

DID Malaysia

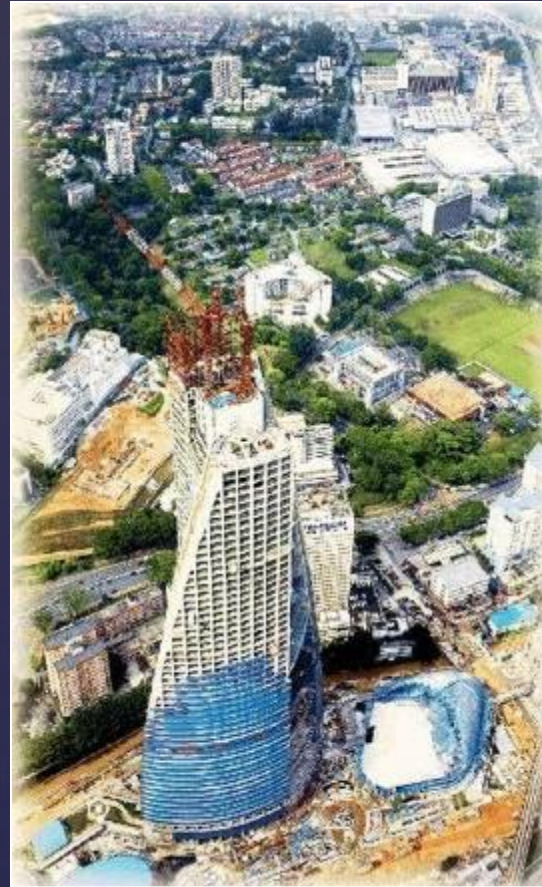
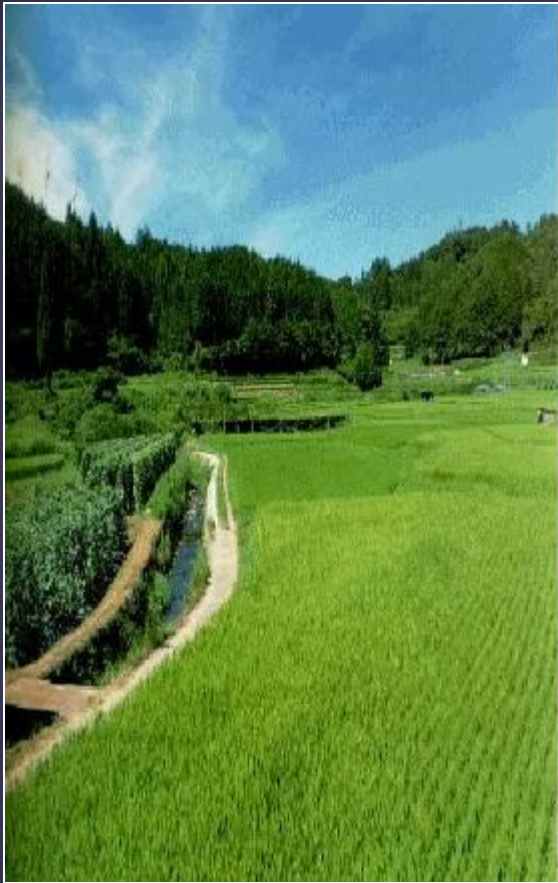
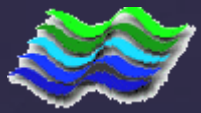
# Solving Urban Flooding Through Sustainable Stormwater Management

Dr Hj Md Nasir bin Md Noh

Department of Irrigation and Drainage  
Malaysia

# Contents

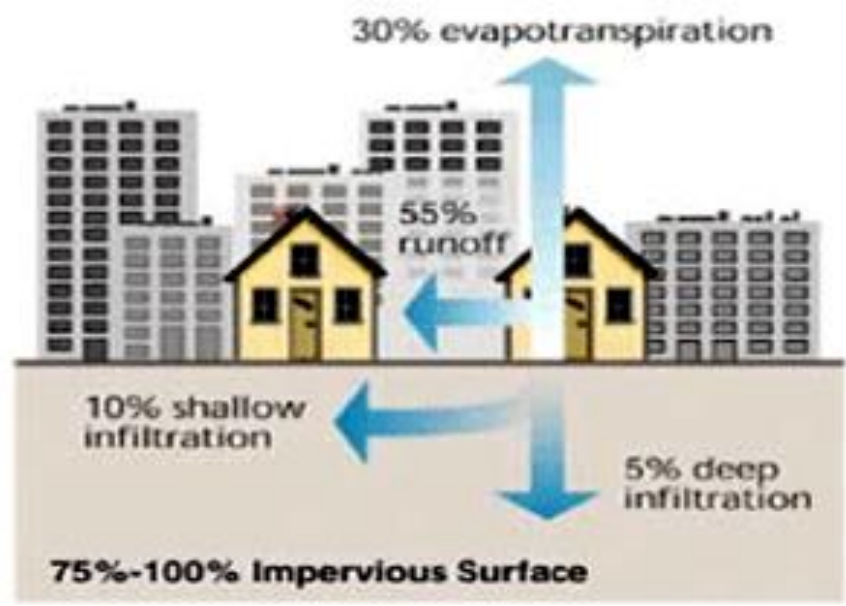
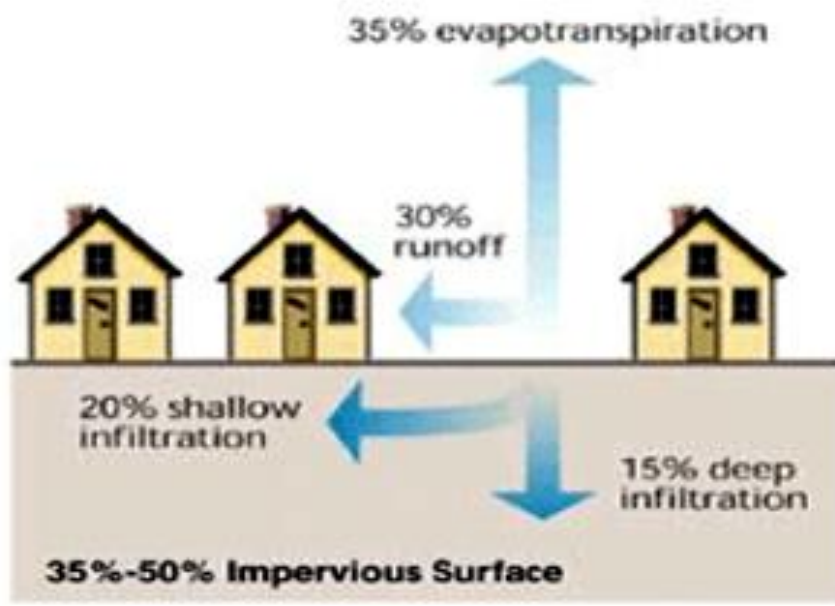
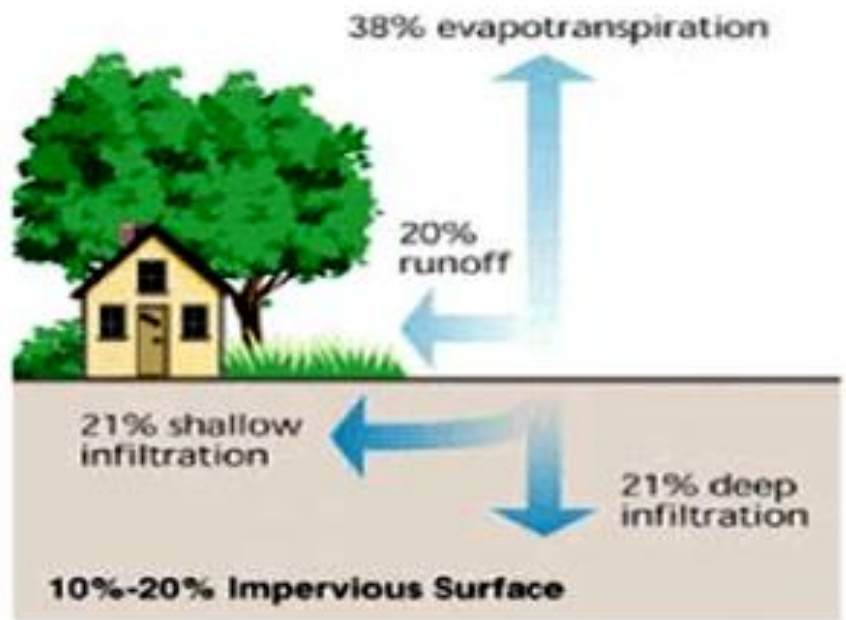
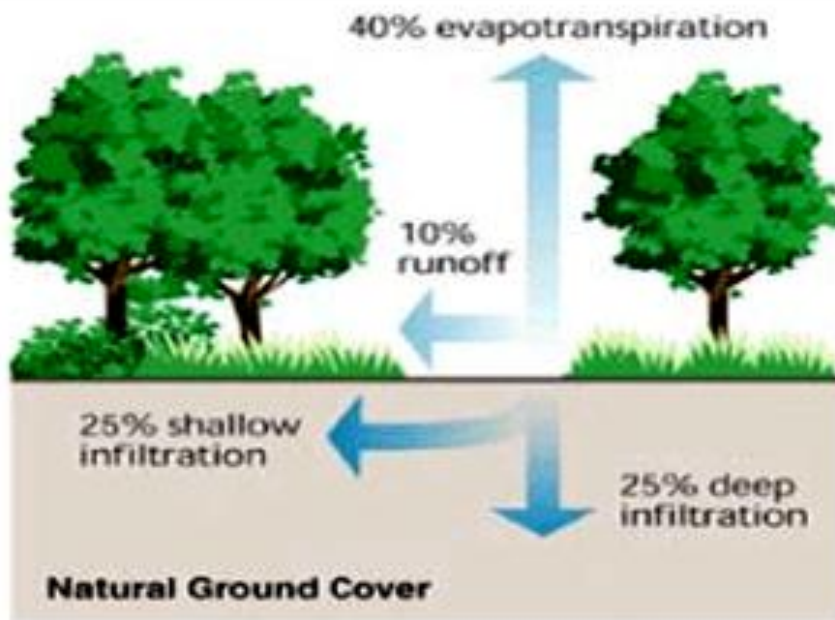
- & Introduction and Background
- & Issues and Challenges
- & Urban Stormwater Management
- & Strategic Direction
- & Program and Activities
- & Expected Outcomes and Conclusions



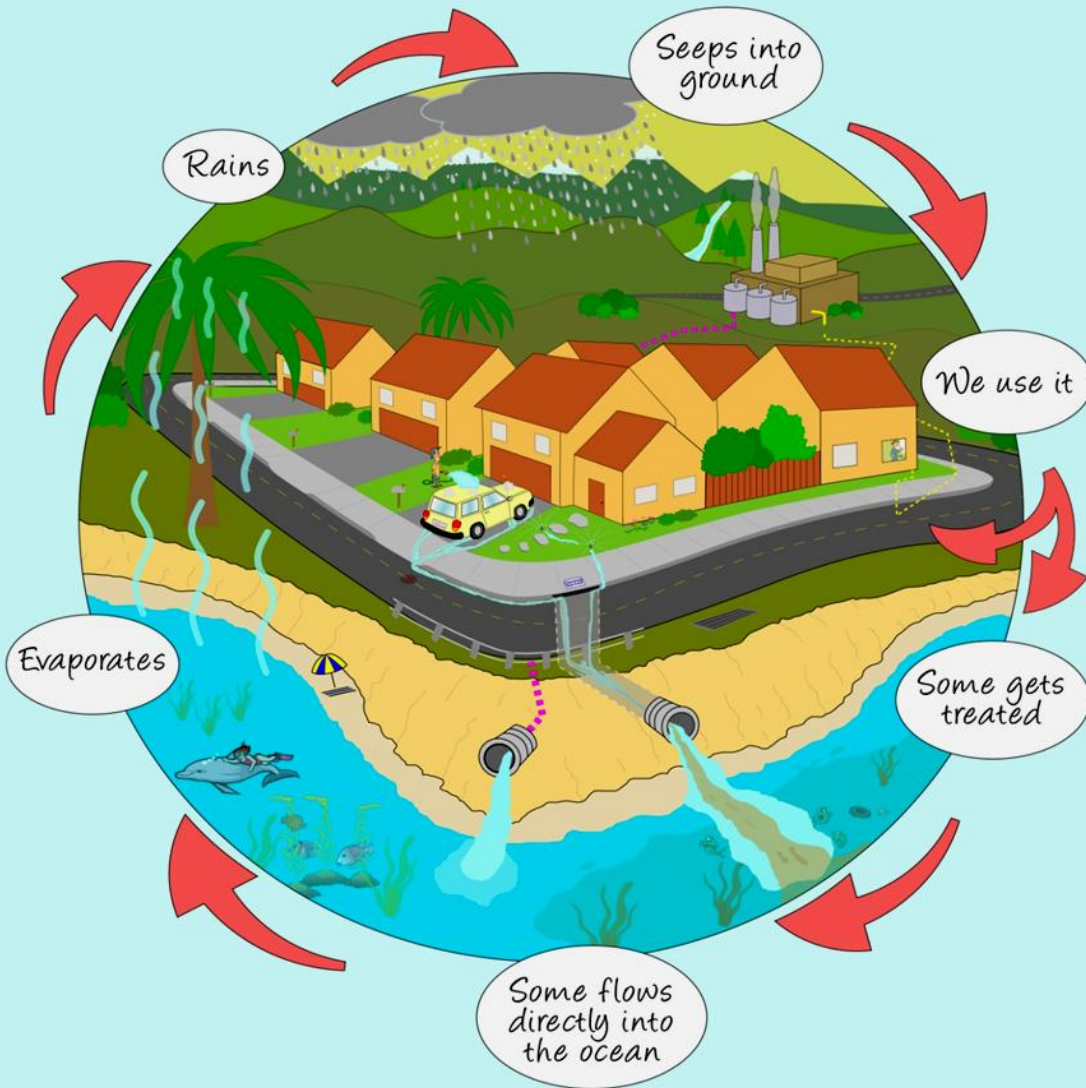
Agricultural Area

Urban Area

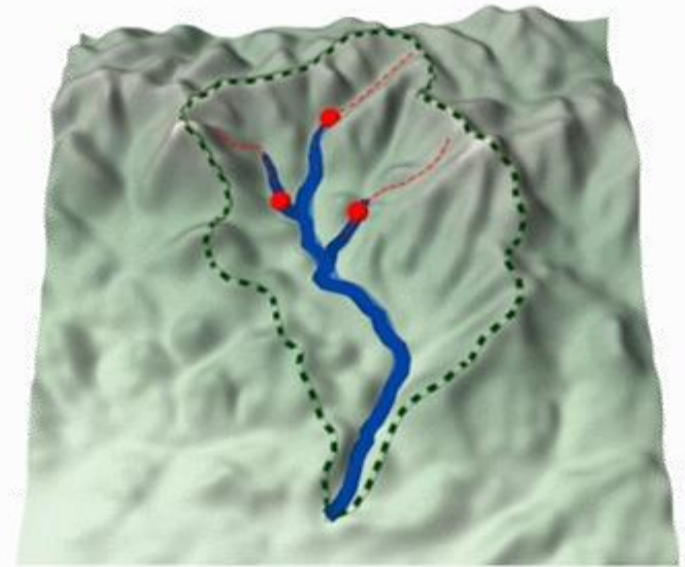
Residential Area



# The Urban Water Cycle



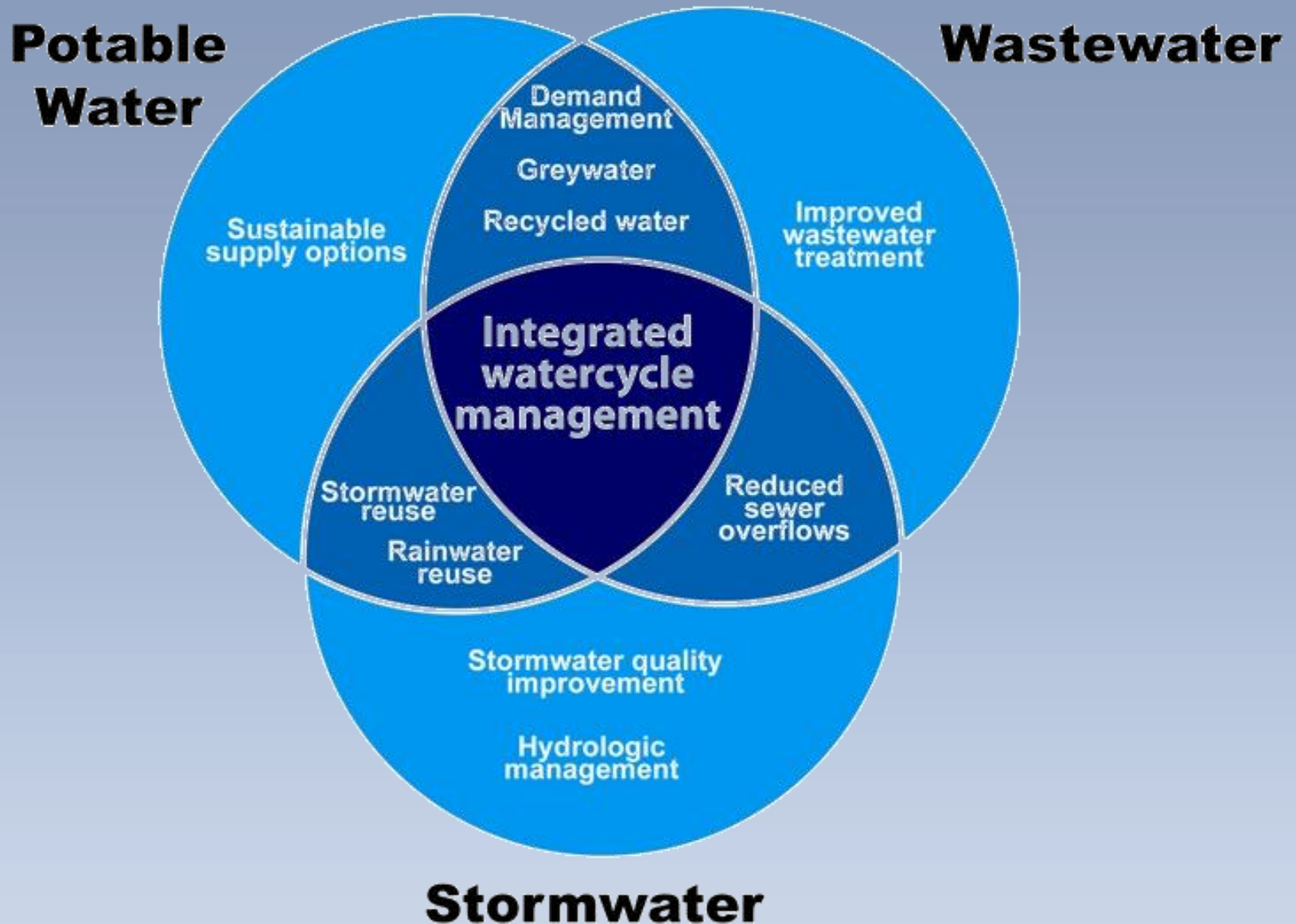
A Drainage Basin



## Urban Hydrology

Change in landuse within the catchment area for development directly influences the hydrological cycle; alters the natural water cycle in the basin.

# Urban Water Cycle



# Issues and Challenges

- Flood
- Erosion and Sedimentation
- Pollution
- Climate Change

# Kuala Lumpur - 29<sup>th</sup> Oct 2001

## FLOODS HIT KL



**CITY OF WATER ...** flood victims getting a boat ride to safety through the heart of Kuala Lumpur (left) and motorists pushing a car at a parking lot near KL Tower yesterday. Major roads in the city were inundated after three hours of heavy rain. — APpix

By ANGELA RAO and  
SIMON KHOO

**KUALA LUMPUR:** The city was thrown into chaos after the Klang

Jalan Sultan Ismail (near Sheraton Imperial Hotel), Jalan Yap Kwan Seng, Jalan Tun Razak (near the LRT station), Jalan Gurney and Jalan The Hill.

Roads were cut off by the waters from the drains clogged with silt and garbage from upstream. Some workers were shocked when they

flooded with knee-deep waters, forcing the residents to prepare for evacuation if the situation worsened.

The damage is expected to be massive as private car parks were flooded including Wisma AIA, Wisma Multipurpose and open-air



# Kuala Lumpur - 11<sup>th</sup> June 2002



Kuala Lumpur - 10<sup>th</sup> June 2003

Befrienders > Track suicide bids

Star  
The people's paper

WEDNESDAY

11 June 2003

Abdul Kudus sacked

VCD ops to go on

StarBiz



Israel tries to kill Hamas leader

# KL hit by floods

## Three-hour downpour causes havoc in city

**KUALA LUMPUR:** Hundreds of thousands of people were caught in chaos caused by flash floods that saw one person drowned in what has been described as the worst deluge yet to hit the city for the past year.

Hundreds of cars were damaged when underground car parks were turned into giant pools as police reported that several people were also injured in various accidents due to the havoc.

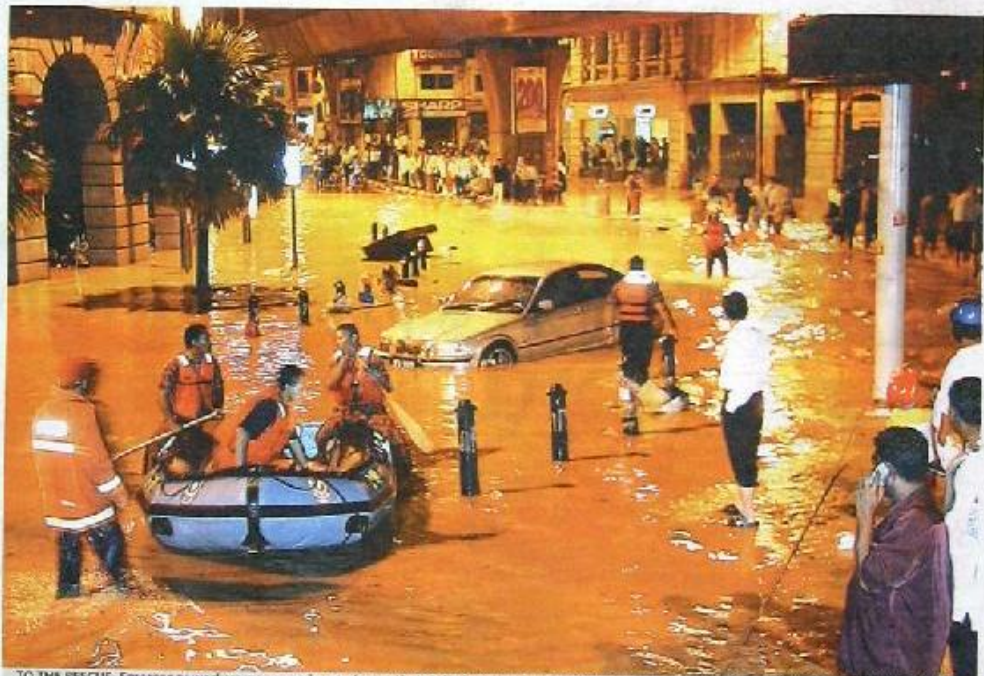
The three-hour rain that brought much relief from the heat started at 4pm and within 30 minutes became a heavy downpour trapping the hundreds of thousands as they tried to make their way home from work.

Even the Sentral Fire Station fell victim to flood waters and all the engines had to be parked outside as the water level in the building was chest-high at the peak.

City Mayor Datuk Shaid Mohd Taufik had to take to a motor-cycle to get to visit the various affected places.

City Hall's 24-hour monitoring centre also reported flooding at the nearby areas of Dataran Merdeka, Masjid Jamek, St. Mary's Cathedral and parts of Jalan Sultan Ismail.

The low-lying areas of Kampung Baru,



**TO THE RESCUE.** Emergency workers manouvring past a car that stalled at the Jalan Tun Perak and Jalan Melaka intersection yesterday while getting to those stranded following a three-hour downpour.

● TURN TO PAGE 3

# Kuala Lumpur - 4<sup>th</sup> June 2007



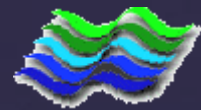
## I wish I had a boat

NST 4/6

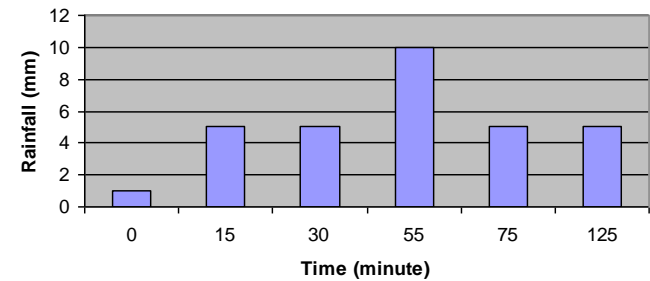
A downpour which began about 4.30pm and lasted for two hours caused water levels in several areas in Kuala Lumpur to rise to more than half-a-metre. Among the worst-hit areas were Jalan Bangsar, Jalan Travers heading to the Mahameru highway (picture), Jalan Duta, Jalan Semantan in the Damansara area, Jalan Pantar, Jalan Chan Sow Lin and Jalan Masjid

Jamek. According to a City Hall spokesman, the traffic jams in these areas only cleared after the water level subsided. Meanwhile, a landslide at the Mahameru highway heading towards Jalan Duta caused a road closure for several hours, resulting in a massive traffic congestion. There were no casualties in the 7.10pm incident.

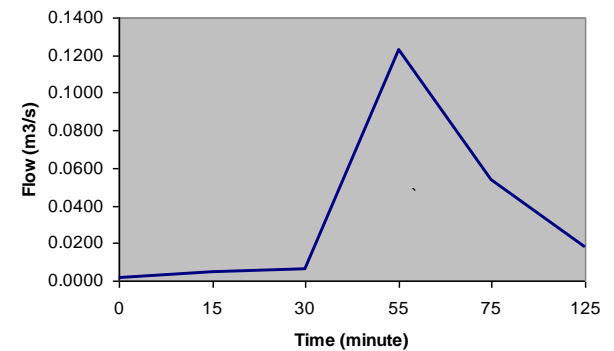
# Erosion and Sediment Control - Construction



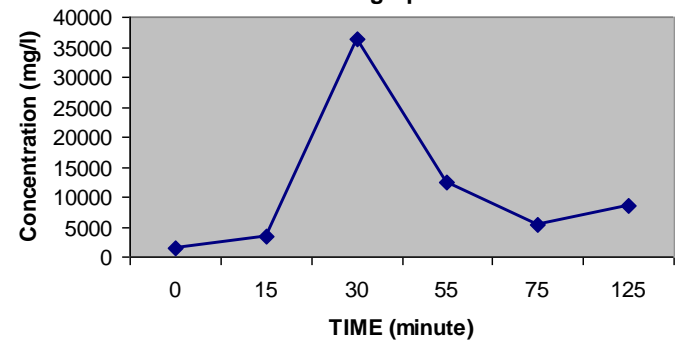
### Storm Hyetograph



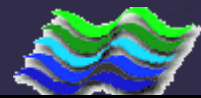
### Discharge Hydrograph



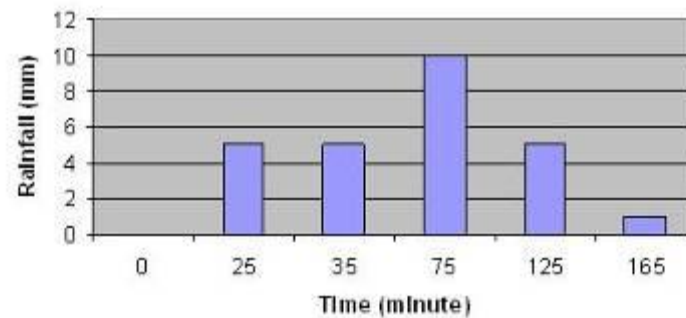
### Pollutograph of TSS



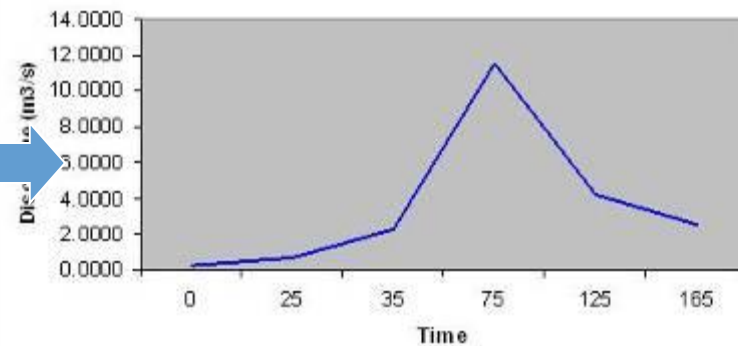
# Erosion and Sediment Control - Agriculture



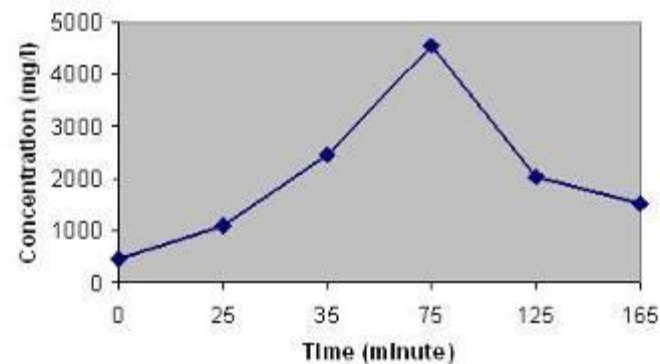
### Storm Hyetograph



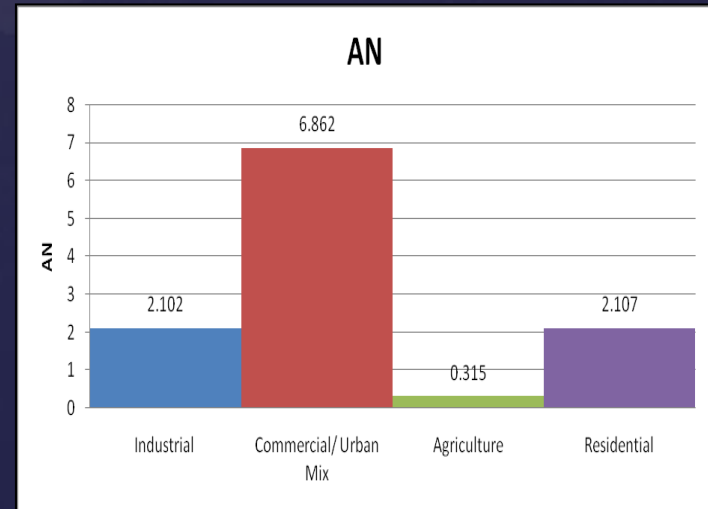
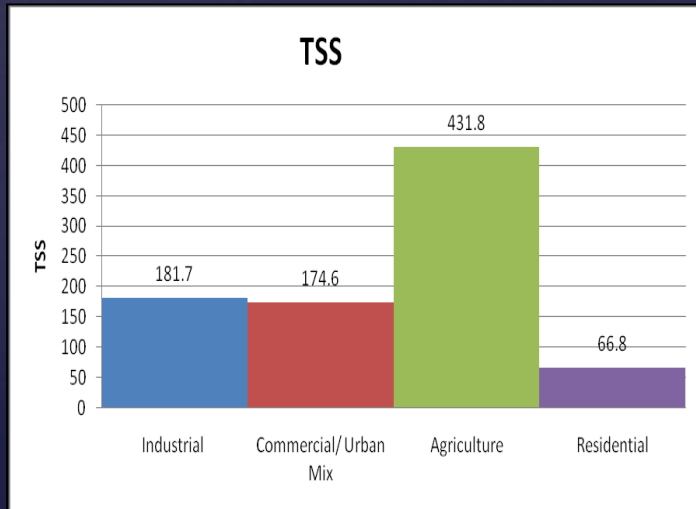
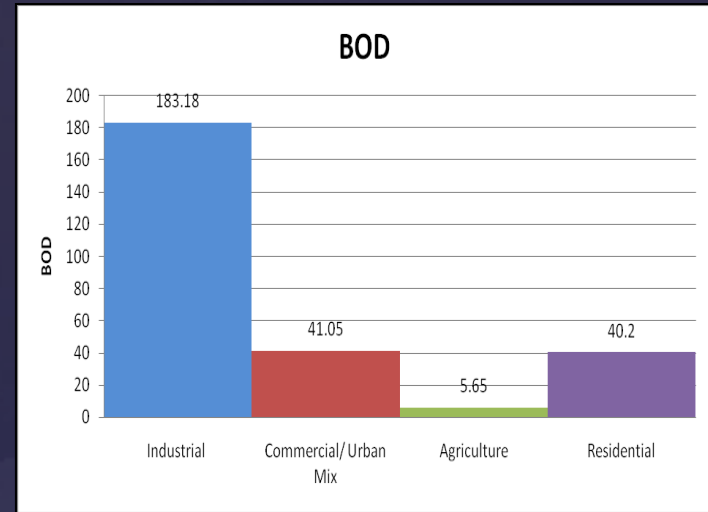
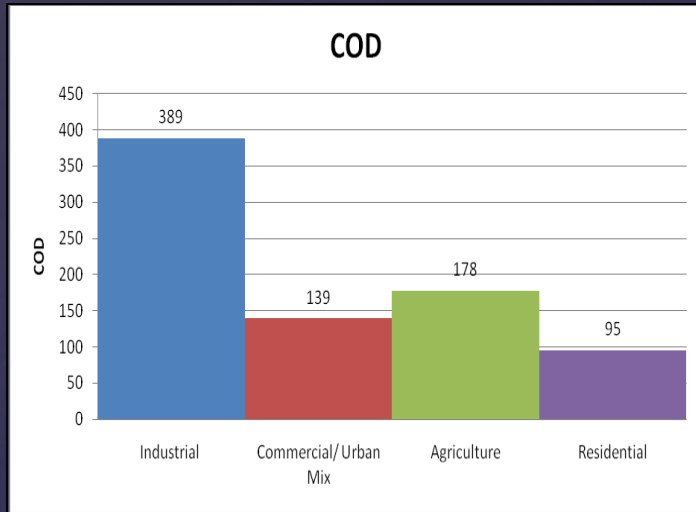
### Discharge Hydrograph



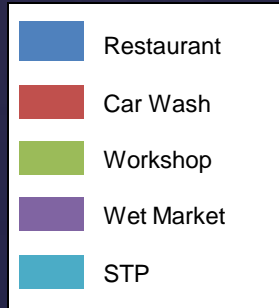
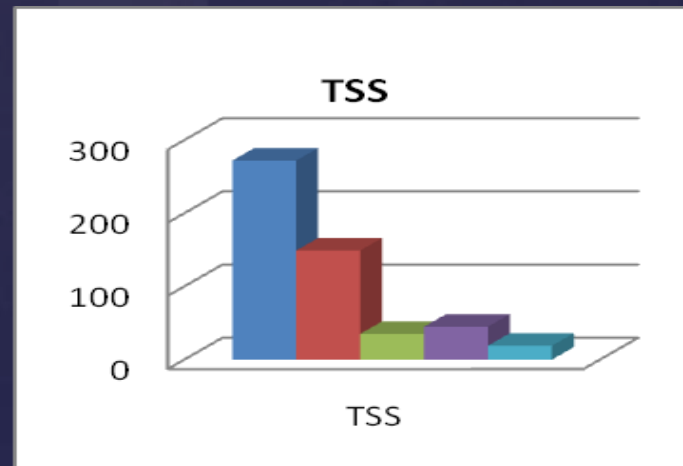
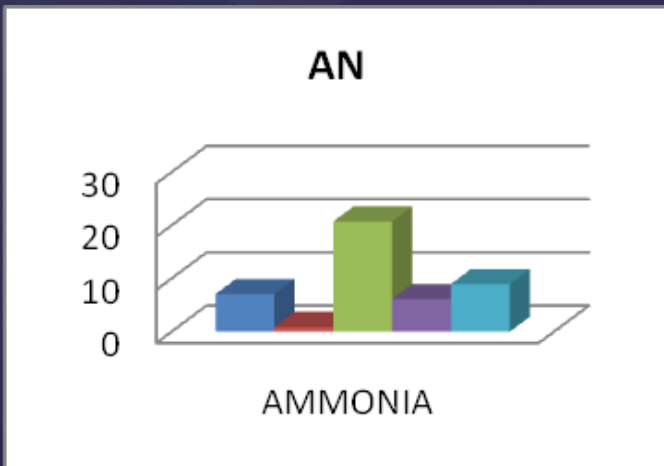
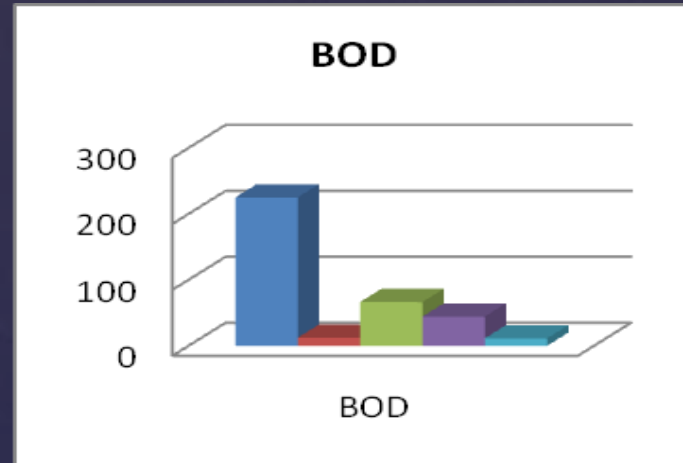
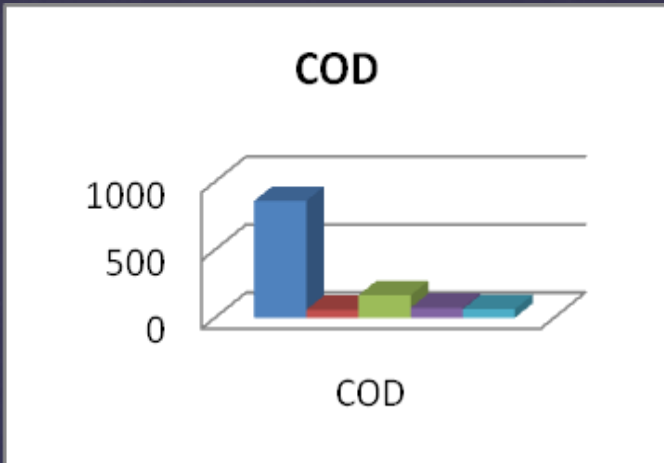
### Pollutograph of TSS



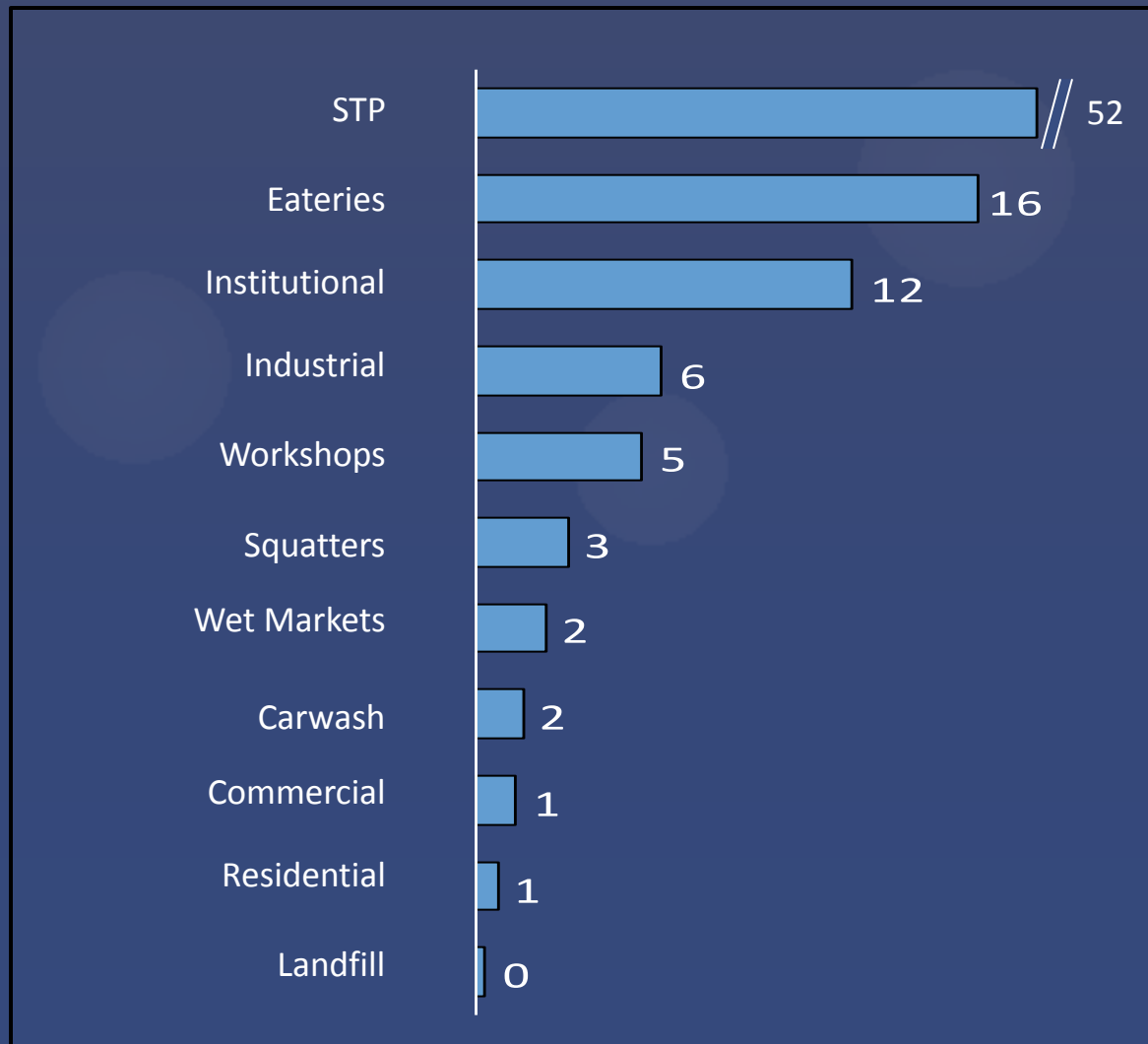
# Non-Point Source Pollution



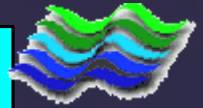
# Point Source Pollution



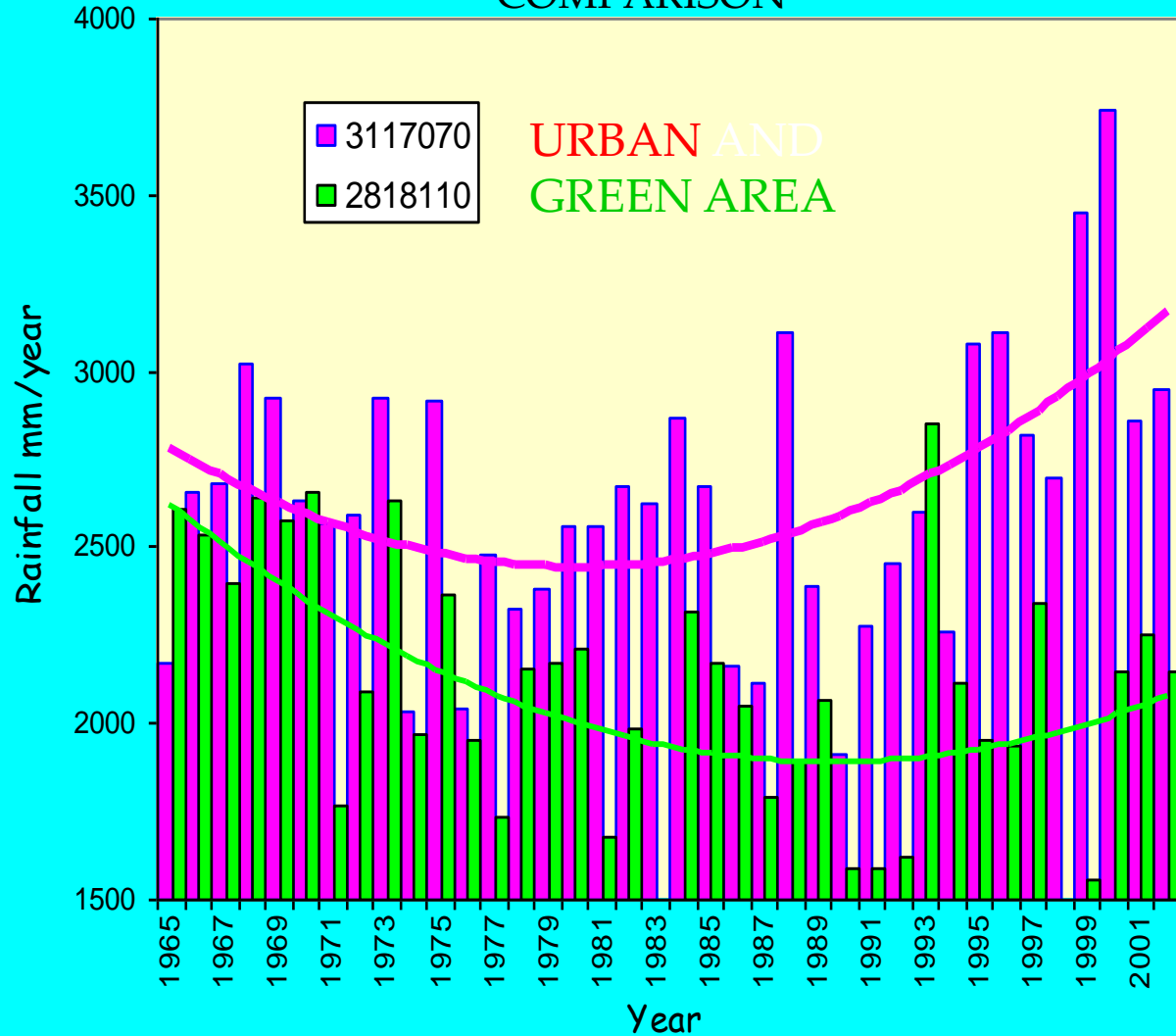
# % Pollution Contribution







# LONG TERM ANNUAL RAINFALL (1965 - 2002) COMPARISON

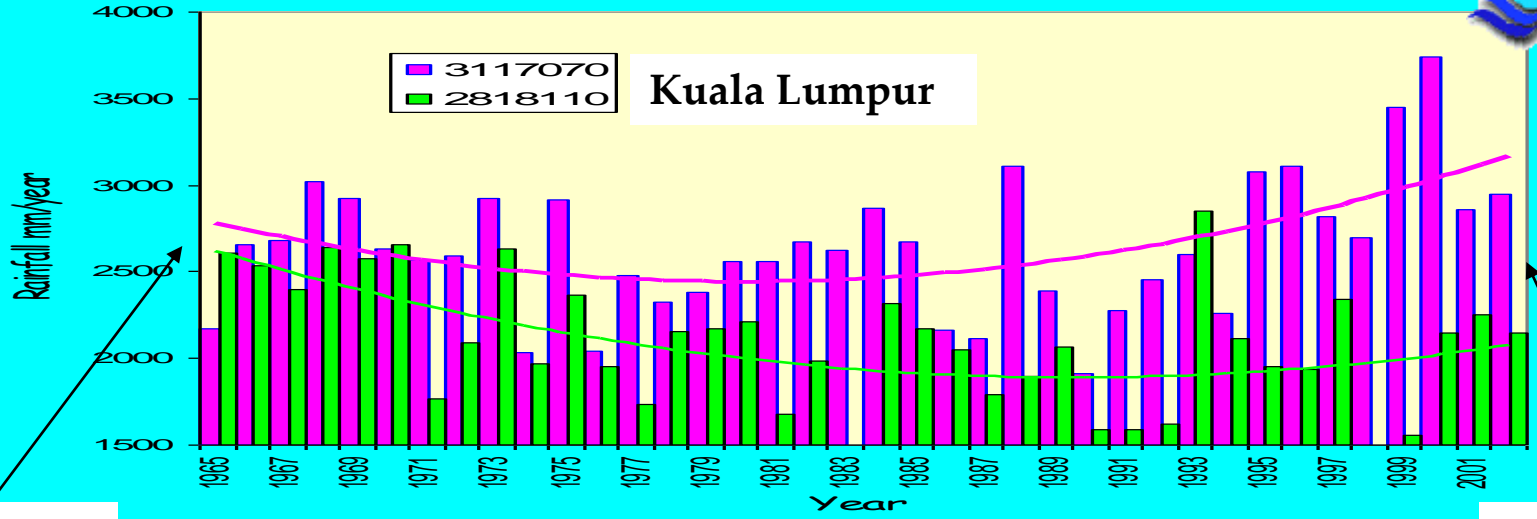


Small difference



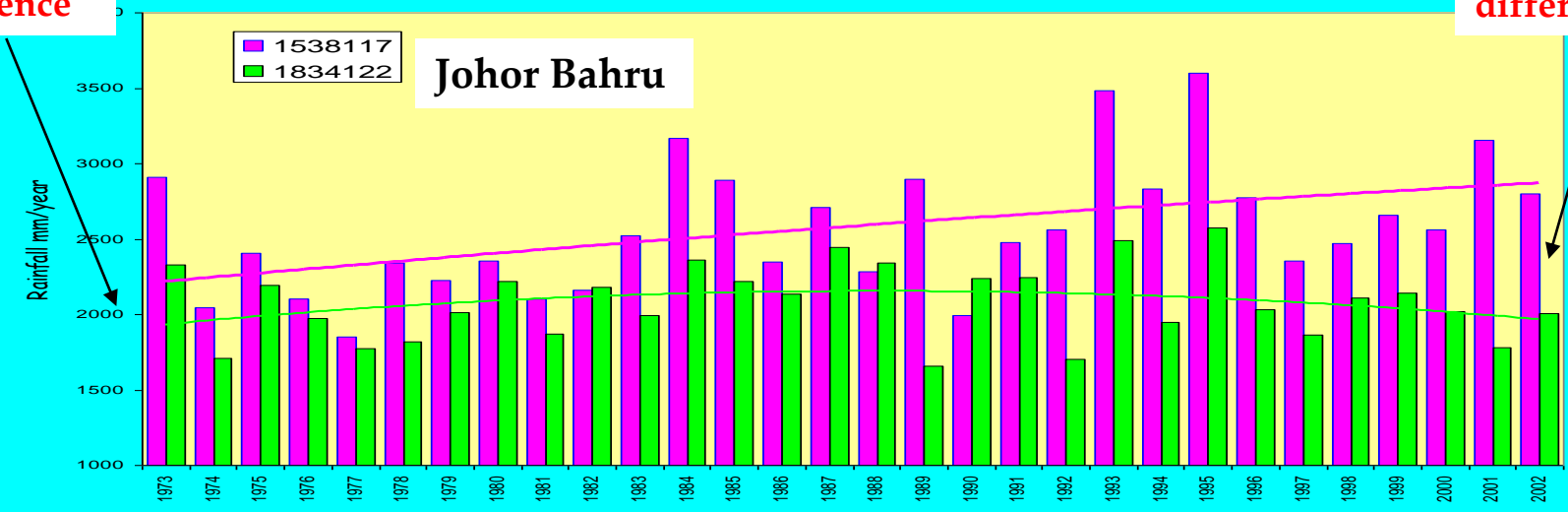
large difference

## LONG TERM ANNUAL RAINFALL (1965 - 2002)



Small difference

large difference



Gap in rainfall trends between urban and green areas

# Stormwater Management Key Elements



**1 Quantity Control**

**2 Quality Control**

**3 Erosion and Sediment Control**

**4 Operation and Maintenance**

**5 Aesthetic Value**

# Urban Stormwater Management

## Mud Flood



## ESCP



## Water Pollution



## Quality Control



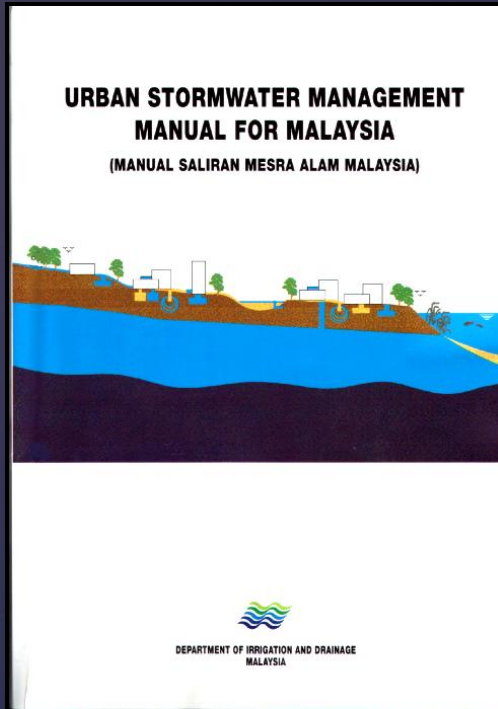
## Flash Flood



## Quantity Control



# Guidelines and Practices

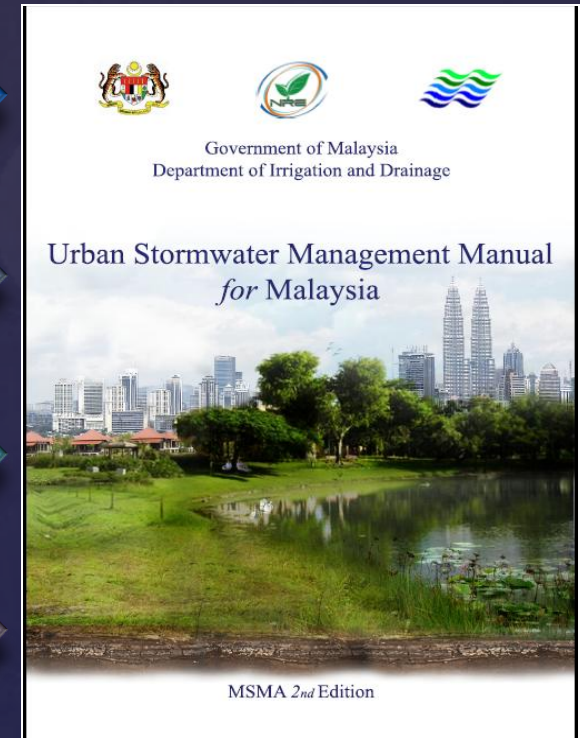


**Raise**

**Reduce**

**Create**

**Eliminate**



**MSMA 2000**

**: 20 Volume, 48 Chapters**

**MSMA 2nd Edition**

**: 1 Volume, 20 Chapters**

The Purpose of this document is to provide a practical guide to assist in the design and implementation of SUDS systems across Thames Region of the Environment Agency.

This guidance explains the Environment Agency's design requirements for SUDS systems and helps you to select the most appropriate and sustainable SUDS system for your site.



Photo 1. An example of a SUDS pond used to drain a 62ha development at Elvetham Heath

Created by: Development Control Technical Specialists, Thames Region  
Date: October 2005

UFC 3-210-10  
15 NOVEMBER 2010

# UNIFIED FACILITIES CRITERIA (UFC)

## LOW IMPACT DEVELOPMENT



APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

# EVALUATING OPTIONS FOR WATER SENSITIVE URBAN DESIGN - a national guide

Prepared by the Joint Steering Committee for Water Sensitive Cities  
in delivering Clause 92(i) of the National Water Initiative

July 2009



### CREATING A CITY OF GARDENS AND WATER

The vision of transforming Singapore into a City of Gardens and Water is made possible by the Active, Beautiful, Clean Waters Programme, an initiative by PUB, Singapore's national water agency.

ABC  
Active, Beautiful, Clean Waters

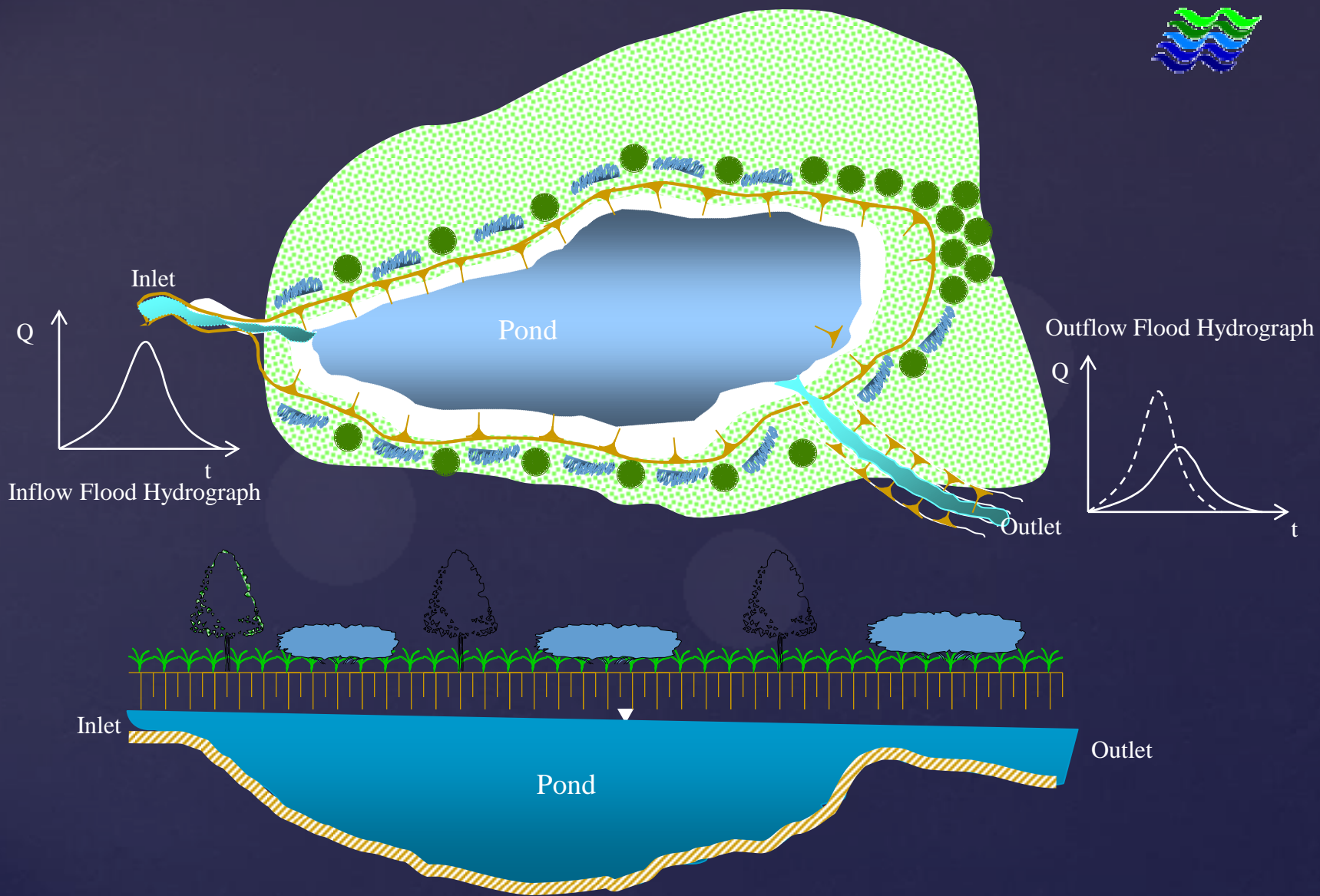
## Design Guidelines

PUB 24 Hour Call Centre: 1800 351 8800  
E: pub\_inform@pub.gov.sg  
W: <http://www.pub.gov.sg/abcwaters>

PUB  
New 24 Hour Call Centre, PUB 24

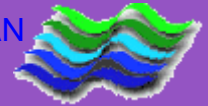
# Approach



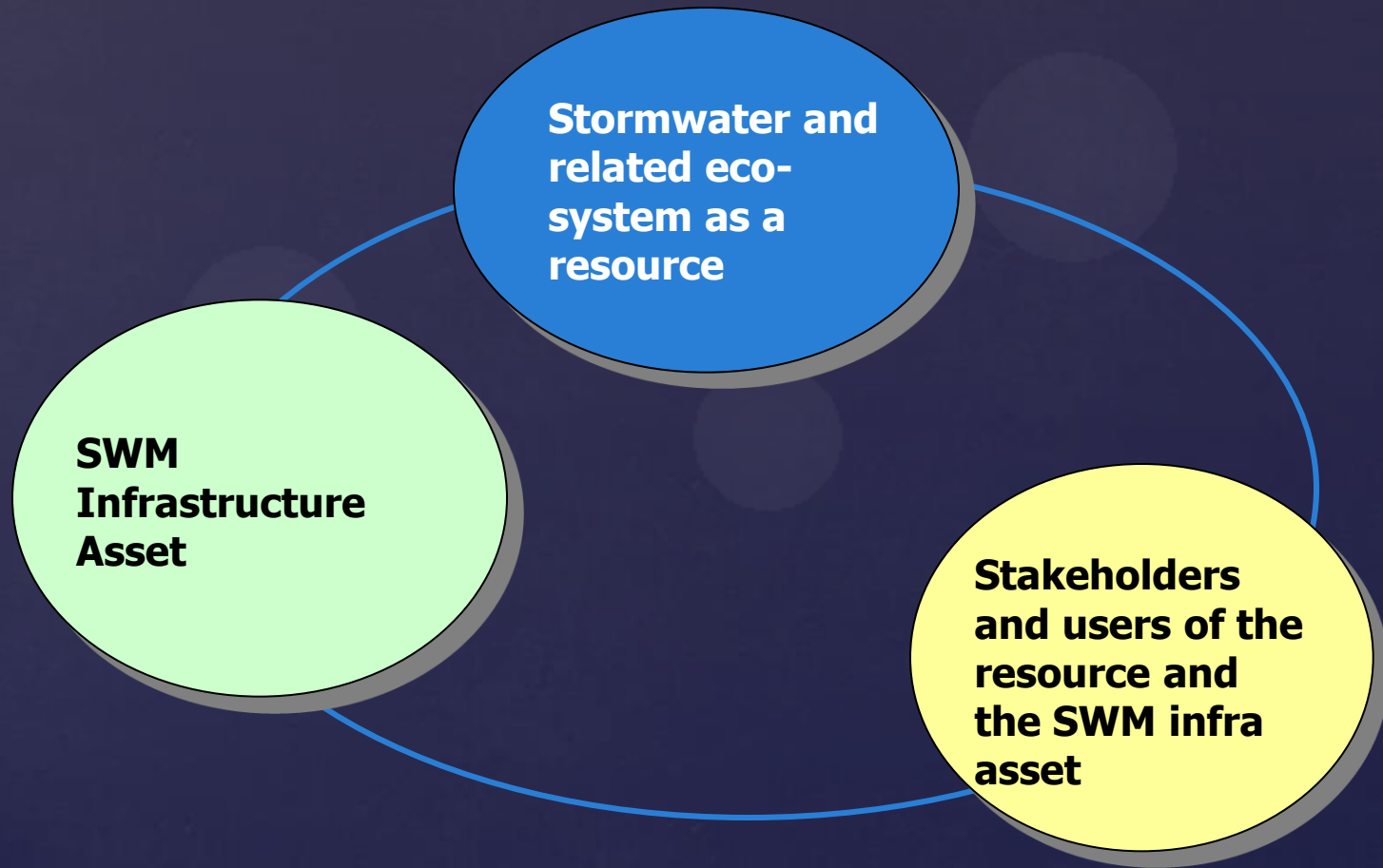


STORAGE EFFECT ON THE OUTFLOW FLOOD HYDROGRAPH





# SWM STRATEGIC DIRECTION



# 1<sup>st</sup> STRATEGIC DIRECTION

## 1. SWM Infrastructure Asset

### & Management Component

- ∅ Develop, operate, maintain and upgrade infrastructure

### & Goal

- ∅ World class facilities and practices

### & Objective

- ∅ Improve performance of SWM

# SWM INFRASTRUCTURE ASSET

SWM Infrastructure Asset	Short term (2010)	Long term (2020)
Solve	localized flash flood	flash flooding
Reduce non-point pollution	by minimum 30%	by minimum 70%
Reduce sediments from construction sites	by 70%	by 90%
Reduce DWF PS pollution	by minimum 15%	by minimum 30%

# 2<sup>nd</sup> STRATEGIC DIRECTION

## 2. Stormwater and Related Ecosystem as a Resource

### ↳ Management Component

- ⌘ Regulate the resource (water and eco-system) utilization

### ↳ Goal

- ⌘ Conservation and sustainable utilization

### ↳ Objective

- ⌘ Promote as alternative water source
- ⌘ Conserve and rehabilitate eco-system
- ⌘ Upgrade aesthetic features

# STORMWATER AS A RESOURCE

Stormwater and related ecosystem as a resource	Short term (2010)	Long term (2020)
Water demand for major towns facing water stress	1% contribution	5% contribution
Introduce natural stream eco-system restoration & conservation	Towns with City status	Other towns
Incorporate aesthetic feature	All new projects and 1% of existing facilities	All new projects and 3% of existing facilities

# 3<sup>rd</sup> STRATEGIC DIRECTION

## 3. Stakeholders and Users of the Resource and the SWM Infra Asset

### ↳ Management Component

- ⌘ Enhance stakeholder participation

### ↳ Goal

- ⌘ Effective role and first world mentality by stakeholders

### ↳ Objective

- ⌘ Increase the public awareness and attitude and participation

# STAKEHOLDER AND USERS

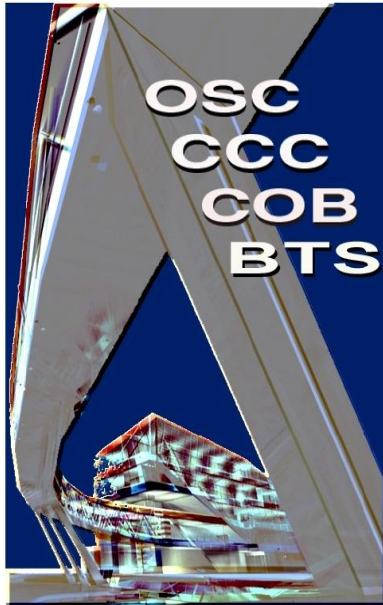
<b>Stakeholders and users of the resource and the SWM infra asset</b>	<b>Short term (2010)</b>	<b>Long term (2020)</b>
Implement Local Agenda 21 SW sector	at 30% of the towns (comprising the bigger towns first)	at 60% of the towns

# SWM PROGRAM AND ACTIVITIES

- One Stop Centre
- Preparation of Stormwater Masterplan for Major Town
- Monitoring and Enforcement
- Capacity Building
- Stakeholder Participation and Public Outreach
- R&D



# 1. OSC (One –Stop Centre)



- Implementation of One stop Centre for Development proposal
- Improve the procedure, process and delivery system
- Prepare Post Construction SOP

# STORMWATER MANAGEMENT TECHNICAL STANDARDS FOR SUBMISSION CHECKLIST

APPLICATION FOR LANDUSE CONVERSION  
AND LAND SUBDIVISION REVIEW CHECKLIST

APPLICATION FOR DRAINAGE AND  
STORMWATER MANAGEMENT  
REVIEW CHECKLIST

APPLICATION FOR EROSION AND  
SEDIMENT CONTROL  
REVIEW CHECKLIST





MALAYSIAN  
STANDARD

MS XXX - 3: 2011

**Malaysian Standard**  
*Urban Stormwater  
Management*

URBAN STORMWATER MANAGEMENT  
PART 3: QUALITY DESIGN  
FUNDAMENTALS

ICS:

@ Copyright 2010

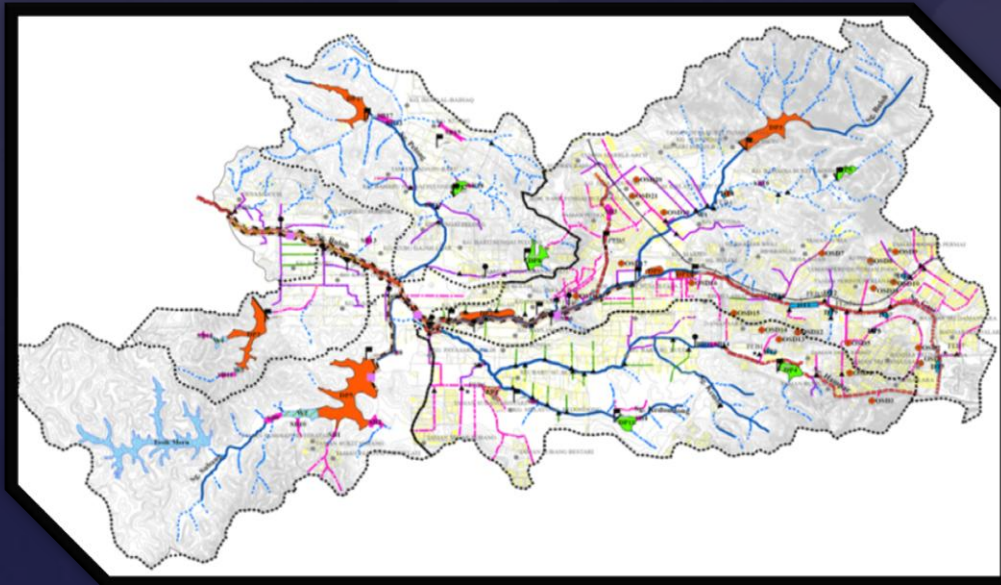
DEPARTMENT OF STANDARDS MALAYSIA

**Expected SIRIM  
publication by May  
2013**

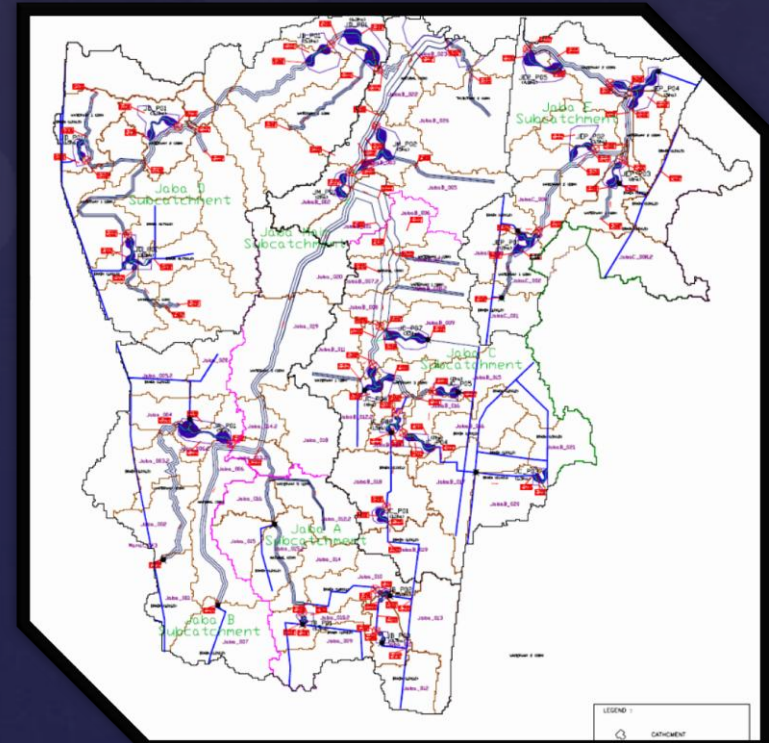
## 2. Preparation of Stormwater Management Master Plan for Major Town

### List of Town

1. Kangar, Arau dan Padang Besar
2. Parit Buntar dan Bagan Serai
3. Ipoh
4. Manjung, Lumut dan Sitiawan
5. Klang
6. Sg. Besi dan Seri Kembangan
7. Bandar Sungai Buloh
8. Kajang
9. Tuaran, Mengatal dan Talipok
10. Tawau
11. Kuching dan Kota Samarahan
12. Miri
13. Pasir Gudang
14. Tanah Merah
15. Pasir Mas
16. Dungun
17. Kuantan



Pelan Induk Bandar Sungai Buloh



Pelan Induk Seri Kembangan

# 3. Monitoring and Enforcement

PM INSTRUCTION AS CHAIRMAN OF NATIONAL WATER RESOURCES COUNCIL MEETING ON 20th August 2008

"All State and Federal Government must implement an integrated monitoring and enforcement activities Ops Lumpur Program to address the problem of flooding and pollution of the river"

# Ops Lumpur Objectives

- ❑ To ensure all developers comply Land Development Plan and Erosion and Sedimentation Control Plan that had been revised by State/District DID and approved by Local Authorities.
- ❑ To reduce mud flood event occurring during land development and to reduce silt flowing into drainage system
- ❑ MSMA use solely (as approved by cabinet in 2001) for sustainable development for the whole country

# ONE NRE ENFORCEMENT

- ⌘ Joint Enforcement between DOE & DID
- ⌘ Section 31 & 34 of EQA (Erosion and Sediment Control)

# 4. Capacity building



# Capacity Building

- MSMA as part of important subject in University (e.g. USM, UM, UTM & UNITEN etc)
- Training program
  - ✓ Government Agencies (JKR, KPKT,ILPBT)
  - ✓ NGOs and Private Sectors

# Malaysian Stormwater Organisation (MSO)

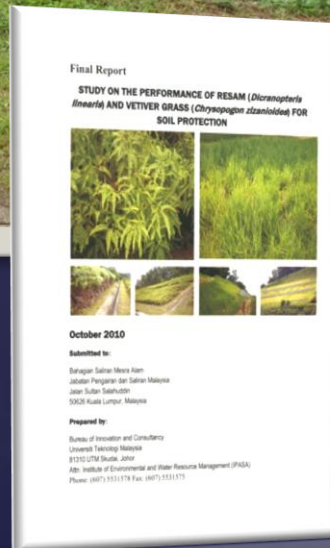
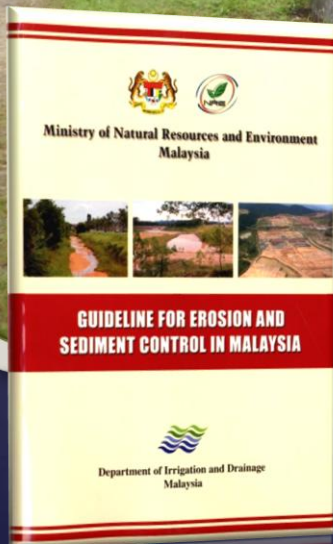
- Organising Seminars and Examinations
  - Joint Organiser with RoL Key Initiative Holders
  - CPESC, CPSWQ & CESSWI

# 5. Stakeholder Participation & Public Outreach



Stakeholder involvement during preparation of Master Plan

# 6. R & D



- *Guideline for Erosion and Sediment Control in Malaysia*
- Pemasangan Sistem Pemantauan Kualiti Air di I-DICODE, Ipoh
- Pemasangan Sistem Pemantauan Kualiti Air di *Upstream Sg Kinta* (sebelum Bandar Ipoh)
- *Study on the Performance of RESAM*
- *GPT Monitoring*
- *Bio-media test for RWTP*

# EXPECTED OUTCOMES & CONCLUSIONS

- ⌘ Minimize and control nuisance flooding and provides safe passage of less frequent flood events
- ⌘ Stabilize the landform and control erosion
- ⌘ Minimize runoff water quantity impact on environment
- ⌘ Provide safety for the public and protect properties
- ⌘ Harmonize public and ecosystem needs

# http://www.water.gov.my

The screenshot shows the homepage of the Malaysian Water Resources Management Authority (WRMA). The top navigation bar includes links for Home, About Us, Our Services, Resource Centre, Media Centre, Information For, Contact Us, and Help. A search bar is located on the right. The main content area is divided into several sections:

- Core Business:** Features five categories: Water Resources Management & Hydrology, Flood Management, Stormwater Management, River Management, and Coastal Management.
- Services By Categories >>:** A sub-menu with tabs for Public, Business, DID's Sta, and **Download**. The **Download** tab is circled in red, with a red arrow pointing to it from a blue box labeled "Download".
- Manual & Guidelines:** Lists various documents, with **MSMA 2<sup>nd</sup> Edition** circled in red and a red arrow pointing to it from a blue box labeled "MSMA 2<sup>nd</sup> Edition".
- Archive:** A link to view archived documents.
- Technical Studies:** Lists technical reports such as Coastal Engineering and Flood Mitigation.
- Login:** A section for user authentication with fields for Username and Password, and a "Log in" button.
- CALENDAR OF EVENT:** A calendar for September 2012.



Thank You