

**URBAN STORMWATER MANAGEMENT FOR PROPERTY DEVELOPMENT
PROJECTS IN SELANGOR AND NEGERI SEMBILAN**

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ABSTRACT

Rapid urbanizations and its consequent increase in impervious surfaces and changes in land use generally resulted in problem of flooding and heavy pollution of urban water system and other receiving waters. Urban drainage practice and control philosophy has been based on solving localized floods by transferring excessive flows into the drainage systems downstream. The consequence of removing the stormwater from the land surface so quickly is to increase volumes and peak discharge, overloading the drainage system. This causes severe flooding to downstream areas and a threat to the ecosystem and environment. Since 2001, Urban Stormwater Management Manual for Malaysia (MASMA) was introduced by Drainage Irrigation Department of Malaysia and approved by the Cabinet for the application to replace the earlier manual for storm water management in urban areas. The focus of this study is on the implementation of MASMA in property development projects. The objective of this study is to investigate and identify the problems encountered in its implementation. The study also identifies its effects on project cost and time and benefit of MASMA compliance to property development projects. The methodology adopted involving literature search, interviews with authorities, consultants, developers, contractors and property owners and questionnaire survey to the project engineers. Frequency Analysis and Relative Index analyses were used to analyze the data. The study is limited to on going and completed property development projects of 10 Ha and above in the states of Selangor and Negeri Sembilan only. In conclusion, the problems encountered at MASMA implementation to property development projects have been identified. It includes the identification of cost and time implications on MASMA compliance to the project. Various benefits of MASMA compliance to the developers and property owners have also been identified. Several recommendations are proposed to enhance MASMA application.

ABSTRAK

Perbandaran yang pesat dan kesannya terhadap pertambahan permukaan tanah tidak telap serta perubahan gunatanah umumnya mengakibatkan masalah banjir serta pencemaran yang serius terhadap sistem air bandar dan air penerima yang lain. Amalan dan kaedah kawalan saliran bandar sebelum ini yang berasaskan penyelesaian banjir setempat dengan mengalirkan air berlebihan ke dalam sistem saliran di hilir. Kesan memindahkan ribut hujan dari permukaan tanah dengan cepat adalah peningkatan isipadu dan kadar alir puncak seterusnya membebankan sistem saliran. Ini mengakibatkan berlakunya banjir yang serius dan menggugat ekosistem dan alam sekitar. Bermula 2001, Jabatan Pengairan dan Saliran Malaysia telah memperkenalkan Manual Saliran Mesra Alam (MASMA) yang dilulus penggunaannya oleh kabinet bagi menggantikan manual yang terdahulu untuk pengurusan ribut hujan di kawasan bandar. Fokus kajian ini adalah pelaksanaan MASMA di projek pembangunan hartanah. Objektif kajian ialah untuk mengenalpasti masalah yang dihadapi dalam pelaksanaannya. Kajian ini juga mengenalpasti kesannya terhadap kos dan masa projek serta manfaat pematuhan MASMA kepada pemaju dan pemilik hartanah projek berkenaan. Metodologi kajian melibatkan kajian literatur dan temubual dengan pegawai kerajaan, perunding, pemaju, kontraktor dan pemilik hartanah serta kajian melalui soalselidik kepada jurutera perunding. Analisa frekuensi dan relatif indeks telah digunakan untuk menganalisis data. Skop kajian ini terhad kepada projek yang sedang berjalan dan telah siap dengan keluasan lebih dari 10 hektar di Negeri Selangor dan Negeri Sembilan sahaja. Dalam kesimpulan kajian, masalah yang dihadapi dalam pelaksanaan MASMA telah berjaya dikenalpasti. Ia juga berjaya mengenalpasti kesannya kepada kos dan masa projek. Pelbagai faedah pematuhan MASMA kepada pemaju dan pemilik hartanah juga dikenalpasti. Beberapa cadangan dikemukakan bagi menambahbaik dan meningkatkan keberkesanan pelaksanaan MASMA.

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CHAPTER I

INTRODUCTION

1.1 Introduction

The size of urban areas has increased to accommodate the increase in urban population and activities that power the economic engine for country's development. These developments has brought about several positive results such economic improvement and alleviation of poverty. Inadequate controlled development has had significant adverse impact on the environment, such as flash flooding, erosion, mudflow and sedimentation, slope failure, water pollution and ecological damage, increased floatable and debris flow and depleting water resources.

These negative impacts are in most cases brought about by inadequate handling of stormwater management during planning, development and maintenance resulting in much hardship to the urban community in the form of traffic jams, property damage, inconveniences, and loss of income, productivity and sometimes live.

To address the problems, Drainage and Irrigation Department of Malaysia introduced a new manual, *Urban Stormwater Management Manual for Malaysia or MASMA* to replace the earlier guideline Urban Drainage Design and Standard and Procedures for Peninsular Malaysia published in 1975.

The new manual, MASMA utilised the concept of urban stormwater management control at source while the earlier drainage manual based on rapid disposal. MASMA introduces a comprehensive, broad and flexible approaches, strategies and guidelines for the current and future urban storm water management which covers management of quantity and quality for environmental enhancement and sustainable development. MASMA was approved by the Cabinet for application in storm water management throughout Malaysia from first of January 2001.

1.2 Background of the study

Urbanization results in the growth of impervious areas and a diversification of urban land use practices with respect to the hydrologic and environmental terms. The construction of buildings, access road, highways, paved areas, footpaths, etc., increases the impermeability of the catchments and consequent changes in surface types reduce the quantity of water seeping into subsoil. The changes in land use usually involve the loss of vegetation cover with consequent water use due to evaporation. Very often marginal land, including reclaimed land in river flood plains, may be developed and this will generally reduce depression storage in the catchments. All above factors lead to an overall increase in impermeability and therefore in the quantity of rainwater that will run off the land into the drainage system. Development will decrease the response time to rainfall for many reasons.

Smisson, 1979 concluded that the effect of a reduction in catchments response time is to increase the maximum rate of flow discharging to the drainage system or alternatively increase frequency of significant floods.

In some river basins, development pressures on the water environment are now at alarming level. It is widely recognized that land use changes from rural to urban or industrial areas cause local runoff impacts on receiving water flow, quality and ecology.

As a result rivers, lakes, ponds, reservoirs, and estuarine and coastal water have become sensitive to increased rates and volumes of runoff and pollutant discharges. These discharges have posed major issues to many urban and residential centers, particularly in western states of the Peninsular.

Apart from erosion and sedimentation problems associated with development, it has become increasingly apparent that storm water runoff contributes to receiving waters a significant part of total loads of such pollutants as nutrients, heavy metals, oil and grease, bacteria etc.

Andoh, 1994, identified that the consequence of removing the stormwater from the land surface so quickly is to increase volumes and peak rates of flow discharged, overloading the natural drainage system. This causes severe damage not only to downstream areas but to the environment as a whole. In addition, the amounts of storm water to deal with are such that drainage scheme have become unaffordable for the community. There is therefore the need for a new approach. Source control is one of the proposed alternatives

The application of Urban Stormwater Management Manual for Malaysia (MASMA) is regarded as important milestone to achieve an environmental friendly and sustainable development. The concept of stormwater management control at source is relatively new to the country and a paradigm shift would be required to turn around traditional concept of drainage engineering practices based on rapid disposal towards the new concept. As recognized in MASMA itself, the manual has its limitation in that being newly introduced it may be lacking in many aspects representing the peculiarities of the stormwater process and practice in the country.

As mentioned in MASMA also it is imperative to understand that this manual is just a guideline and its applicability depends on many factors such as adoption and the extent of the manual by Local Governments, necessary adjustment to suit administrative

requirements of each Local Government and reform and changes in institutional and legal matters pertaining to stormwater that may take place in the country.

1.3 Problem Statement

The implementation of MASMA poses enormous challenges to many parties especially in the land and property development sector. The implementation of MASMA requiring the developers to comply with new stormwater management guideline that is not familiar to them. The new concept will need new approaches and orientations to planning, design, construction and maintenance of stormwater infrastructures and facilities.

Jefferies et. al,1999 recognised that at the time of the first system implemented in the United Kingdom, knowledge of the detail implementation of the relevant practice was limited and a number of systems have been constructed which are clearly not successful. He concluded that the poor performance might arise from a number of reasons including lack of availability of sufficient land for the system installed, particular administration factors in the region, bad design and construction and inadequate maintenance.

Selangor Drainage and Irrigation Department Director, Lee Lock Chong, 2006 stated that some local authorities have been not given enough consideration to drainage when approving development projects and the consequence of this is manifested in the frequent floods in some areas (The Sun, Monday 10th July 2006).

The developers have their own reservation with regard to MASMA application in their development projects. They need to complete within the tight budget and time constraints to meet their commitment to the consumer and try to maximize land

utilization to increase their profit. Application of MASMA may hinder their targets if those factors affecting their planning.

1.4 Aims and Objectives of the Study

The aim of the study is to identify and establish the problems of MASMA implementation to the property development projects. The study will also identify implication of MASMA compliance on the project costs and time and benefits of its compliance to the developers and property owners.

As to achieve the aims of the study, the following objectives have been identified:

- i. To identify and establish problems in MASMA implementation in property development projects;**
- ii. To identify the cost implication of MASMA compliance to property development projects;**
- iii. To identify time implication of MASMA compliance to property development projects; and**
- iv. To identify the benefits of the MASMA compliance to the developers and property owners of projects**

The problems in MASMA implementation can be investigated through the experience of the construction players involved in its implementation by conducting survey using questionnaire. Some questions related to MASMA implementation at various project development stages will be asked to the project engineers identify the problems in MASMA implementation as experienced in their respective projects. The questionnaire covers the problems at four project development stages; planning stage, design stage, construction stage and utilisation stage.

Cost implication of MASMA compliance can be investigated through the experience of the project engineer in estimating the project cost or actual cost in the project implementation as compared to the cost if the previous manual is used. The costs have been classified into four project component costs; consultancy cost, construction cost, erosion and sediment control structure cost and maintenance cost.

Time implication of MASMA compliance is mainly related to the time taken by the authorities to issue plans approvals and Certificate of Fitness for Occupancy. The time implication can be identified through the delay of the approvals of plans and CFO and its causes experienced by the project engineers in their respective project.

And the fourth goal, the benefits of MASMA compliance to the developer and property owners is identified through the project engineers' experience through their close relationship with the developers of projects and the property owners.

1.5 Scope of the Study

The scope of the study encompasses completed and on-going projects property development projects in the states of Selangor and Negeri Sembilan. The respondents are the project engineers for the selected project in both states. The projects engineers are chosen as the respondent basically because of they are direct or indirectly involve in application of MASMA the whole stage of project development.

As to achieve the objective of the study with the various limitations and constraints of the researcher will confined to the following scopes:

- i. The study will focus on MASMA implementation in property development projects;
- ii. The land size of the projects are 10 hectare and above;

- iii. Projects are in Selangor and Negeri Sembilan; and
- iv. The surveys in form of questionnaire will be conducted to project engineers of the projects who handle the matters related to MASMA implementation.

1.6 Importance of the Study

MASMA introduces a comprehensive, broad and flexible approaches, strategies and guidelines for the current and future urban storm water management. The manual is an important milestone and a new direction for storm water management in urban areas in Malaysia. Considering the broadness it covered and due to the complexity and the nature of construction industry in Malaysia, MASMA application posts an enormous challenge to regulators, planners, designers, developers and contractors who are involved in stormwater management.

After five years of its implementation, the study on the problems and related implication of MASMA application to the construction industry is very useful. Property development projects are the most affected sector as the result of MASMA application for stormwater management. In the light of that, the study looks into the problems and implication of MASMA application in property development projects. The problems in MASMA application cover the whole project stages from planning to the maintenance stage. The implications of MASMA application cover the project cost and time, and the benefits to the developers and property owners (the buyer). The outcome of the study is formulated through experience and the feedback from the industry players involved in the implementation of MASMA is very useful for the future enhancement of its application.

1.7 Research Methodology

To achieve the aim and the objectives of the study, an appropriate approach and research methodology will be adhered to. Chapter 4 of the thesis is specially dedicated to explain and discuss the methodology adopted in the study. This part is only directed to show briefly the flow diagram of the thesis commencement.

The study will provide description on urban stormwater management practices in Malaysia and globally in the pasts and present. The focus of this study is to identify problems and issues encountered in its implementation. This will be obtained through literature review of journal papers, books, reports and web sites browsing. To understand the local problems further the interviews and discussion was carried out with several people involved with the stormwater management in Malaysia. They include engineers and planners from government agencies and consultancy companies, developers, contractors, and academicians.

Besides that, the study will also be conducted through surveys in the form of questionnaire to the project engineers who in the implementation of MASMA in their respective projects in the past five years. The surveys are conducted to identify the problems and implications in the perspective of the project engineers through their own experience in MASMA implementation and their interaction with other related parties such as contractor, developers, other consultants and government agencies. Theoretical framework using determined dependent and independent variables are important to design relevant questions to be asked in the process of carrying out the survey.

Figure 1.1 shows the flow chart of the study.

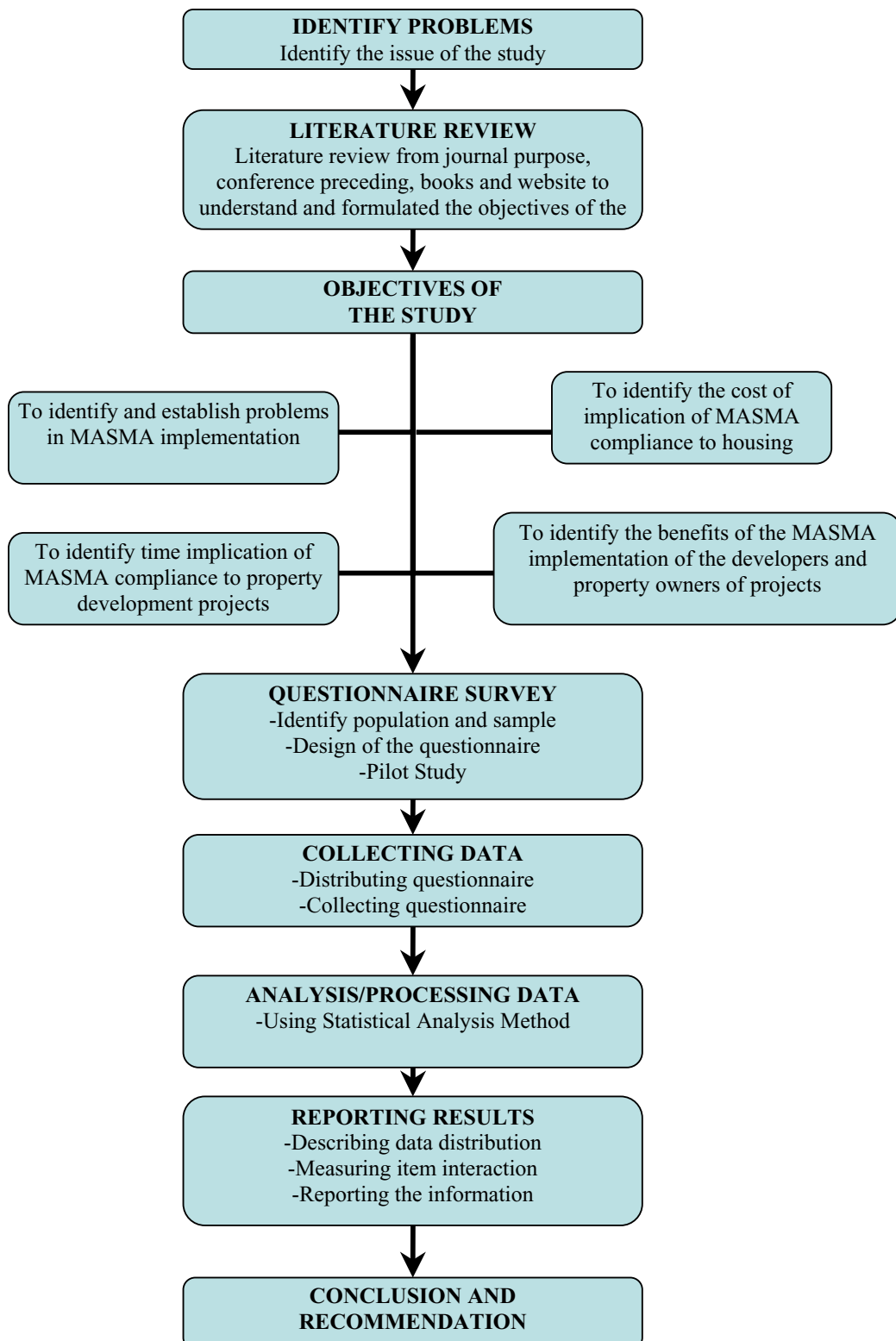


Figure 1.1: Flow Chart of the Study

1.8 Organisation of the Thesis

Chapter I discusses the background and problem statement of the study, follows by the aims and the objectives, scope and important of the study. The methodology of the study is then discussed briefly to show the direction of the study towards achieving the objectives. It then summarizes the contents of this project report.

Chapter II highlights the development and issues related to stormwater management in Malaysia and globally. It covers the discussion on stormwater management issues and drainage practices, new direction in urban stormwater management, stormwater management principles, urbanisation and urban areas. Best Management Practices in urban stormwater management, urban stormwater as a resource and problems in Best Management Practices application in developed countries.

Chapter III discusses on Urban Stormwater Management Manual for Malaysia (MASMA), its purpose, goal and objectives, scope and application, and its organization and format. The relevancy of MASMA application to the authorities and users to different activities is also discussed. It also briefly explains the previous drainage practice and the application of MASMA related to land development. Roles, problems, issues and challenges in property development industry related to MASMA application are also elaborated. It ends with the discussion on problems of MASMA application, cost and time implication of MASMA compliance and benefits of MASMA compliance to developers and property owners.

Chapter IV outlines the detail of methodology adopted in the study. The study is conducted using interviews and questionnaire survey. This chapter explains the type of data used, method of sampling, description of sample and population, technique of data collection, processing and analysis and questionnaire design.

Chapter V details out the finding of the study concerning the problems in MASMA application in property development projects as experience by the developers and project engineers in their projects. To determine the ranking of the significant of the problems, cost and time implications and benefits gained by developers and property owners, the costs increase, the relative index of the responses was computed and ranked to compare their ratings and relative importance. The results derived from Statistical Package for Social Science (SPSS) are appended in the Appendices as Appendix E, F, and G.

Chapter VI elaborates and discusses at length the findings of the study from the questionnaire survey conducted. The problems of MASMA implementation at the planning, design, construction and after construction is identified, established and elaborated. The implication of the problems at one stage that causes the problems to other stages is also discussed then followed by discussion on the cost and time implications of MASMA compliance. The factors that contribute to the delay also highlighted. The benefits of MASMA compliance to the developers and property owners is discussed towards the end of the chapter.

Chapter VII, the final chapter concluded the aim and the objectives of the study, problems encountered during the course of the study and the recommendation for the improvement in MASMA implementation and suggestion for the future research works.

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