EAST AND SOUTH EAST REGIONAL SEMINAR ON

FLOOD HAZARD MAPPING

PREPARATION OF FLOOD HAZARD MAP FOR KOTA TINGGI TOWN

Presented by
Paridah Anun bt. Tahir and Anuar Md. Ali
Department of Irrigation and Drainage
Malaysia

Feb

2007

Contents

1. Flood Situation in Malaysia
2. Flood Management in Malaysia
3. Preparation of Kota Tinggi town Flood Hazard Map
4. Progress
5. Challenges

Flooding in Kuala Lumpur in 1971

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Kuala Lumpur, January 1971

Stormy Sunday

This picture shows a section of Taman Tun Dr Ismail Jaya in Shah Alam, Selangor, submerged in floodwaters. The picture was taken at 11am after Sungai Damansara overflowed its banks due to unusually heavy rain which started at 3.30am yesterday.

- More than 9,000 people evacuated in Shah Alam
- Over 3,000 houses damaged and over 1,000 vehicles submerged
- Floods caused closure of Federal Highway Route II near Batu Tiga, Shah Alam and New Klang Valley Expressway near Bukit Jelutong interchange
- Roads closed for eight hours
- Unusually heavy rainfall caused Sungai Damansara to overflow

See Pages 3, 4, 30 and 31 for reports and pictures

STARpic by KAMAL SELLEHUDDIN

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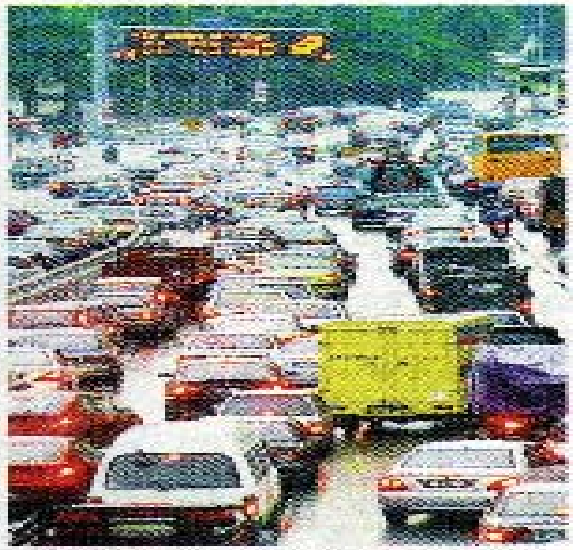
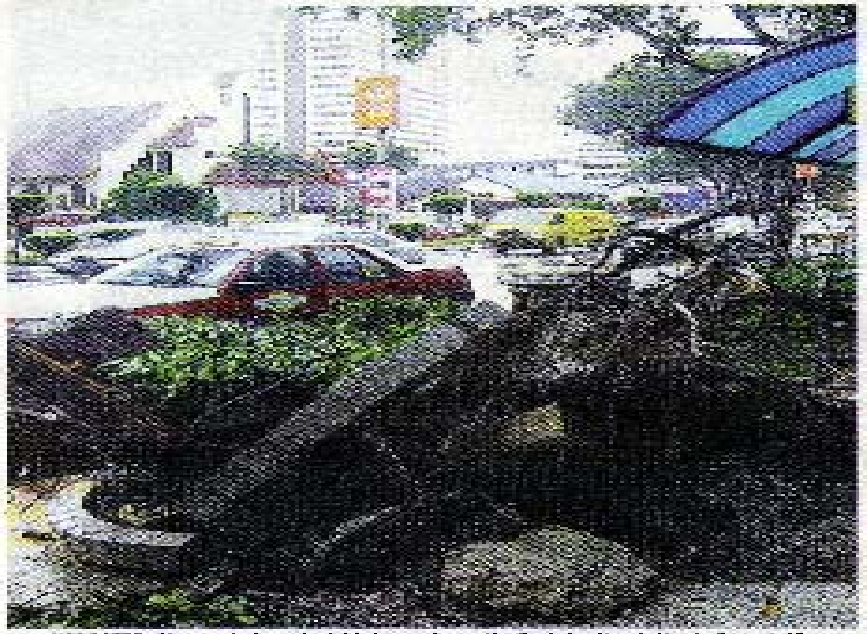
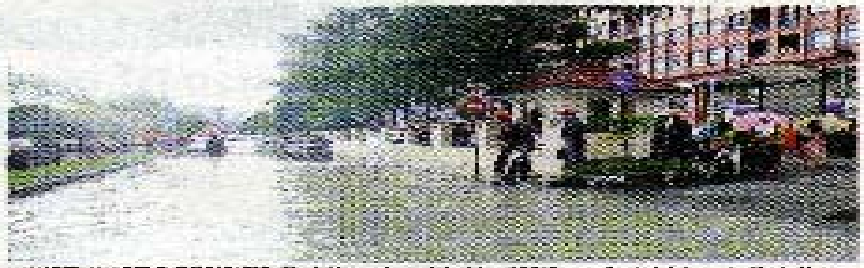
Shah Alam, February 2006



Klang Valley storm havoc





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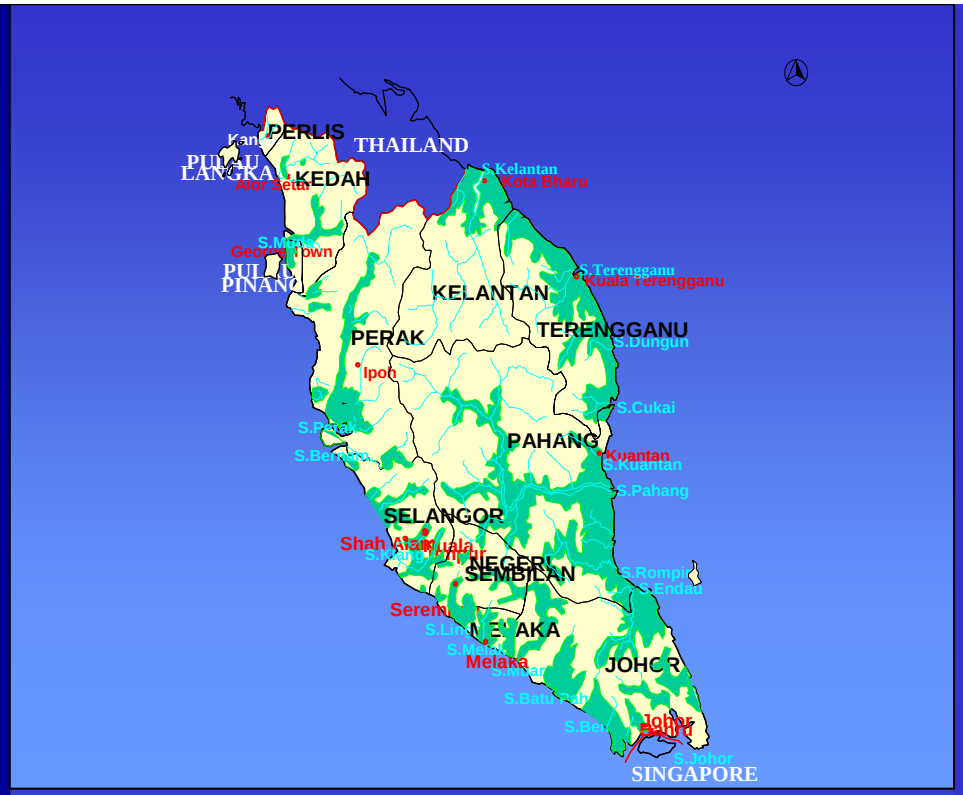

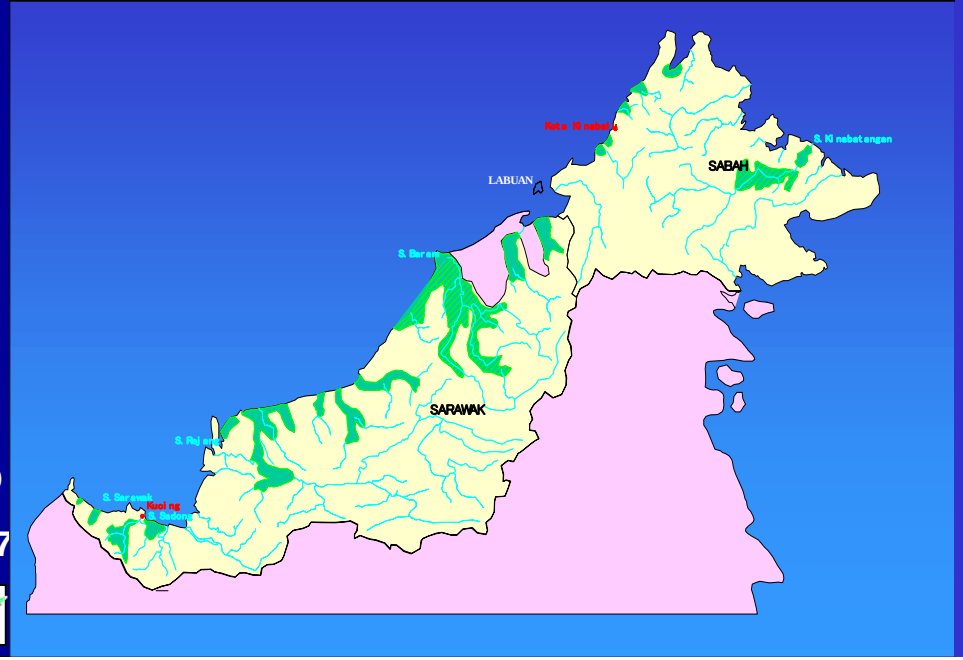

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FLOODS IN MALAYSIA

Climate:

Annual Average Rainfall

Peninsular Malaysia	2,500 mm
Sabah	3,000 mm
Sarawak	3,500 mm

Extreme Events

600 mm in 24 hours,100 – 200 mm in 1-2 hours

- Heavy Rainfall during North East Monsoon affecting East Coast Stat (Widespread floods)
- Intense rainstorms during inter monsoon periods of April-May and August-October (causing flash floods in major towns)

Topography

- Hilly upper reaches
- Normal sloping middle reaches (1 in 2,000)
- Gentle sloping lower reaches (less than 1 in 5,000)
- Mostly subject to tidal influence downstream

Shallow river bed in flood plain due to sedimentation

High tidal influence can cause flooding in coastal areas

Annual Flood Damage - RM 915 Million
Flooded areas - 29,720 km²
No. of People Affected - 4.84 million

* Based on the study 'Updating of Flooding Conditions'(2002)

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Management of Floods

- Curative measures
- Preventive measures
- Flood emergency response

Curative Measures (structural measures)

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Flood Control Structure

Flood Retention Pond

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Preventive measures

- Policies, Guidelines,Laws
- Urban Stormwater Manual (MSMA)
- IRBM
- Controlled development
- Enforcement

14 MONDAY, OCTOBER 15, 2001 NATIONAL NEW STRAITS TIMES

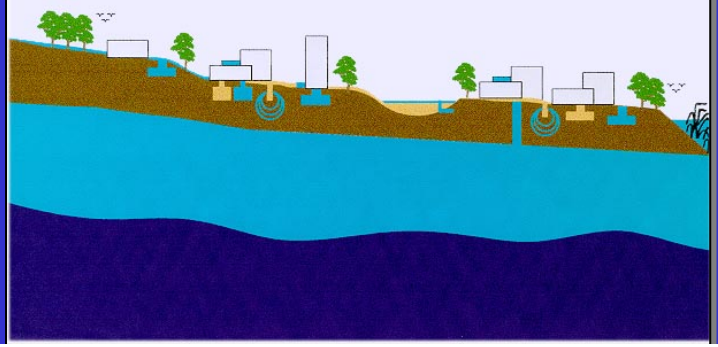
New guidelines for developers

DID manual introduced in move to stop urban flash floods, preserve environs

By Nik Imran Abdullah

DEPARTMENT OF IRRIGATION AND DRAINAGE
MALAYSIA

URBAN STORMWATER MANAGEMENT
MANUAL FOR MALAYSIA



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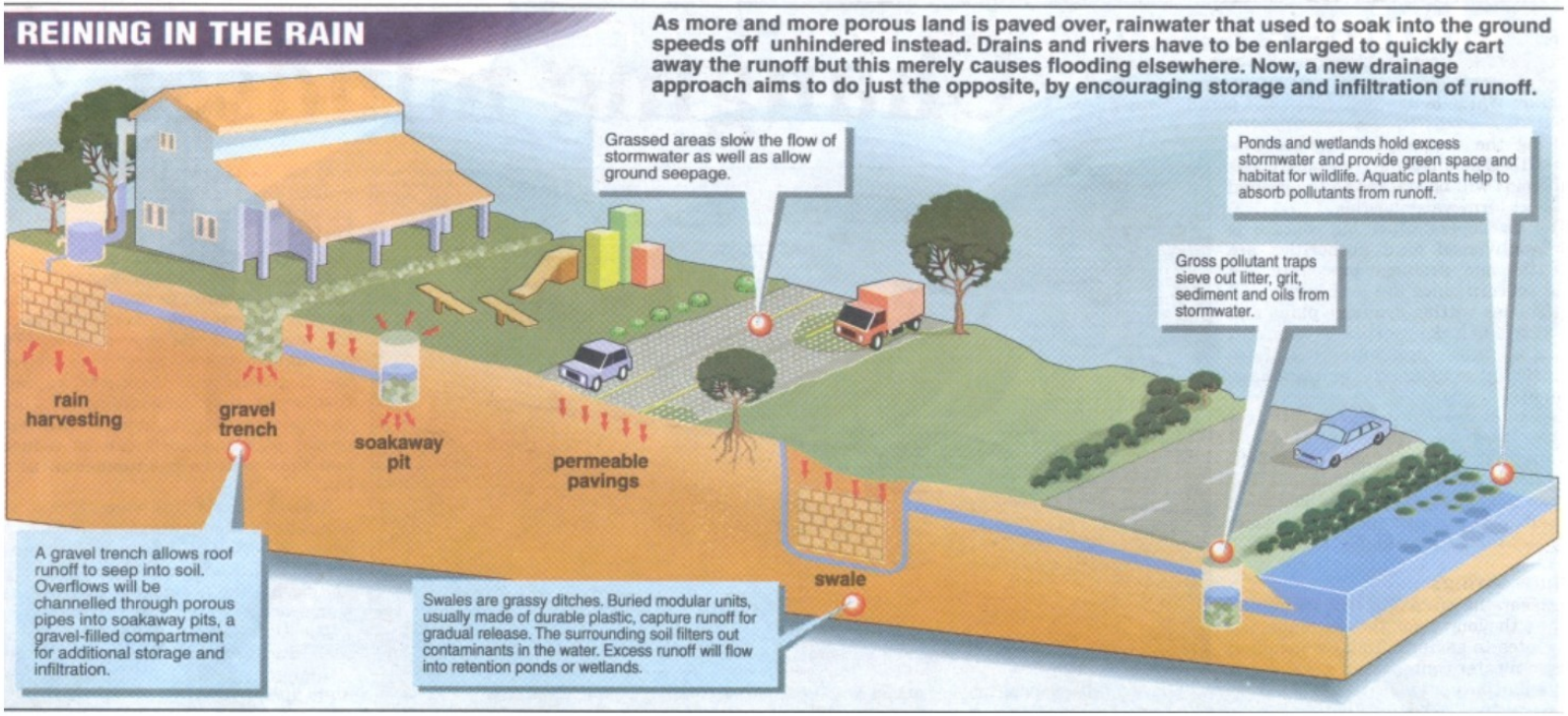
MASMA PRINCIPLE

Managing runoffs



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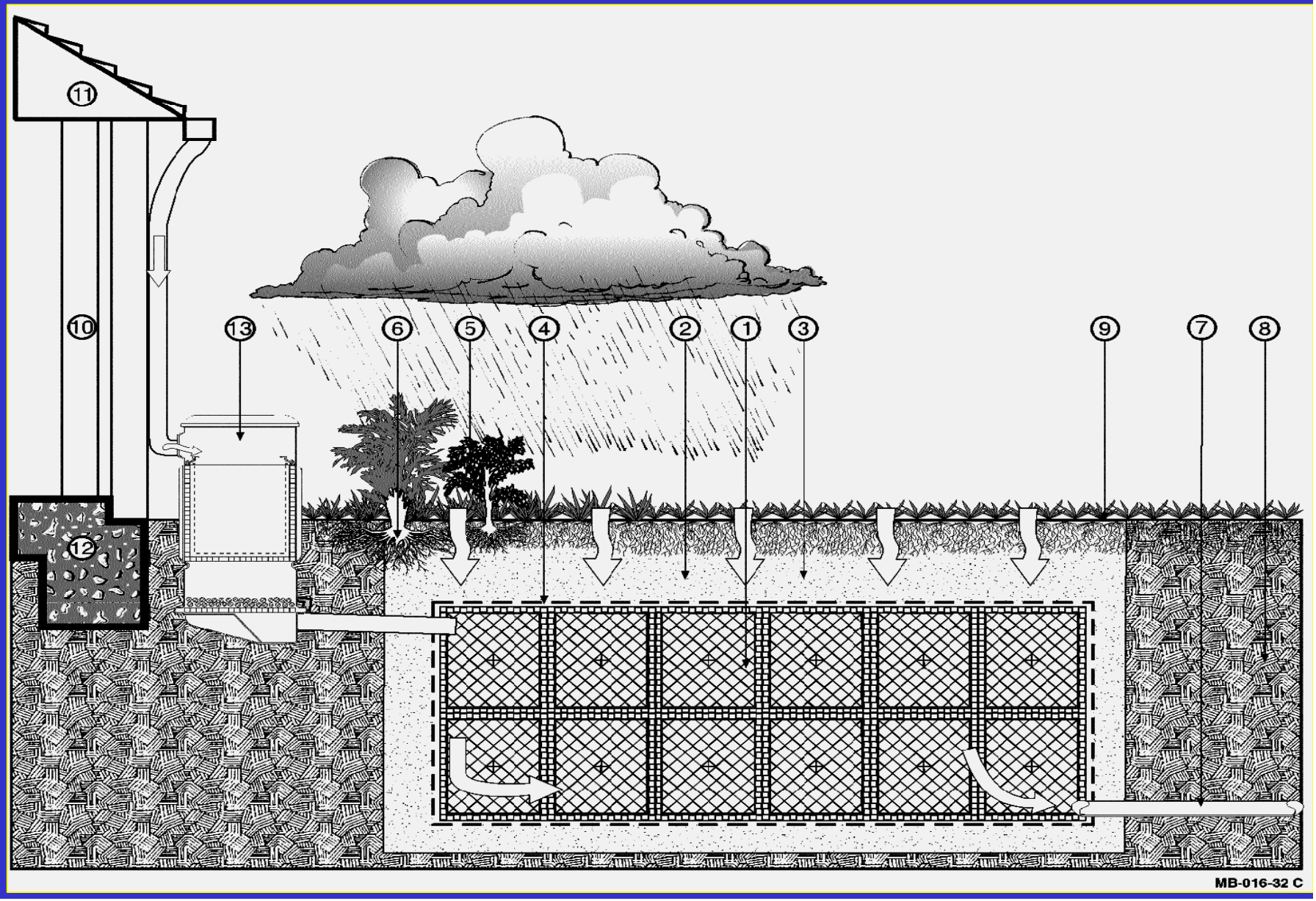
Landscaped Retention Pond

Underground Tanks



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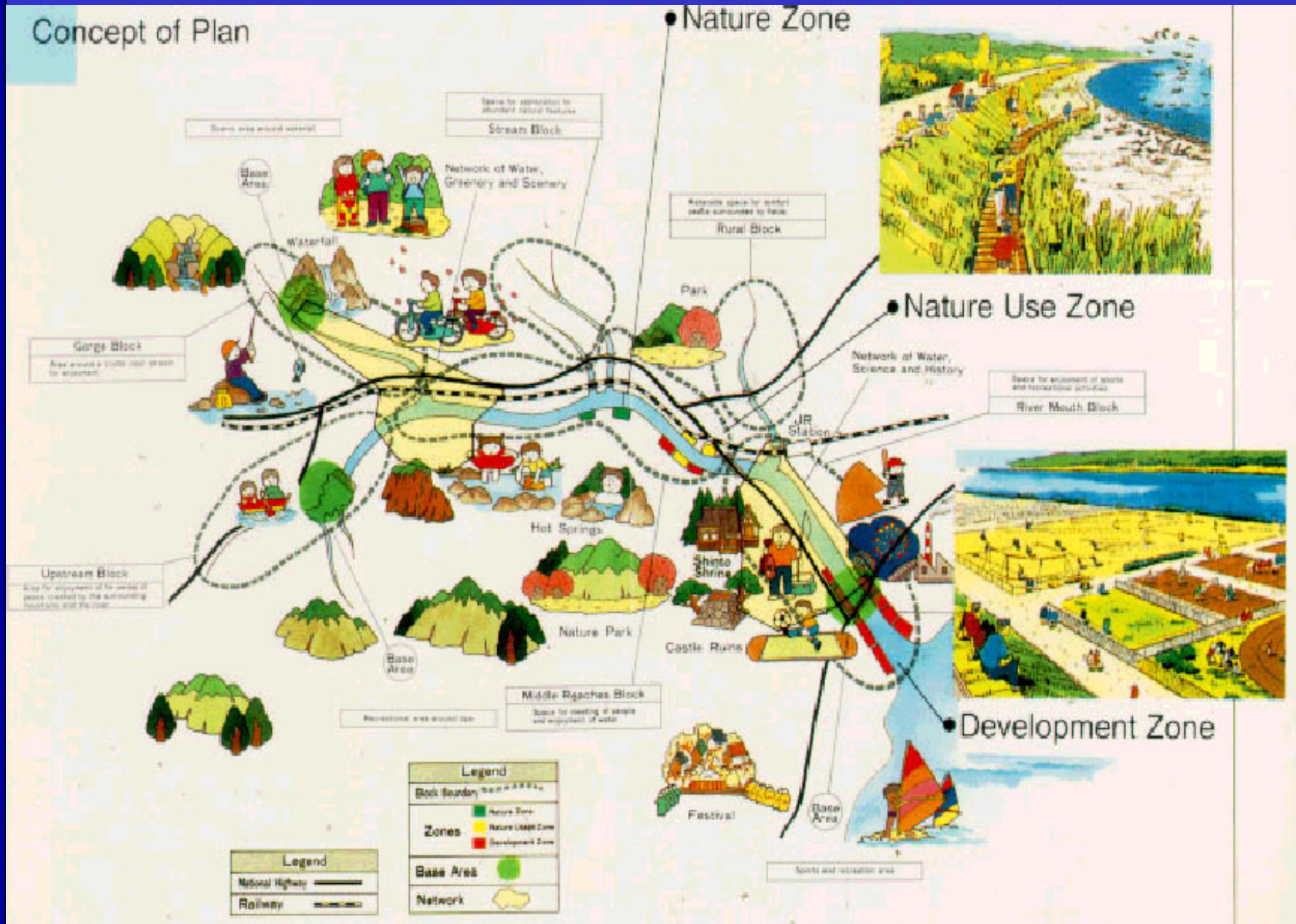

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River Basin Master Plan

Integrated management

Fig. 1 The art and science of river engineering

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NEW STRAITS TIMES NATI

Master plan for river basins

Monitoring land use for development

By Jaswinder Kaur
news@nstp.com.my

KINABATANGAN, Mon. — The Drainage and Irrigation Department will formulate a master plan on land use at 150 river basins in the country, its director-general Datuk Keizrul Abdullah said.

The master plan would become a basis for all local authorities to use as it was impossible for the department's enforcement officers to monitor the almost 12,000 rivers in the country.

He said a master plan was necessary as "every inch" of the country was part of a river basin and all ac-

About 40 people representing government agencies, non-governmental organisations, students and members of the media participated in the expedition which was organised by DID under the "Love Our River" campaign.

Keizrul said integrated plans would be made for major rivers like Sungai Klang and Sungai Langat in Selangor first, while in Sabah, the plan would be for Sungai Kinabatangan which, at 560km, is the longest river in the State.

He said the department aimed to rehabilitate rivers back to Class Three and then down to Class Two.

(Class One refers to pristine riv-

"DID sees rivers as a heritage we should care for. Rivers provide 98 per cent of our drinking water while the remaining two per cent is from underground water," Keizrul said.

"Rivers are also a source of protein in terms of fish, and provides recreation, economic income, ecotourism and transportation," he added.

Mannan, who represented Deputy Chief Minister Datuk Lajim Ukin, said the Government was committed in its efforts to keep rivers clean.

"In 1998, the State Government passed the Water Resources Enact-

National Water Resources Council at its meeting on 29 July 2003 agreed to the preparation of River Basin Master Plans

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FLOOD EMERGENCY RESPONSE

- INVOLVES AN ORGANISED APPROACH
- AIMED AT MINIMISING DAMAGE DURING FLOODS
- THE KEY IS PREPAREDNESS (FHM??)

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Best Practice in Flood Preparedness

i) Before Flood

ii) During Flood

iii) After Flood

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Before Flood

a) Rivers and drain should be obstacle free through regular maintenance and supervision

b) Rivers and coastal bunds checked.

c) Infrastructural set up checked such as dams, pump stations, flood monitoring stations, communication facilities, boats, mobile pumps, and flood-fighting materials like rocks, sandbags and others

d) Inventory updating of flood forecasting and warning monitoring system, flood prone areas and aid facilities.

e) Preparation of the DID flood emergency response mechanism such as set up of emergency/flood surveillance teams, Flood Operation Manual, District/State/Federal Flood Operation Centre,flood emergency operation training.

During Flood

a) Continuous Flood Operation

b) Flood fighting

c) Collection, dissemination and documentation of flood information such as flooded areas, number of people and roads affected, alternative roads, flood mitigation measures.

After flood

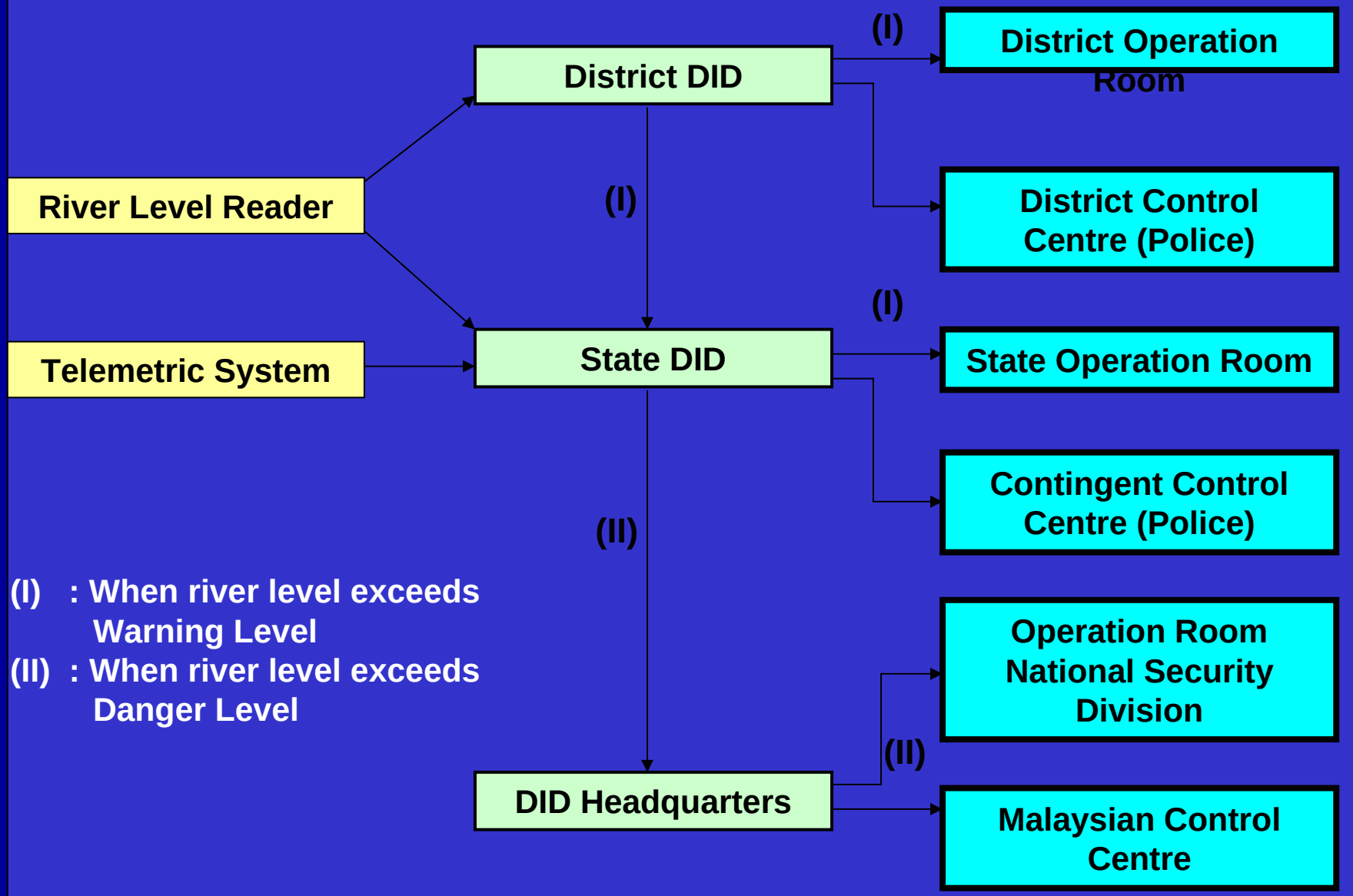
a) Physical restoration such as repair of facilities

b) Compilation of Flood Information

c) Flood analysis- causes of flooding, identify possible measures

d) Flood assessment

DID'S OPERATIONAL STANDING ORDER FOR DISSEMINATION OF CURRENT RIVER LEVEL INFORMATION



(I) : When river level exceeds Warning Level

(II) : When river level exceeds Danger Level

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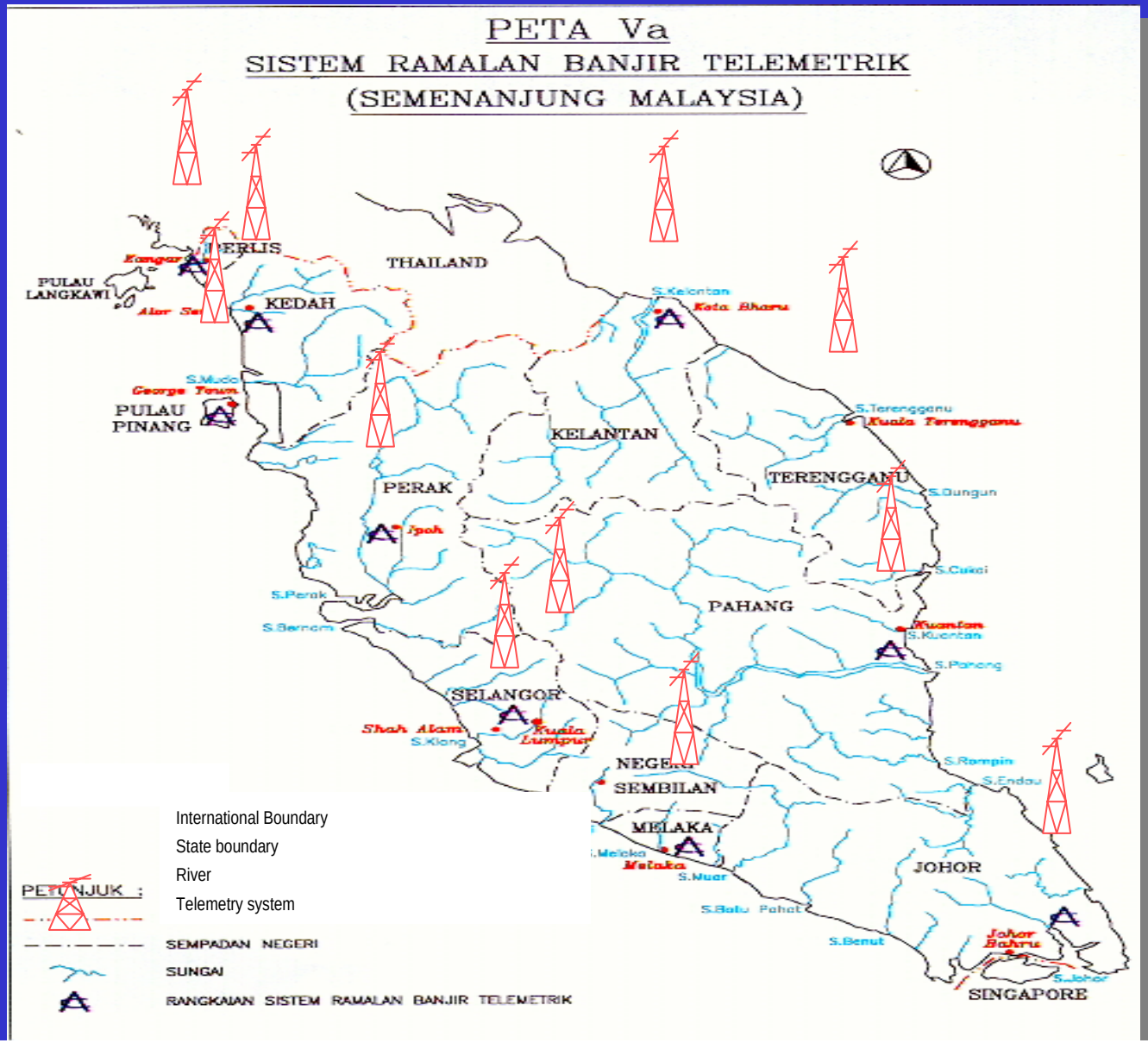
TELEMETRIC SYSTEM
Peninsular Malaysia



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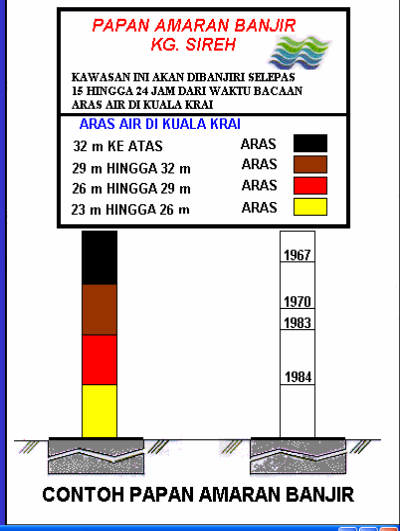
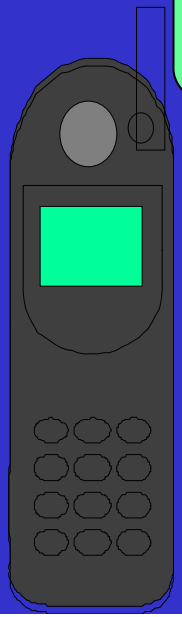
Flood Warning Siren Station

Flood Warning Boards



CONTOH PAPAN AMARAN BANJIR

Sg.Kinabatangan di Balat is at 10.49m, exceeded the alert level by 0.49m on 24/09/2003 08:00



SMS sent to JPS

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Roles of flood hazard map

For residents

(1) Hazard maps offer information on flood damage prior to a disaster, raise awareness of disaster prevention among the residents and encourage residents in normal times to be aware of the need to prepare for voluntary evacuation.

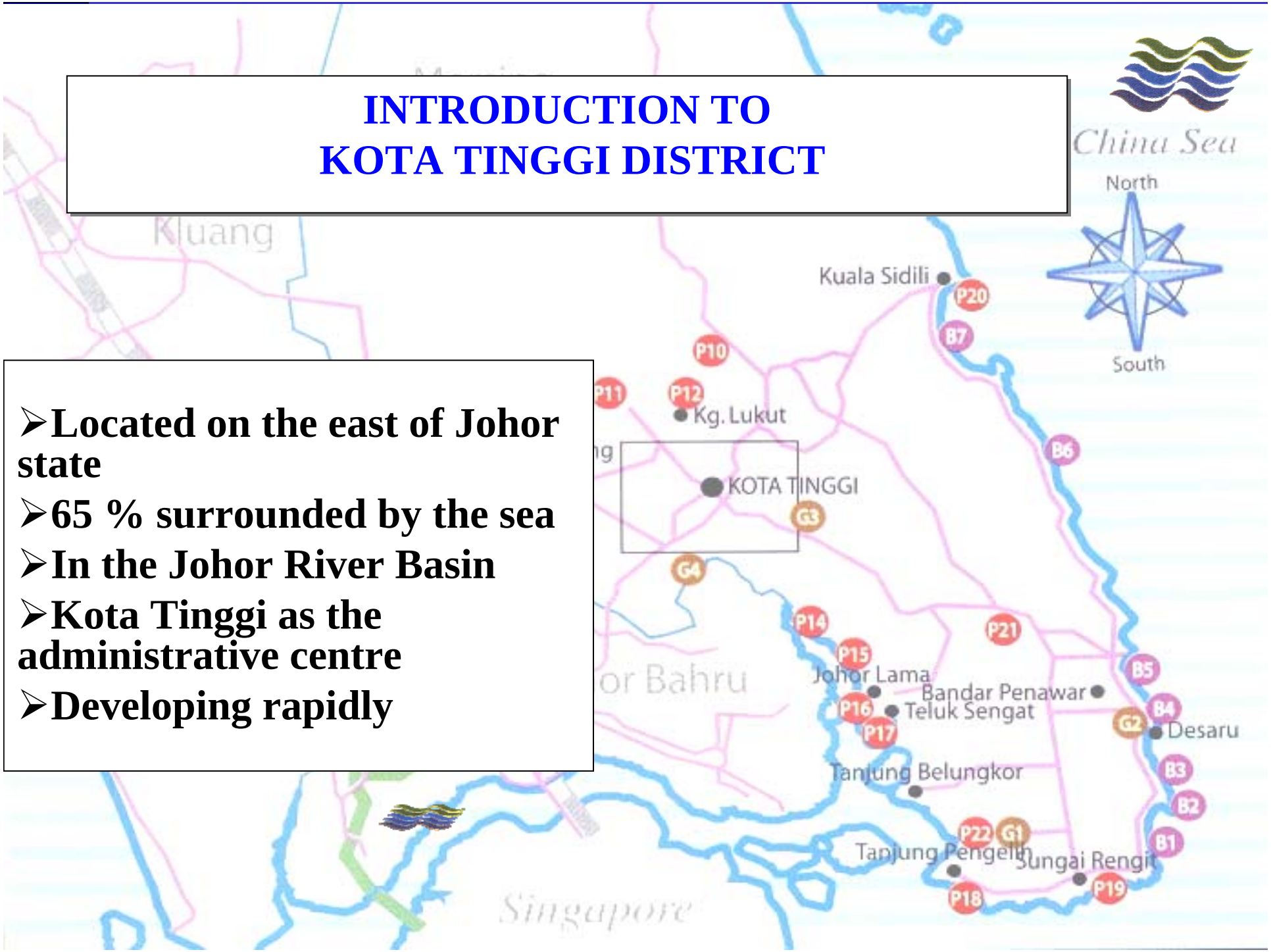
(2) Hazard maps ensure that residents smoothly and promptly evacuate at the time of a warning and the occurrence of a disaster, resulting in a reduction in the damage.

Administrative bodies (persons in charge of disaster prevention)

(3) Through the preparation of flood hazard maps, administrative bodies promote administrative disaster prevention measures on a routine basis.

(4) By using flood hazard maps, administrative bodies can respond quickly and efficiently at the time of a warning and the occurrence of a disaster.

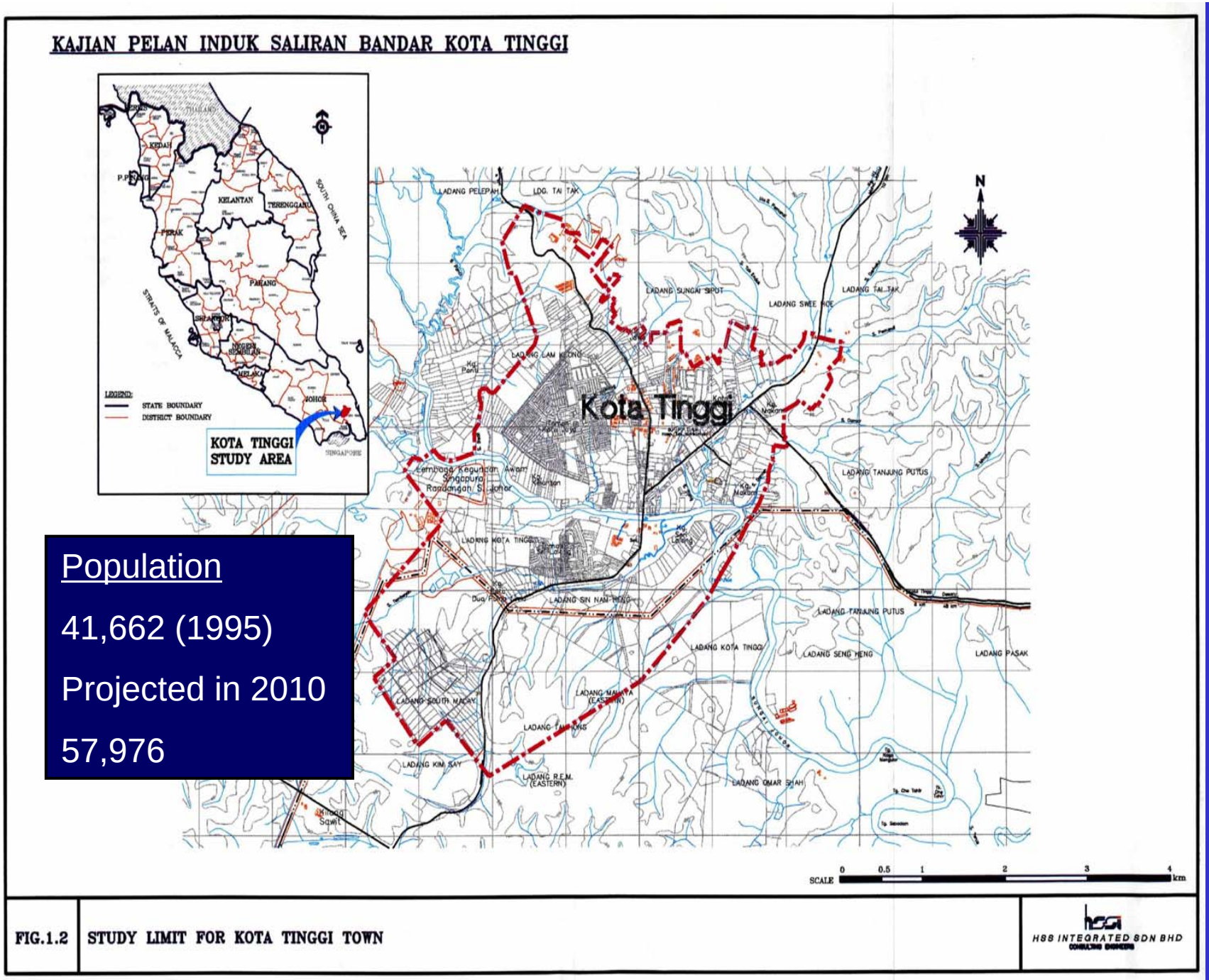
INTRODUCTION TO KOTA TINGGI DISTRICT



- Located on the east of Johor state
- 65 % surrounded by the sea
- In the Johor River Basin
- Kota Tinggi as the administrative centre
- Developing rapidly

Areas frequently flooded in Johor River Basin

- Bandar Kota Tinggi
- Kampung Sg. Telor
- Kampung Tembioh
- Batu 1, Jalan Mawai
- Taman Mawai
- Kg. Sg. Berangan
- Kg Semangar Dalam
- Kg Semangar Luar
- Kg Jawa
- Kg. Kelantan
- Kg. Sg Sembilang
- Kg Sri Jaya
- Kg Rantau Panjang
- Kg Panti
- Kg Batu Empat



Population

41,662 (1995)

Projected in 2010

57,976

FIG.1.2 STUDY LIMIT FOR KOTA TINGGI TOWN

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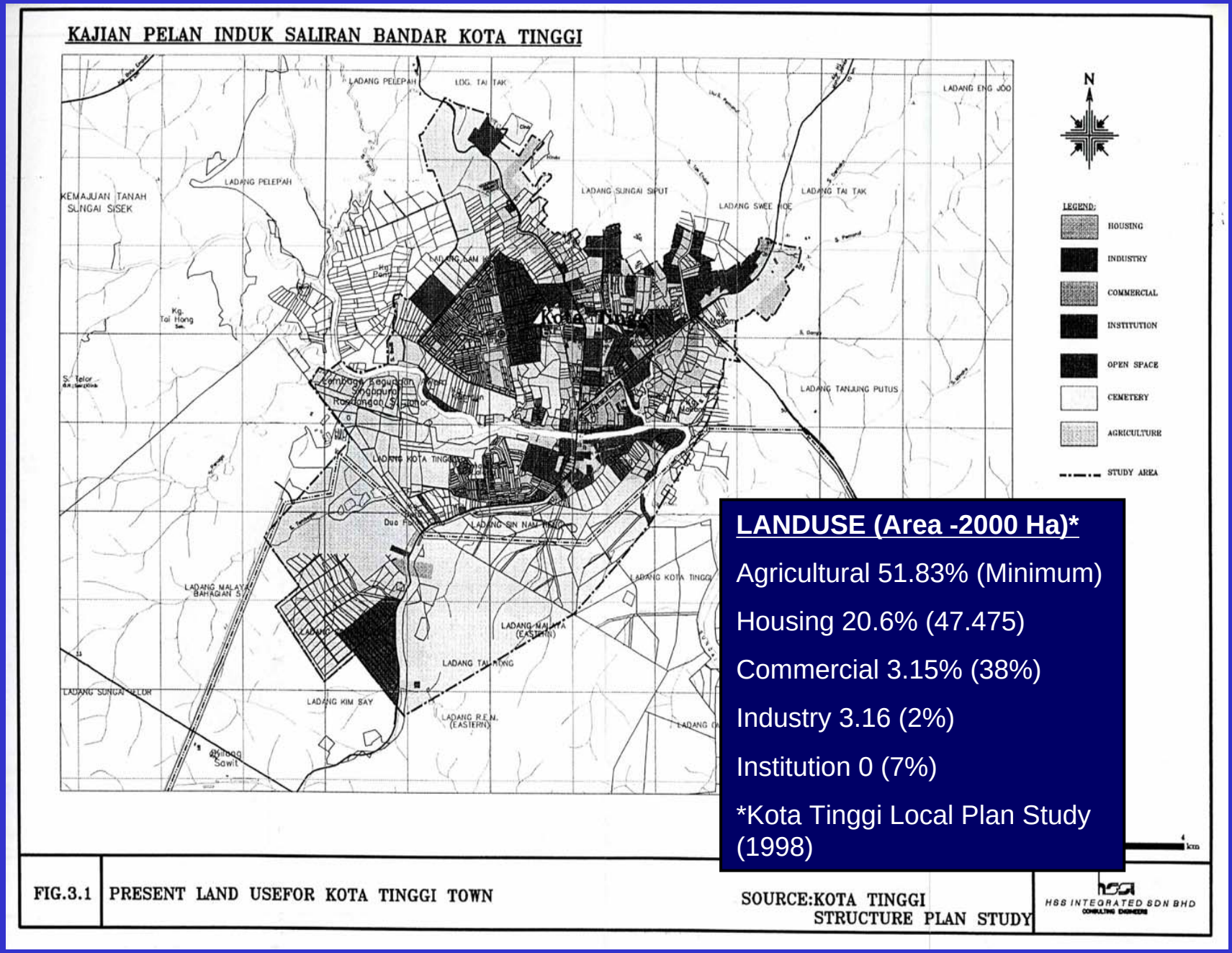

LANDUSE (Area -2000 Ha)*

Agricultural 51.83% (Minimum)

Housing 20.6% (47.475)

Commercial 3.15% (38%)

Industry 3.16 (2%)

Institution 0 (7%)

*Kota Tinggi Local Plan Study (1998)

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Main drainage system in the Kota Tinggi town is Johor river which flows from Linggiu/Sayong Kluang river basin.

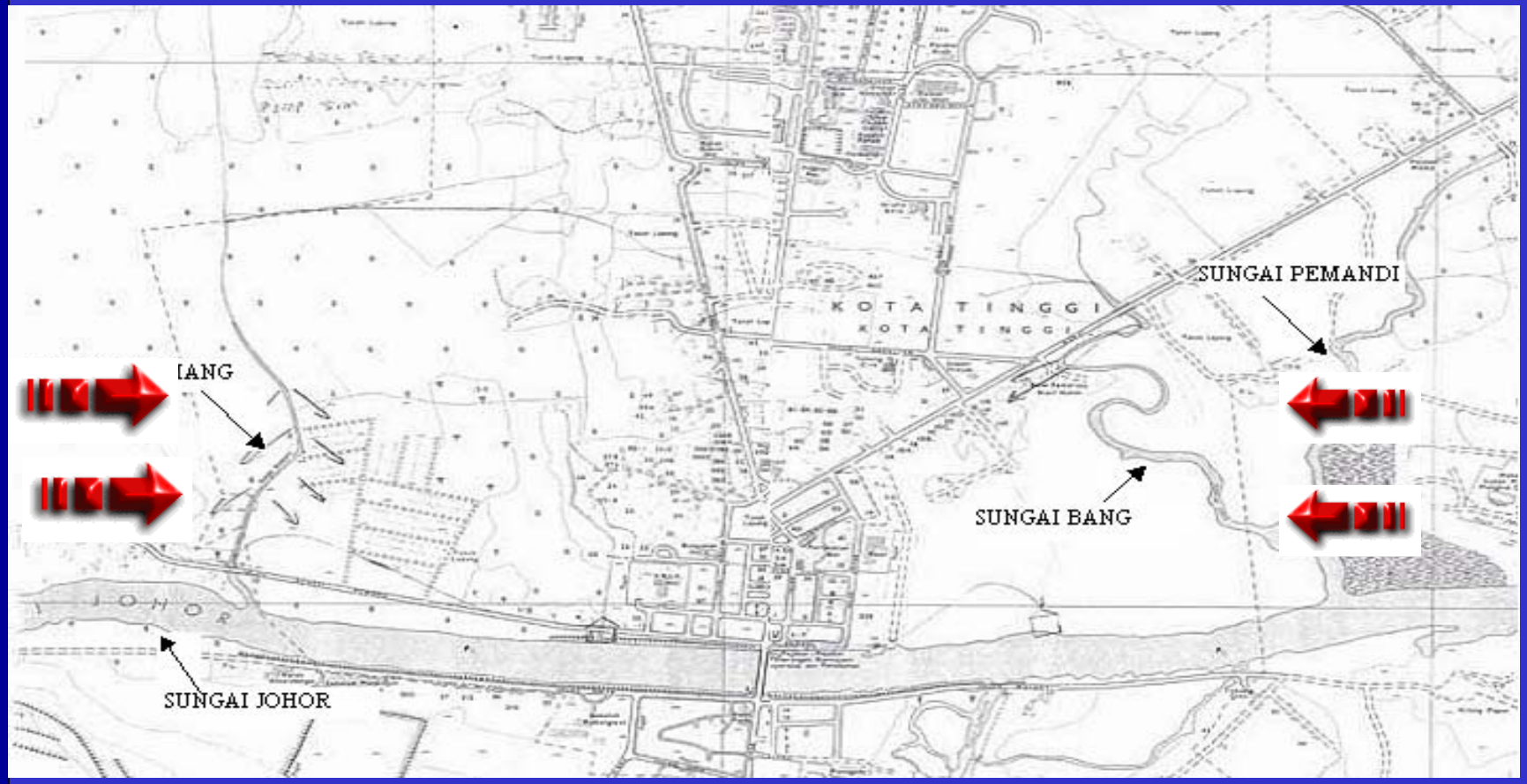
Johor River (Kota Tinggi town):

- ***Sungai Permandi***
- ***Sungai Kemang***
- ***Sungai Kg Kelantan***
- ***Sungai Bang***
- ***Sungai Tembioh***
- ***Sungai Damar***

Reasons for Flooding

- Lack of drains
- Inadequate capacity of waterways and rivers
- Infrastructure crossing waterways
- Tidal effects
- Debris which impede free flow
- Rapid urbanisation
- Areas of low elevation

Overflowing of Johor River



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FLOOD RECORDS

- December 1948
- December 1969
- November 1979
- December 1982
- December 1983
- November 1989
- December 1991
- December 2003
- January 2004
- March 2004

KOTA TINGGI - INUNDATION MAP
10 Years Flood

N
W E
S

Flood Levels
- 0.710667 (m)
- 1.42133 (m)
- 2.132 (m)
- 2.84267 (m)
- 3.55334 (m)
- 4.264 (m)
- 4.97467 (m)
- 5.68534 (m)
- 6.396 (m)
- 7.10667 (m)
- 7.81734 (m)
- 8.528 (m)
- 9.23867 (m)
- 9.94934 (m)

Legend

Par1.dwg
- CONLINE
- GRID
- LAYOUT
- RIVER

Qpoints.txt
- BC WEIR
- CULVERT-Calc
- Q-POINT

Hpoints.txt
- KT
- interpolated

Kt-river1.shp

DEM
- -8.22 - -4.67
- -4.67 - -1.12
- -1.12 - 2.43
- 2.43 - 5.98
- 5.98 - 9.52
- 9.52 - 13.07
- 13.07 - 16.62
- 16.62 - 20.17
- 20.17 - 23.71
- 23.71 - 27.26
- 27.26 - 30.81
- 30.81 - 34.36
- 34.36 - 37.9
- 37.9 - 41.45
- 41.45 - 45

2 0 2 4 Kilometers

Fig.5.7.3

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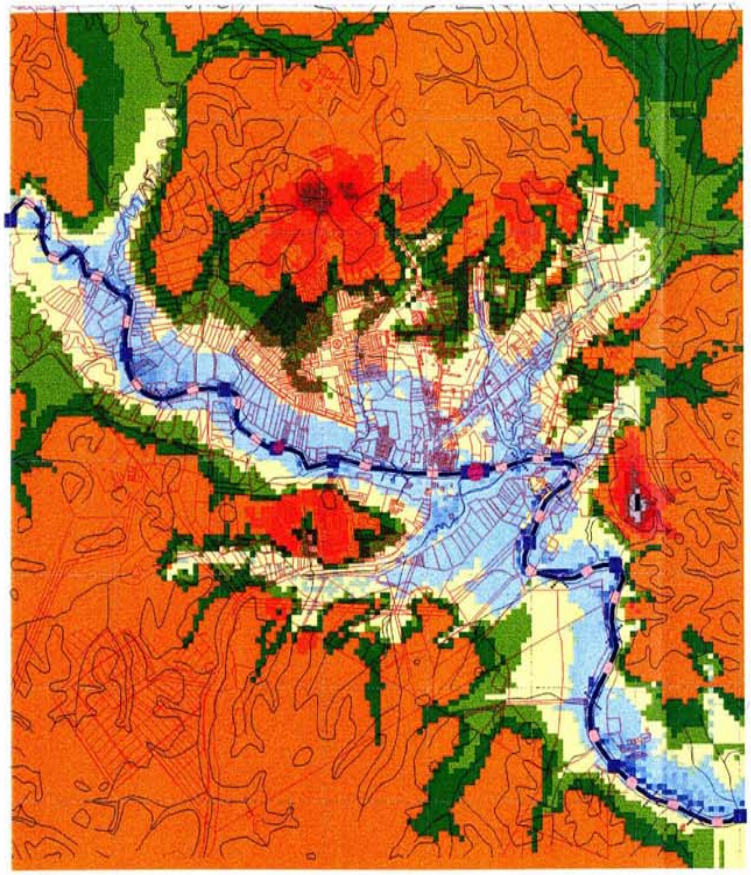
KOTA TINGGI - INUNDATION MAP
25 Years Flood



Flood Levels
- 0.725333 (m)
- 1.45067 (m)
- 2.176 (m)
- 2.90133 (m)
- 3.62667 (m)
- 4.352 (m)
- 5.07733 (m)
- 5.80267 (m)
- 6.528 (m)
- 7.25333 (m)
- 7.97867 (m)
- 8.704 (m)
- 9.42933 (m)
- 10.1547 (m)
- 10.88 (m)

2 0 2 4 Kilometers

N W E S

Legend

Par1.dwg
- CONLINE
- GRID
- LAYOUT
- RIVER

Qpoints.txt
- BC WEIR
- CULVERT-Calc
- Q-POINT

Hpoints.txt
- KT
- interpolated

Kt-river1.shp

DEM
- -8.2 - -4.653
- -4.653 - -1.107
- -1.107 - 2.44
- 2.44 - 5.987
- 5.987 - 9.533
- 9.533 - 13.08
- 13.08 - 16.627
- 16.627 - 20.173
- 20.173 - 23.72
- 23.72 - 27.267
- 27.267 - 30.813
- 30.813 - 34.36
- 34.36 - 37.907
- 37.907 - 41.453
- 41.453 - 45

Fig.5.7.4

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CONSULTING ENGINEERS

Flood occurrence in December 2006

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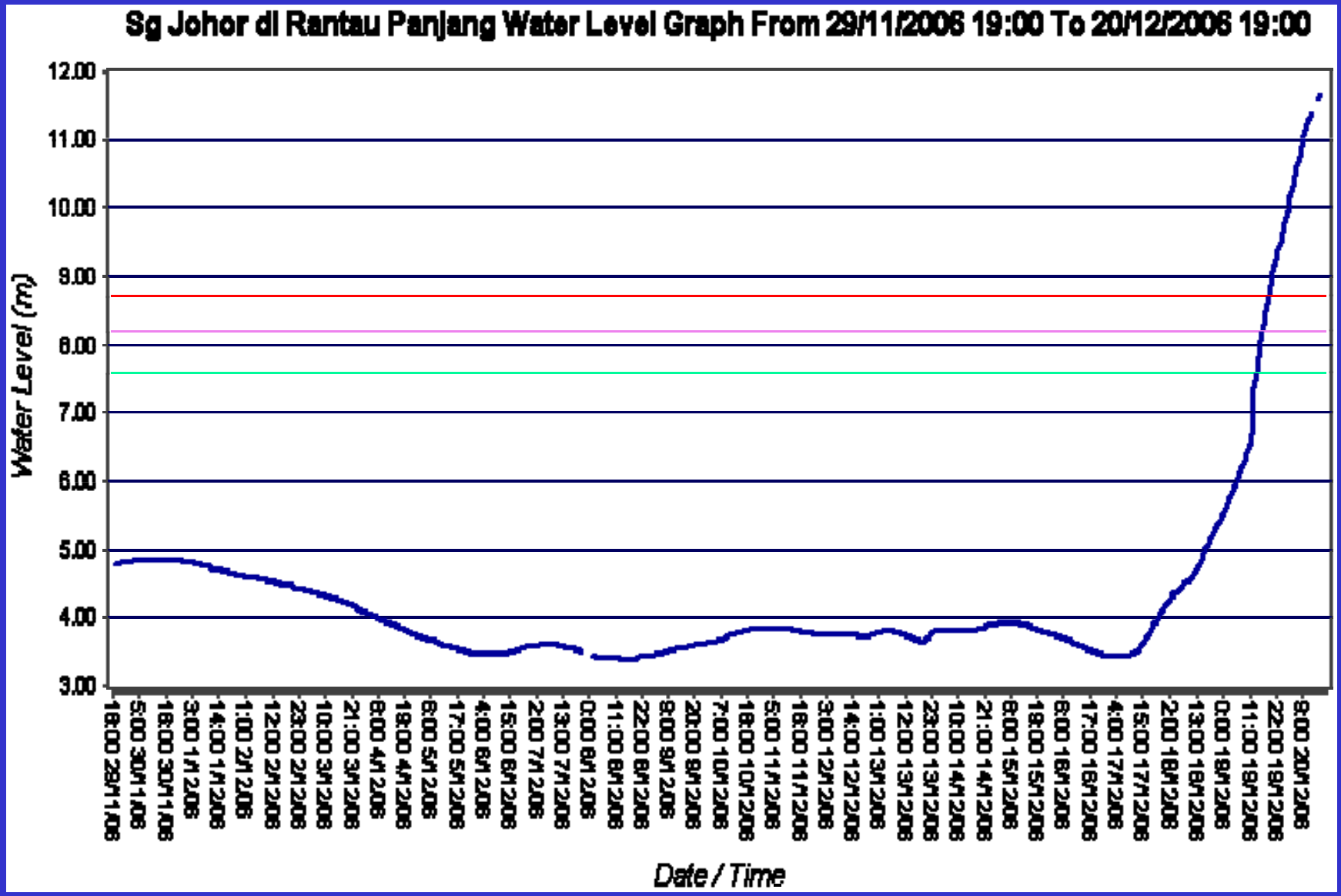
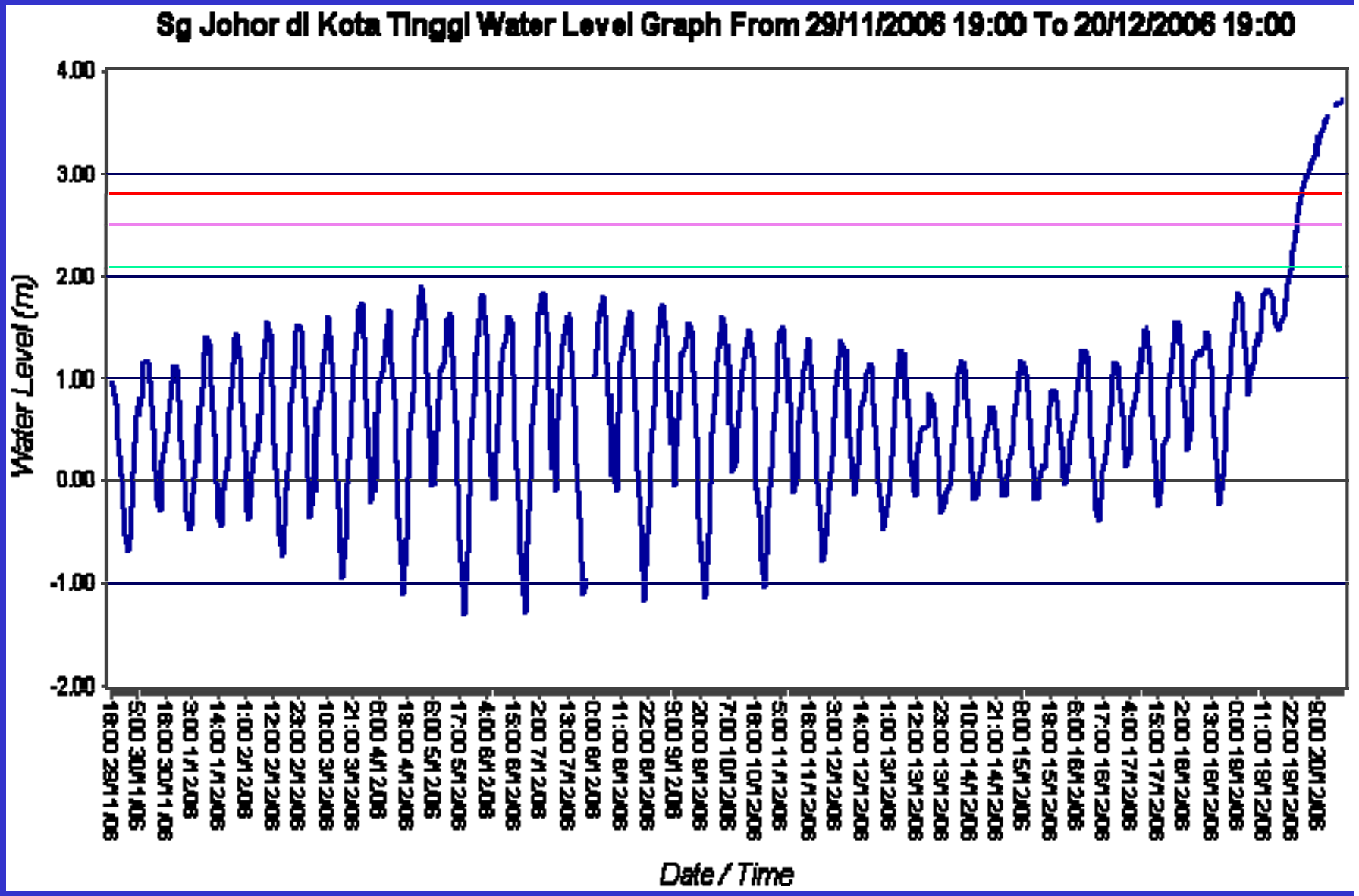
High rainfall between 17/12/2006 – 20 /12/2006 (1900 hrs)

TARIKH	LAYANG-LAYANG	ULU SIBOL	B/BESAR	BNDR. K/TINGGI
17/12/2006	66.00mm	33.00mm	29.00mm	48.00mm
18/12/2006	52.00mm	23.00mm	47.00mm	43.00mm
19/12/2006	176.00mm	219.00mm	200.00mm	157.00mm
20/12/2006	73.00mm	78.00mm	69.00mm	39.00mm
	367.00mm	353.00mm	345.00mm	287.00mm

AVERAGE MONTHLY RAINFALL : 200.00MM


Sg Johor di Rantau Panjang Water Level Graph From 29/11/2006 19:00 To 20/12/2006 19:00
Water Level (m)
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
18:00 29/11/06
5:00 30/11/06
18:00 30/11/06
3:00 1/12/06
14:00 1/12/06
1:00 2/12/06
12:00 2/12/06
23:00 2/12/06
10:00 3/12/06
21:00 3/12/06
8:00 4/12/06
18:00 4/12/06
6:00 5/12/06
17:00 5/12/06
4:00 6/12/06
15:00 6/12/06
2:00 7/12/06
13:00 7/12/06
0:00 8/12/06
11:00 8/12/06
22:00 8/12/06
8:00 9/12/06
20:00 9/12/06
7:00 10/12/06
18:00 10/12/06
5:00 11/12/06
16:00 11/12/06
3:00 12/12/06
14:00 12/12/06
1:00 13/12/06
12:00 13/12/06
23:00 13/12/06
10:00 14/12/06
21:00 14/12/06
8:00 15/12/06
18:00 15/12/06
8:00 16/12/06
17:00 16/12/06
4:00 17/12/06
15:00 17/12/06
2:00 18/12/06
13:00 18/12/06
0:00 19/12/06
11:00 19/12/06
22:00 19/12/06
9:00 20/12/06
Date / Time



Highest level at 5.0m on 21/12/06

Flood occurrence in January 2007 (second wave)

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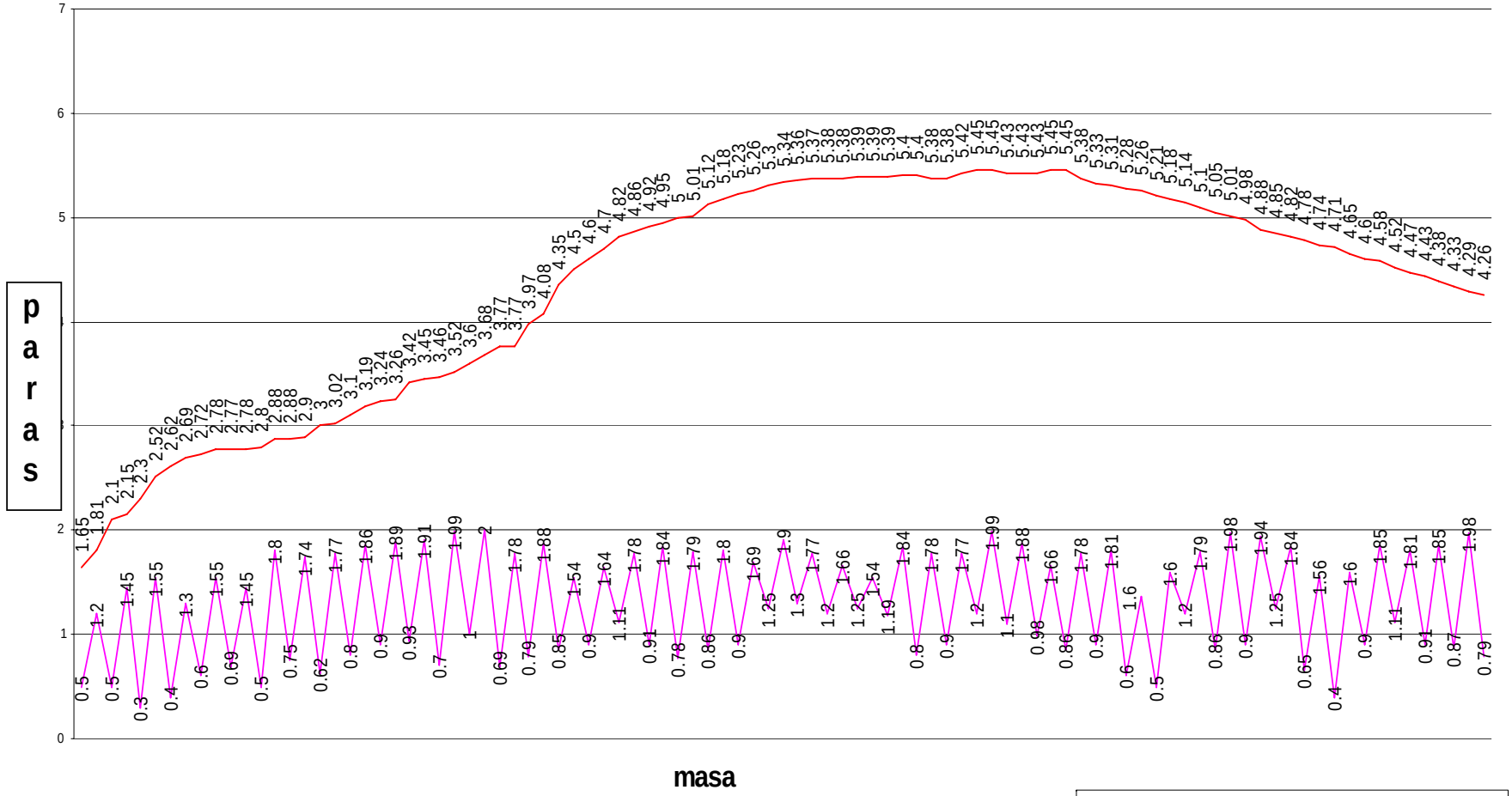
PARAS SUNGAI JOHOR DI BANDAR KOTA TINGGI

12/1/2007 hingga 15/1/2007



Highest level at 5.45m on 14/1/07

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RAINFALL READING FROM 11/1/2007 TO 15/1/2007

STATION	11/1/07	12/1/07	13/1/07	14/1/07	15/1/07	JUMLAH
LAYANG-LAYANG	133	106	87	17	2	345
ULU SIBOL	123	255	82	46	5	511
BUKIT BESAR	134	213	48	35	3	433
KOTA TINGGI	141	111	52	57	12	373

Johor , January 2007

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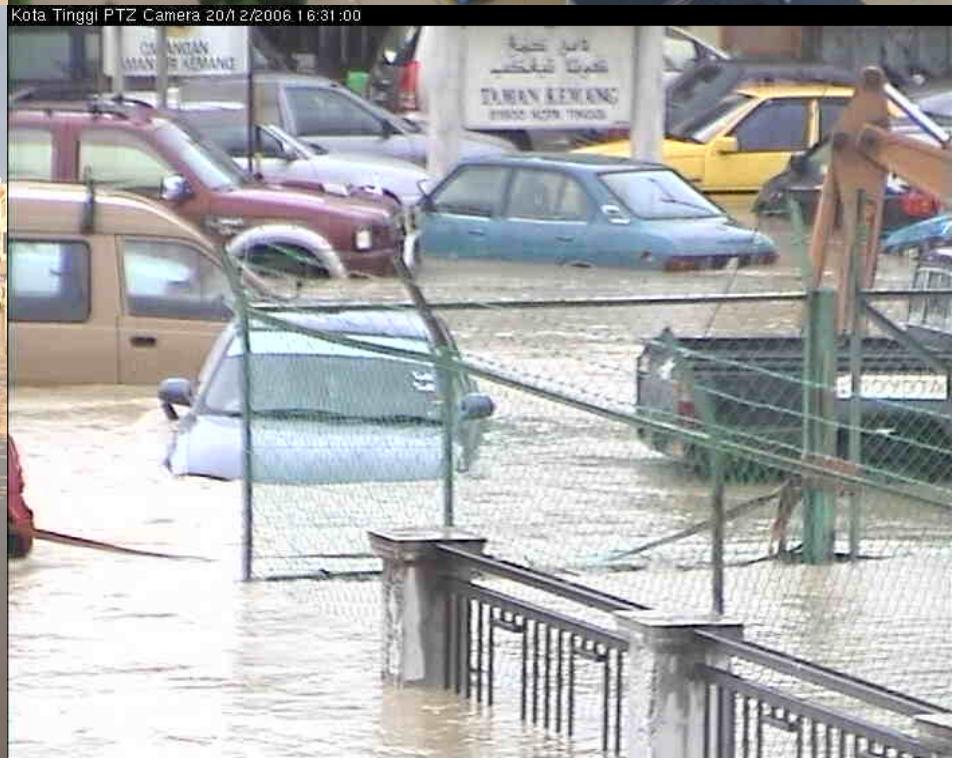
AT KG. BATU 25



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KOTA TINGGI BRIDGE ACROSS SUNGAI JOHOR

NORMAL CONDITION

FLOOD ON JAN 2007

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KOTA TINGGI BRIDGE ACROSS SUNGAI JOHOR

NORMAL CONDITION

FLOOD ON 1968

FLOOD ON DEC 2006

FLOOD ON JAN 2007

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FLOODING IN KOTA TINGGI

NORMAL SITUATION

DEC 2006

DEC 2006

JAN 2007

Feb 2007


TAKAFUL MALAYSIA
TAKAFUL
Bank Islam

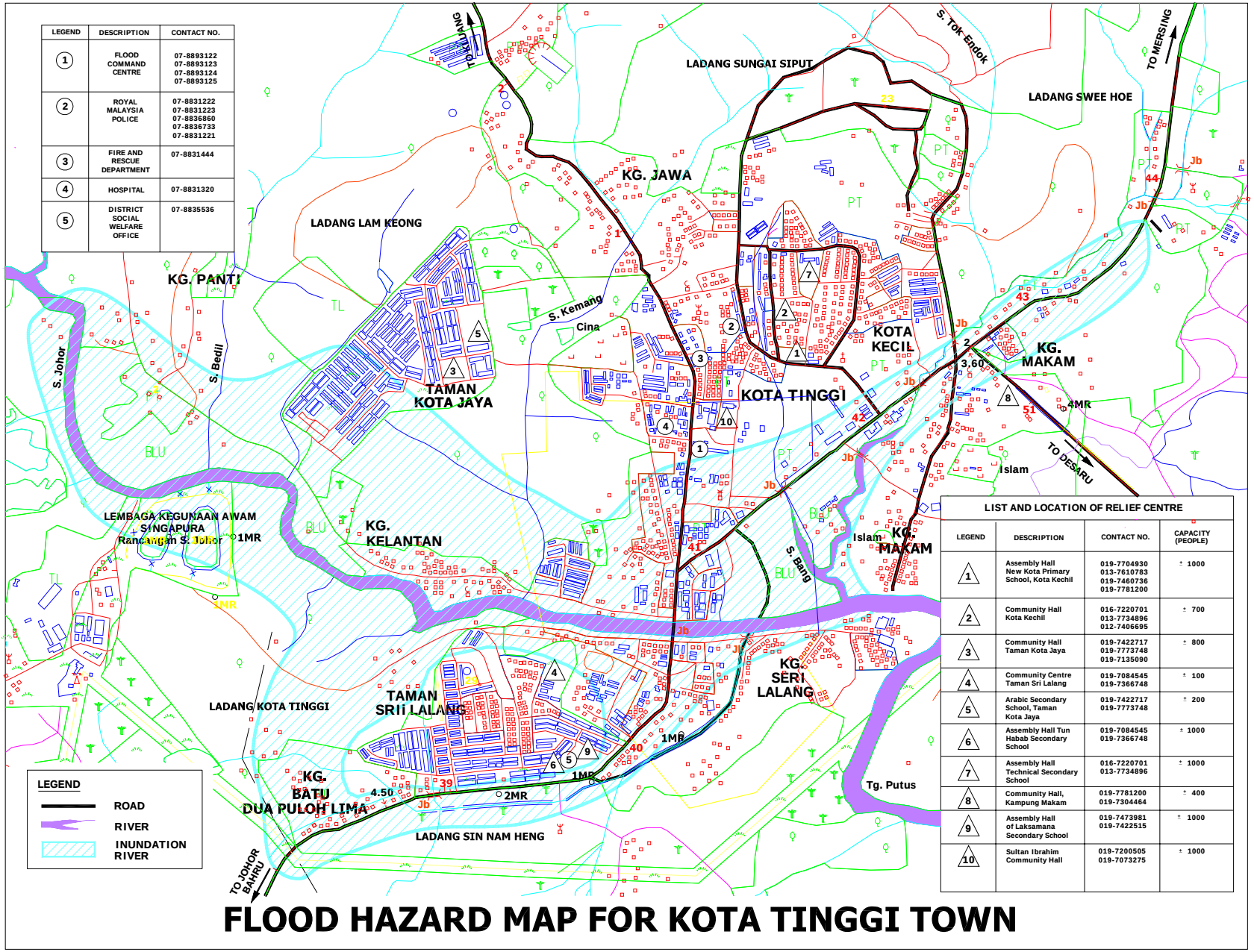

TAKAFUL MALAYSIA
Bank Islam
26 1 2007


AGATA


BANK RAKYAT
26 1 2007

Feb

2007



LEGEND	DESCRIPTION	CONTACT NO.
1	FLOOD COMMAND CENTRE	07-8893122 07-8893123 07-8893124 07-8893125
2	ROYAL MALAYSIA POLICE	07-8831222 07-8831223 07-8836860 07-8836733 07-8831221
3	FIRE AND RESCUE DEPARTMENT	07-8831444
4	HOSPITAL	07-8831320
5	DISTRICT SOCIAL WELFARE OFFICE	07-8835536

LIST AND LOCATION OF RELIEF CENTRE

LEGEND	DESCRIPTION	CONTACT NO.	CAPACITY (PEOPLE)
1	Assembly Hall New Kota Primary School, Kota Kechil	019-7704930 013-7610783 019-7460736 019-7781200	± 1000
2	Community Hall Kota Kechil	016-7220701 013-7734896 012-7406695	± 700
3	Community Hall Taman Kota Jaya	019-7422717 019-7773748 019-7135090	± 800
4	Community Centre Taman Sri Lalang	019-7084545 019-7366748	± 100
5	Arabic Secondary School, Taman Kota Jaya	019-7422717 019-7773748	± 200
6	Assembly Hall Tun Habab Secondary School	019-7084545 019-7366748	± 1000
7	Assembly Hall Technical Secondary School	016-7220701 013-7734896	± 1000
8	Community Hall, Kampung Makam	019-7781200 019-7304464	± 400
9	Assembly Hall of Laksamana Secondary School	019-7473981 019-7422515	± 1000
10	Sultan Ibrahim Community Hall	019-7200505 019-7073275	± 1000

FLOOD HAZARD MAP FOR KOTA TINGGI TOWN

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FLOOD RELIEF CENTRES

LEGEND	DESCRIPTION	CONTACT NO	CAPACITY (PEOPLE)
1	Assembly Hall New Kota Primary School, Kota Kechil	019-770 4930 013-761 0783	± 1000
2	Community Hall, Kota Kechil	016-7220701 013-7734896	± 700
3	Community Hall, Taman Kota Jaya	019-7422717 019-7773748	± 800
4	Community Centre, Taman Sri Lalang	019-7084545 019-7366748	± 100
5	Arabic Secondary School, Taman Kota Jaya	019-7422717 019-7773748	± 200
6	Assembly Hall Tun Habab Secondary School	019-7084545 019-7366748	± 1000
7	Assembly Hall Technical Secondary School	016-7220701 013-7734896	± 1000
8	Community Hall, Kamapung Makam	019-7781200 019-7304464	± 400
9	Assembly Hall of Laksamana Secondary School	019-7473981 019-7422515	± 1000
10	Sultan Ibrahim Community Hall	019-7200505 019-7073275	± 1000

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Legend	Description	Contact No
1	FLOOD COMMAND CENTRE	07-889 3122 07-889 3123 07-889 3124 07-889 3125
2	ROYAL MALAYSIA POLICE	07-883 1222 07-883 1223 07-883 6860 07-883 6733 07-883 1221
3	FIRE AND RESCUE DEPARTMENT	07-883 1444
4	HOSPITAL	07-883 1320
5	DISTRICT SOCIAL WELFARE OFFICE	07-883 5536

INFORMATION ON EVACUATION CENTRE
MUKIM BANDAR ZONE

1 **Name of Evacuation centre** : Dewan Serbaguna Taman Kota Jaya

2. Area : 55m x 28m **3. Capacity** : ± 800
4. Sanitary facilities : 5 male 5 female
5. Electricity : Available
6. Cooking facilities : Taman Kemang resident association
7. Praying facilities : Bilik Solat Dewan
8. Name of village head : Tuan Haji Rahman

9. Zone officer :
1. Encik Hairudin bin Hj Aripin - 019-7422717
2. Encik Prasadh a/l K.V. Pillay - 019-7773748
3. Puan Murukasvary a/p Thanarajan - 019-7135090
4. Tn. Hj Mohd Amin @ Hasnat bin Sulaiman - 07-8831719
5. Tn. Hj Abd. Latip bin Ali - 019-7435159

10. Assistant Zone officer :
1. Encik Md Khisban bin Abu Yamin - 017-7163444
2. Encik Azman bin Hj Abdul Rahman -
3. Encik Soffian bin Mohd Yassin - 013-7980474
4. Cik Halina binti Hussine - 019-7666286

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INFORMATION ON EVACUATION CENTRE
MUKIM BANDAR ZONE

1. Name of Evacuation Centre : Sekolah Menengah Agama (Arab)
Taman Kota Jaya

2. Area : 42m x 7m **3. Capacity** : ± 200

4. Sanitary facilites : 3 male 3 female

5. Electricity : Available

6. Cooking facilites : Jawatankuasa Taman Kemang

7. Praying facilites : Surau Taman Kota Jaya

8. Name of village head : Tuan Haji Rahman

9. Zone officer :

1.	Encik Hairudin bin Hj Aripin	- 019-7422717
2.	Encik Prasadh a/l K.V. Pillay	- 019-7773748
3.	Puan Murukasvary a/p Thanarajan	- 019-7135090
4.	Tn. Hj Mohd Amin @ Hasnat bin Sulaiman	- 07-8831719
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Procedure on preparation of flood hazard maps

Establish location for a flood hazard map based on certain criterias	Done
Collection of data	Data and information need to be updated
Establishment of preparation conditions	To be reviewed
Review of information on inundation	To carry out modelling
Review of information on evacuation	Done
Review of an outline plan for the flood hazard map	To discuss further
Systematization of issues related to disaster prevention	Can be raised through the Flood Commission
Preparation of a basic plan for the flood hazard map	Done
Dissemination of the flood hazard map for residents	Through local authority (not yet)
Use of the flood hazard map by residents and administrative bodies	Not yet. Promotion needed

Challenges

- Acceptance of local authorities
- Acceptance of residents
- Continuous programme on flood awareness and preparedness

THANK YOU

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