2000

Growth Centre	Residential		Commercial		Industrial	
	1984	2000	1984	2000	1984	2000
<b>KUALA LUMPUR</b>	<b>3,822.03</b>	<b>5,489.56</b>	<b>504.36</b>	<b>1,091.71</b>	<b>474.63</b>	<b>553.05</b>
Central Planning Area (CPA)	390.58 (1.37)	287.60 (0.70)	254.88 (6.75)	318.99 (3.90)	4.12 (0.12)	0.93 (0.02)
<b>Designated New Growth Centres</b>						
Wangsa Maju	108.58 (0.53)	314.59 (1.07)	5.22 (0.19)	64.64 (1.10)	18.57 (0.73)	30.66 (1.03)
Bukit Jalil	2.75 (0.01)	51.76 (0.18)	0.00 (0.00)	9.04 (0.15)	9.25 (0.36)	33.09 (1.11)
Damansara	640.56 (2.12)	774.56 (1.78)	12.74 (0.32)	49.60 (0.57)	0.00 (0.00)	0.00 (0.00)
Bandar Tun Razak	289.69 (1.03)	410.67 (1.01)	19.18 (0.51)	62.25 (0.77)	10.73 (0.31)	26.52 (0.65)
<b>Other Growth Areas</b>						
Jinjang	252.65 (0.77)	428.77 (0.90)	32.27 (0.74)	80.63 (0.85)	106.57 (2.60)	134.94 (2.82)
Sentul	276.93 (1.00)	492.28 (1.24)	17.63 (0.48)	124.50 (1.58)	62.10 (1.81)	112.34 (2.81)
Setapak	366.86 (1.76)	458.06 (1.45)	15.79 (0.54)	53.20 (0.84)	37.33 (1.38)	7.91 (0.25)
Datuk Keramat	248.87 (2.32)	306.49 (1.99)	11.83 (0.84)	41.81 (1.36)	0.00 (0.00)	0.00 (0.00)
Maluri	97.59 (1.24)	141.15 (1.25)	13.14 (1.27)	34.01 (1.51)	9.46 (0.97)	8.68 (0.76)
Bukit Anggerik	56.97 (0.36)	127.46 (0.57)	8.50 (0.41)	21.08 (0.47)	11.29 (0.58)	21.69 (0.96)
Seputeh	268.10 (0.99)	397.74 (1.02)	39.80 (1.11)	70.50 (0.91)	37.86 (1.13)	32.49 (0.83)
Bukit Indah	305.78 (0.81)	677.90 (1.24)	31.00 (0.62)	99.79 (0.92)	99.46 (2.11)	57.77 (1.05)
Penchala	147.00 (0.50)	281.11 (0.66)	12.80 (0.33)	27.65 (0.33)	1.97 (0.05)	2.76 (0.06)
Bukit Maluri	189.28 (1.19)	197.11 (0.87)	11.88 (0.57)	20.08 (0.44)	22.64 (1.15)	25.90 (1.13)

Note: All areas are in hectares

( ) refers to Specialisation Index (SI)

SI > 1 Sub region is more specialised than the City

SI = 1 Sub region and the City have equal degree of specialisation

SI < 1 Sub region is less specialised than the City

Source: Kuala Lumpur Structure Plan 2020

Every development will have 'deficiencies' or problems that arise in line with its outcome. One of them is the flash flood. Flash floods are one of the most critical issues in developing countries. Flash floods in urban areas are different from regular floods, where floods occur less than 6 hours. Flash floods can cause significant disruption to economic activity and a greater impact on the population of Malaysia. Risk and public exposure to the dangers of flash floods, especially in large cities with high population density and high construction rates, have increased significantly in recent years. Severe flash floods have occurred in big cities such as Kuala Lumpur, Georgetown, Ipoh, Kota Bharu, and others (Chan, 1996). Typically, the leading

causes of flash floods are the rapid flow of soil due to changes in land use (from unsustainable surfaces such as forests to non-waterproof surfaces such as concrete, cement, and asphalt), river flow and blocked waterways, reduced river capacity through deposition mud and storm events such as heavy rainfall convection (Tu et al., 2005, Murgatroyd & Dadson, 2019).

In Kuala Lumpur, flash floods become so frequent that the reason for the floods due to natural events is no longer acceptable. Flash floods occur in most places every time it rains for several hours. This phenomenon also often occurs year after year in most areas in Kuala Lumpur. This also happens in Kuala Lumpur around Jalan Klang Lama, Kampung Baru, Pantai Dalam, and Desa Abdullah Hukum. People are aware that these flash floods result from human error in planning and managing flash floods efficiently. Flash floods will not occur if those responsible do not continue building floodplains, destroy forest areas, and cut down slopes for development (Pandey & Vishwakarma, 2020). Although in many cases, KLCH does not have direct control over the adequacy of the provision of infrastructure, utilities, and services, any shortcomings describe the city as a whole and, therefore, indirectly to KLCH itself. To that end, KLCH should pay attention to the planning and coordination of these services properly to ensure that they meet the urban population's needs and expectations as in the Kuala Lumpur Structure Plan 2020.

Although there are orders about flash floods, flash floods still adversely affect the economy, the environment, and society when they occur. These include traffic disruptions, landslides, erosion, road accidents, rising river and road maintenance costs, damage to buildings and infrastructure, impaired health, economic losses, environmental damage, disruption of river and lake ecosystems, and damage. Therefore, this study aims to explain the impact of flash floods and the necessary criteria for doing development planning to reduce the risk of flash floods. The goals and objectives of this research were also identified and the scope of work and expected findings.



## 1.2 Problem Background

Flash floods caused by heavy or extreme rainfall over a short period, usually less than 6 hours (Rao et al., 2017; Santangelo, 2019). According to Hamdy et al. (2016), flash floods are generally categorized by heavy currents after heavy rains overflow rivers, city roads, or mountain valleys. According to the National Weather Service, this phenomenon can arise within minutes to several heavy rain hours. Previous studies have stated that flash floods are characterized by short warning times and high-velocity flows (Sharesta 2010). Due to its far-reaching effects due to the danger of falls, flash floods are sometimes stored in precise land areas such as mountains (Yong Tu et al. 2013) This phenomenon brings catastrophe to lowland areas and is also known as the most dangerous type of flood because it occurs with rapid duration and unusual river level fluctuations (Doocy et al. 2013). Such a sudden surge like this usually causes a lot of damage to the environment, infrastructure, and the loss of housing that encourages damage to the local community's life and economy.

Kuala Lumpur is no exception to flash floods. The city's location is in the river valley from the two main rivers (namely the Klang River and the Gombak River), which is also in the middle of the valley, which contributes to flash floods. The flash floods in Kuala Lumpur in 1971 (Bulletin. 4 January 1971) were major flash floods in Malaysia that occurred in January 1971. The floods were mainly caused by heavy rains, which flooded the Klang, Batu, and Gombak rivers. Thirty-two people were killed, and 180,000 were killed (Fernandez, C. Dec 1988). The then Prime Minister of Malaysia Tun Abdul Razak had declared a national disaster in West Malaysia. Floods have been the worst in the country since 1926. So far, a flood management system has to be put in place to address this problem. Therefore, the effects and factors of flash floods need to be improved.

This study aims to clarify some of the questions that will be posed that lead to that purpose.

- i. The effects and factors of flash flood most in Kuala Lumpur?
- ii. What are the development guidelines that consider flood risk preventable?
- iii. What are the challenges and obstacles in implementing flood management for Kuala Lumpur City's development?
- iv. What criteria should be considered in flood management planning in Kuala Lumpur?
- v. Have the existing guidelines thought the impact of development risk on a particular area?

### **1.3 Research Aim and Objectives**

This study aims to identify improvise planning guide in order to overcome the problem of flash floods in Kuala Lumpur. The objectives of this study are:

- i. To identify the current guidelines used for city development approval that has considered to the flood prevention
- ii. To identify the needs of improvise elements in planning to reduce the risks of flash flood.
- iii. To investigate the challenges and barriers in planning management of flash flood.
- iv. To propose the improvise elements of planning for flash flood management improvement of Development Order.

## **1.4 Scope of works**

This study is conducted in the Klang Valley area. The data is obtained from the Department of Irrigation and Drainage (DID) and KLCH. The sampling chooses for this study which is included rainfall tabulation data and questionnaire to industry respective person.

## **1.5 Expected Finding**

This report presents findings based on survey from industry practitioners' perspective in terms of their knowledge base of flood management practices in Malaysia. It is expected that the respondents agree that a flood management system should be developed including a procedural system which can be used as a guide in approving a development project. With this system, the local authorities will also can predict when and where a flash flood can occur based on the data obtained.

Besides that, the main challenges and obstacles of implementing flood management development plans could be highlighted in this study. Thus, actions to overcome the barriers should be done and a comprehensive. The findings from the study are expected to identify the current guidelines used for city development approval that consider flood prevention. This is because, with such guidelines, it can reduce the effects of flash flood.

Other than that, this report will also state the need in planning to reduce the risks of flash flood. With help of the need assessment, hope the responsible authorities will taking into account this flash flood elements for rapid development planning in the future.

In addition, the challenges and barriers in planning management of flash flood will be discussed in detail in this report. The finding from this section hope can cause planning management of flash flood more effective.

This report is also expected to propose the weightage criteria of planning flash flood management for improvement of development order. One of the examples of weightage criteria is introducing a system called on site detention or detention pond. All the surface water will discharge into the system before the water is release into the existing drainage or stream. The surface water will contain certain hours in the pond before slowly discharge out into the channel. The size of outlet pipe also become important weightage criteria because the design will control the outflow. In response, this report presents findings based on survey from industry practitioners' perspective in terms of their knowledge base of green planning and procurement adoption and practices in Malaysia.

## **1.6 Significant of Study**

This study is important with aims in predicting the finding to propose a new city development order that consider flood prevention that suitable for development guidelines. The outcome will give benefit to all the stakeholder who involve in the city development. For example, for the nations, hope with this finding can reduce the amount of flash flood happened in the Klang Valley area. For the city, rapid development will continue to grow without worried the problem regarding to flash flood. For the government or local authorities, as the improvement for the current practices in order to reduce the flash flood in the Klang Valley area.

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