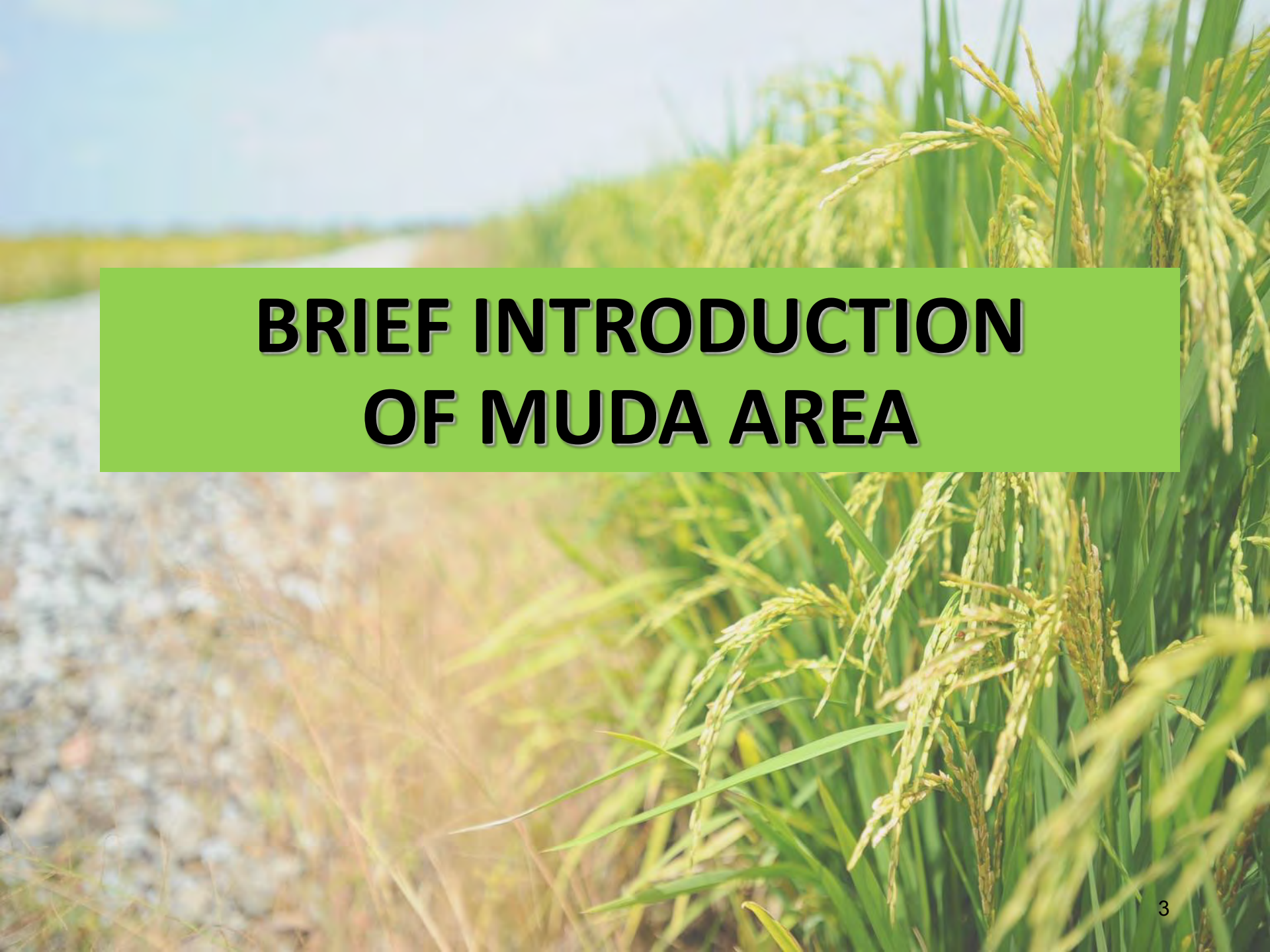
WELCOME *to*

MUDA AGRICULTURAL DEVELOPMENT AUTHOURITY

ALOR SETAR, KEDAH DARUL AMAN.

Presentation Outline

1. Brief Introduction of MADA
2. Irrigation & Drainage Management
3. Flood Mitigation
4. Tidal Barrage Operation at Sg. Kedah
5. Impact Of Muda Irrigation Scheme



BRIEF INTRODUCTION OF MUDA AREA

BRIEF INTRODUCTION OF MUDA AREA

LOCATION MAP

BRIEF INTRODUCTION OF MUDA AREA

1

THE HISTORICAL PROFILE (PRE-MUDA PROJECT)

- Paddy has for centuries been cultivated in **coastal plains of Kedah and Perlis states**.
- Paddy cultivation then was carried out **using local tradition implements** and was **planted once a year**.
- In general about **72% of farmers lived under poverty level**

.

BRIEF INTRODUCTION OF MUDA AREA

POLICY CHANGES

- Following the fall in tin and rubber prices in the 1920s, the **Colonial British Government** started to take steps to **increase rice production to meet local demand**.
- From 1955 to the immediate post – independence years**, a policy of self-sufficiency** in rice was adopted by the government.
- In accordance with the policy, under the **First Malaysia Plan (1965 – 1970)** the Muda Irrigation Project was **launched**.

BRIEF INTRODUCTION OF MUDA AREA

MADA

MUDA AGRICULTURAL DEVELOPMENT AUTHORITY (MADA)

- **A statutory body** legislated under the Act of Parliament, Federation of Malaysia. **- Act 70, Muda Agricultural Development Authority Act, 1972**

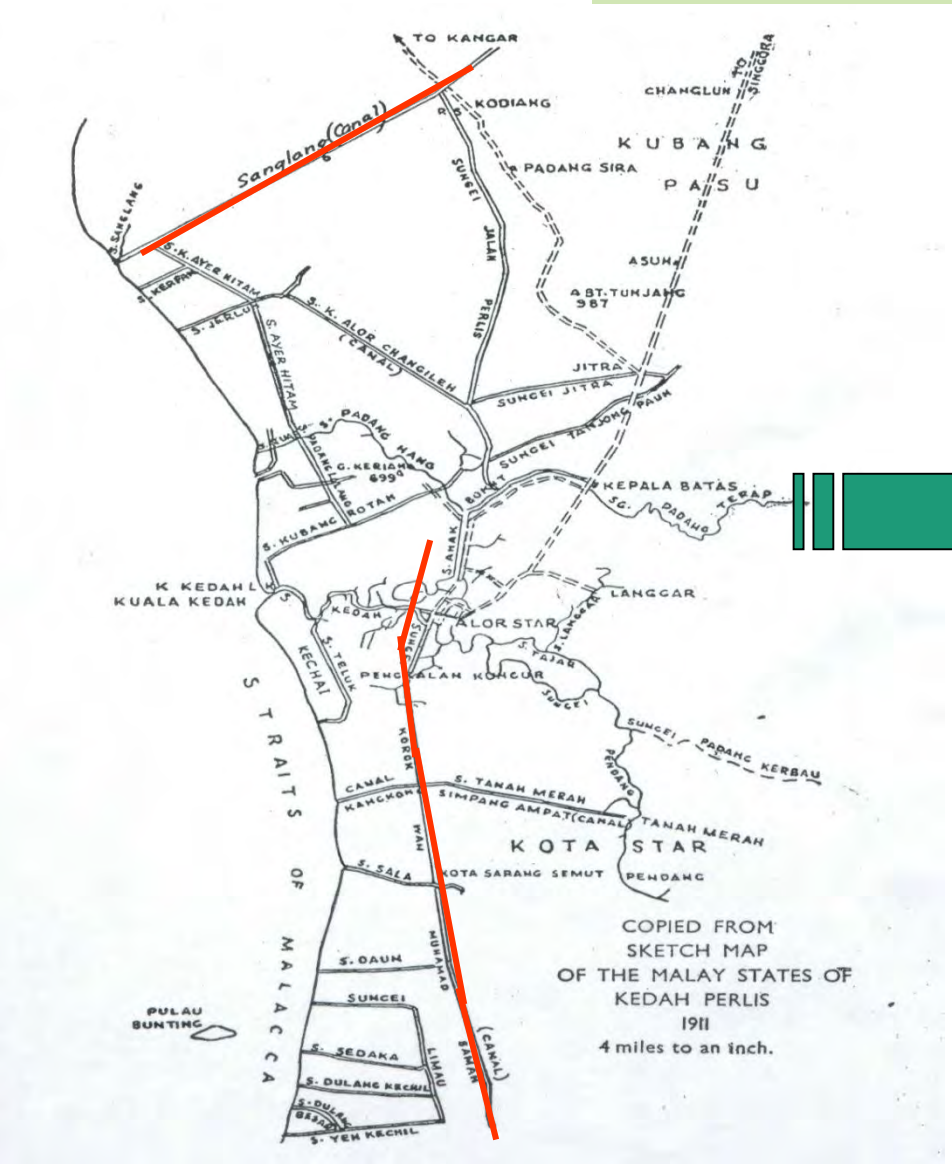
MAIN FUNCTION PROVIDED IN ACT:

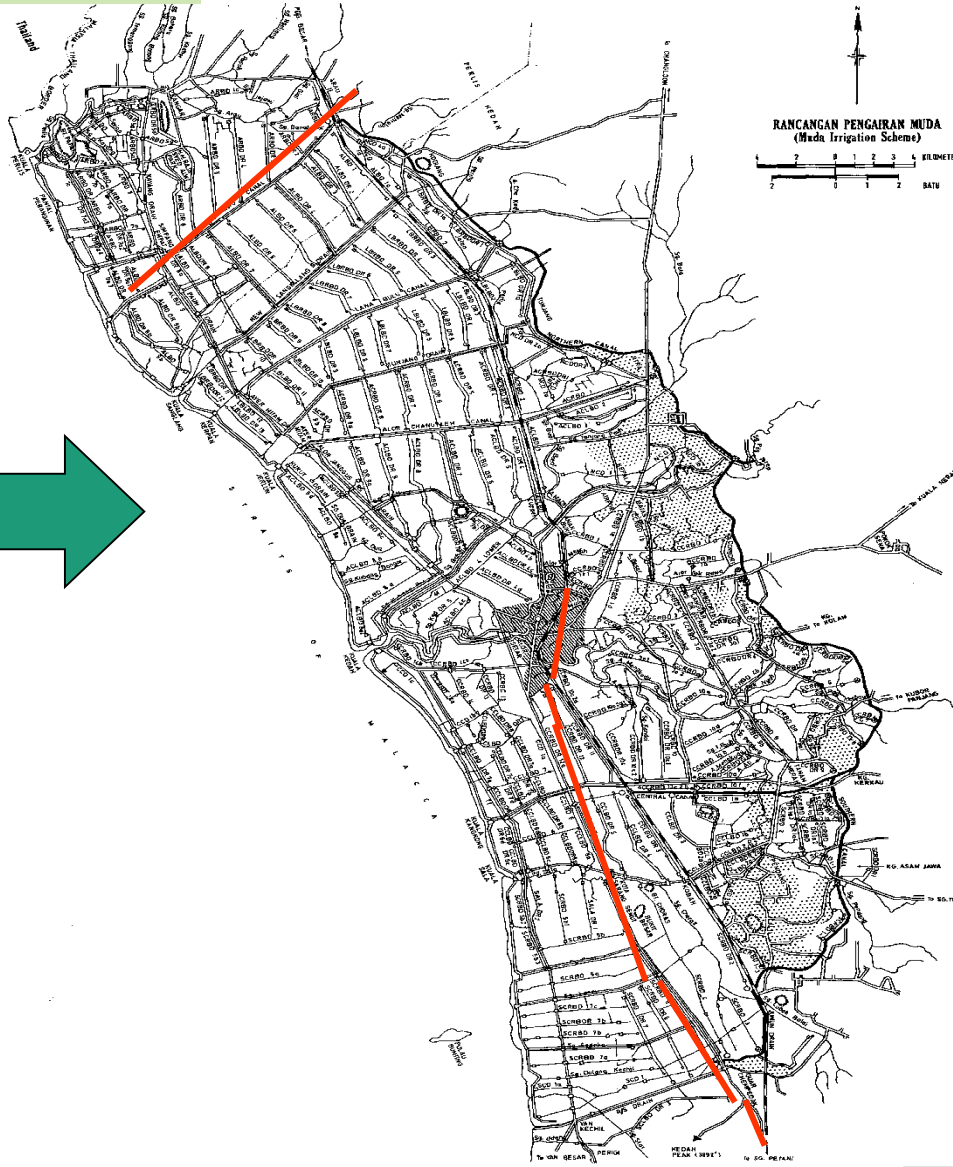
- To develop, promote, facilitate and execute **socio and economic development** in the Muda Area.
- To plan and execute in the Muda Area any **agriculture development** that has been authorized by the State Government of Kedah and Perlis.

PADDY CULTIVATION TRANSFORMATION

1895

1970

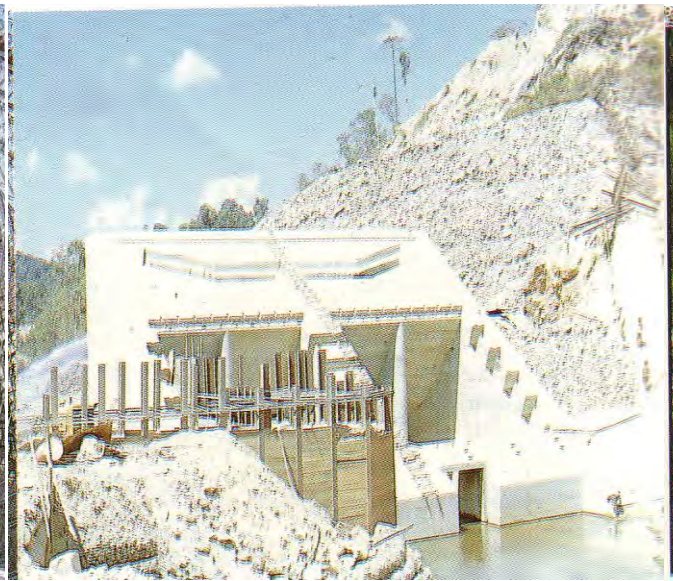




BRIEF INTRODUCTION OF MUDA AREA

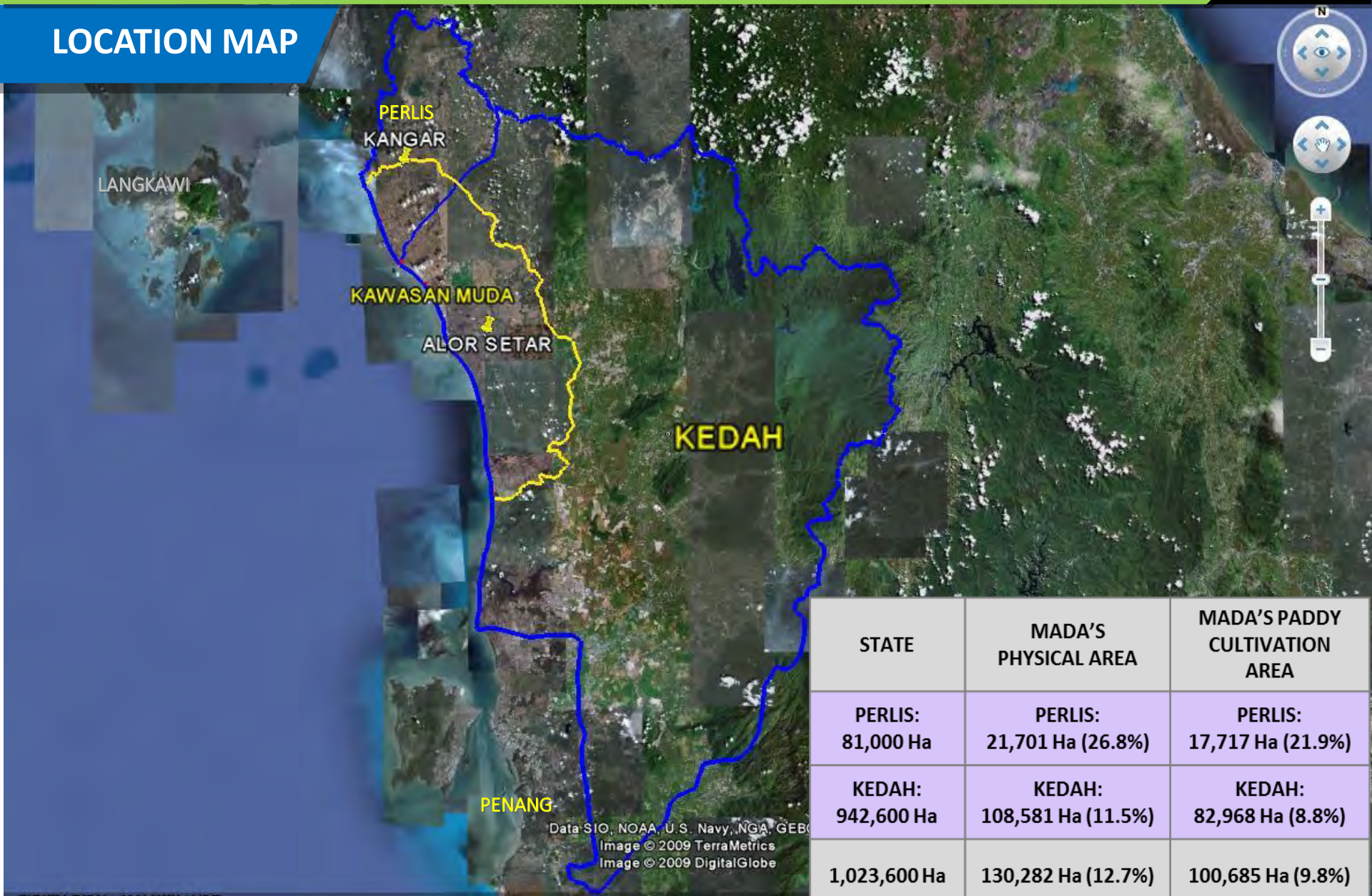
MUDA IRRIGATION PROJECT

- The **1st and largest** integrated agriculture development project
- **World Bank loan** of **USD 245 millon**
- Infrastructure development **started in the year 1966**
- **Completed** for operation in **1974**



BRIEF INTRODUCTION OF MUDA AREA

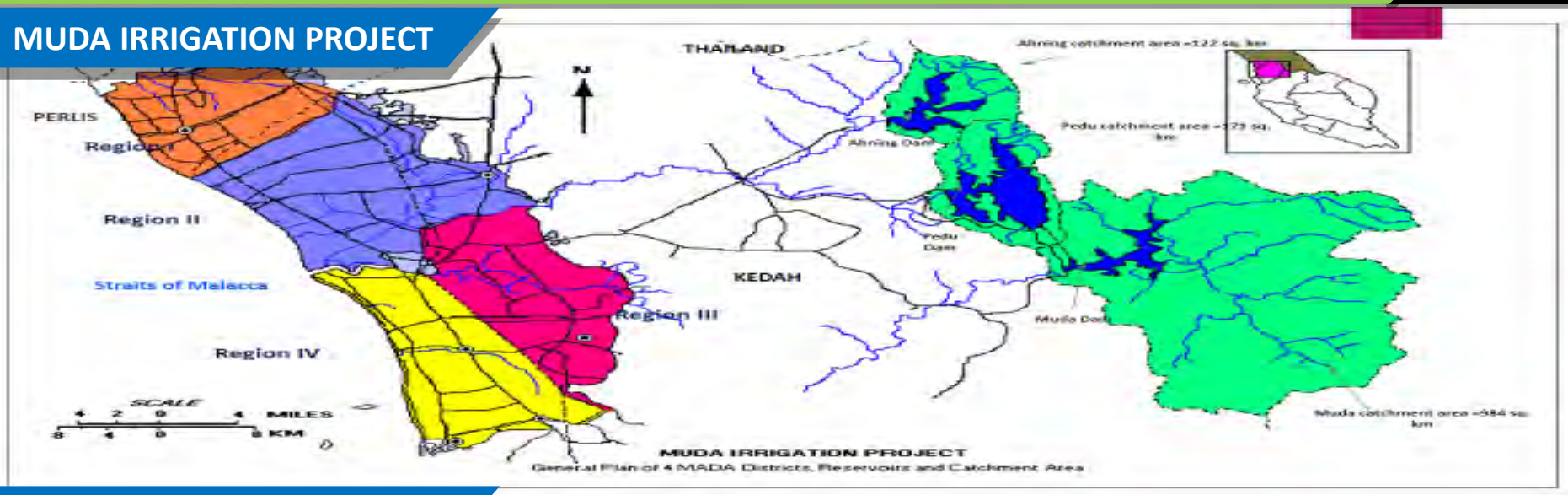
LOCATION MAP



STATE	MADA'S PHYSICAL AREA	MADA'S PADDY CULTIVATION AREA
PERLIS: 81,000 Ha	PERLIS: 21,701 Ha (26.8%)	PERLIS: 17,717 Ha (21.9%)
KEDAH: 942,600 Ha	KEDAH: 108,581 Ha (11.5%)	KEDAH: 82,968 Ha (8.8%)
1,023,600 Ha	130,282 Ha (12.7%)	100,685 Ha (9.8%)

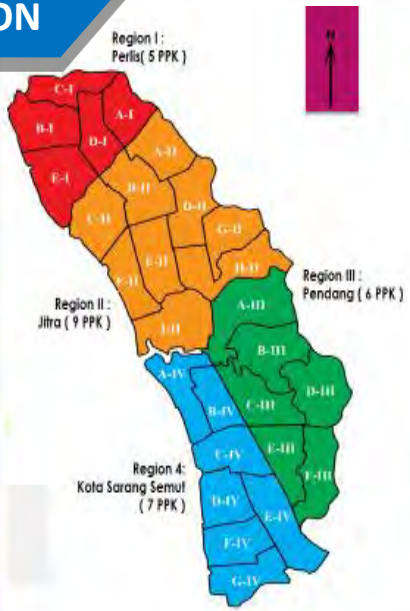
BRIEF INTRODUCTION OF MUDA AREA

MUDA IRRIGATION PROJECT

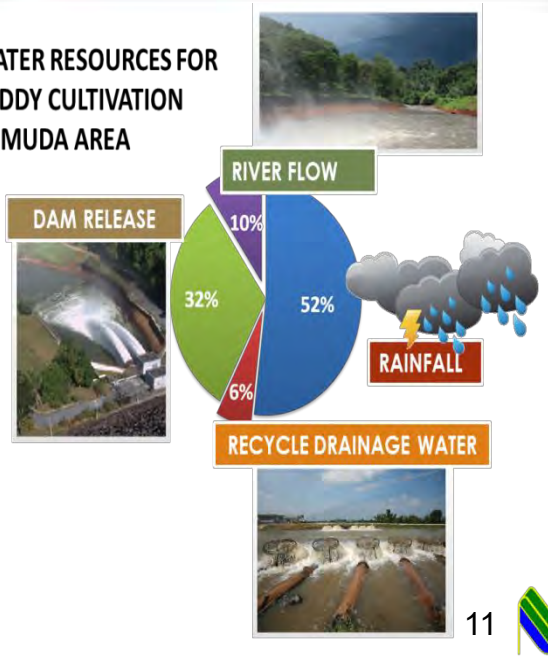


MUDA AREA INFORMATION

PHYSICAL AREA	130,282 hectare
PADDY CULTIVATED AREA	100,685 hectare
AVERAGE FARM SIZE	2.12 hectare
AVERAGE NO. OF FARMERS	57,635 people
AVERAGE FARMER'S AGE	60.1 years
NO. OF REGION	4 nos.
NO. OF ASSOCIATION (PPK)	27 nos.



WATER RESOURCES FOR PADDY CULTIVATION IN MUDA AREA



BRIEF INTRODUCTION OF MUDA AREA

TRANSITION OF PADDY FARMING IN MUDA AREA

Pre Muda	1970s	1980s	1986	2000s	2011
• Individual Farming • Single Cropping • Transplanting Culture	• Individual Farming • Labor Intensive • Transplanting Culture • Paddy Yield at 3.2 ton/ha	• Group Farming • Labor Crisis • Mechanization • Direct Seeded Culture • Coordination of activities • Paddy Yield at 4.67 ton/ha • Paddy Fertilizer Subsidy Scheme	• Semi-Estate launched • Credit Facilities • Marketing • Yield 4.7 ton/ ha	• Paddy Estate launched • Centralized management • 10-ton Technology package • Rice Check • Yield target at 6 ton/ha	• NKEA (PPP) Project launched • Government Support • Commercial Entity • Will involve entire value chain
No infrastructure	Secondary Infra 11m/ha	Tertiary Infra 30m/ha Recycle of drainage water			All tertiary @30m/ ha by 2020


IRRIGATION AND DRAINAGE
MANAGEMENT

EXISTING IRRIGATION AND DRAINAGE INFRASTRUCTURE

3 DAMS

DAM	STORAGE million m^3	CATCHMENT sq. km	RESERVOIR sq. km
MUDA	160 (130,000 ac-ft)	984	16
PEDU	1,080 (870,000 ac-ft)	171	52
AHNING	275 (223,000 ac-ft)	122	12
TOTAL	1,515 (1,223,000 ac-ft)	1,277	80


PEDU


MUDA


AHNING

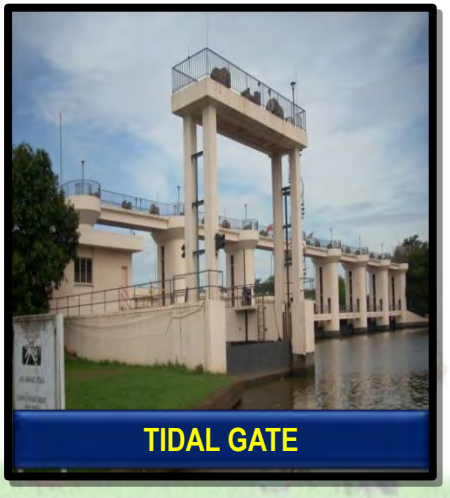
RETICULATION SYSTEM

- **CANAL : 1,840 km**
  - 146 km Main Canal
  - 930 km Secondary Canal
  - 764 km Tertiary Canal
- **DRAIN : 1830 km**
  - 240 km Saliran Utama
  - 883 km Saliran Sekunder
  - 707 km Parit Tersier
- **FARMROAD: 1,670 km**
  - 802 km Secondary Farmroad
  - 868 km Tertiary Farmroad
- **OTHER INFRASTRUCTURE**
  - Coastal Bund 100 km
  - Tidal Gates 25 nos.

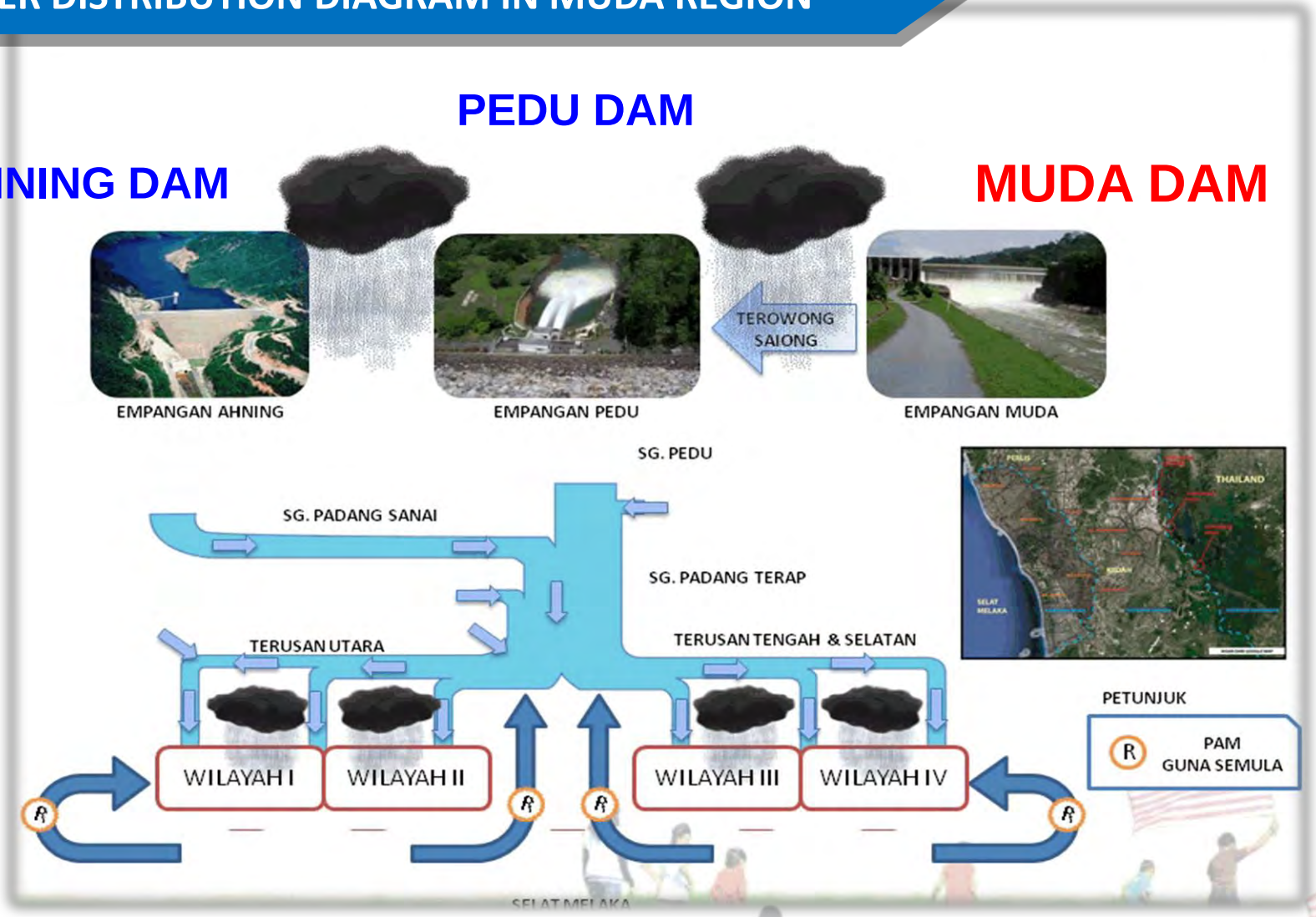

SECONDARY CANAL/FARMROAD


PELUBANG REGULATOR


MAIN CANAL


TIDAL GATE

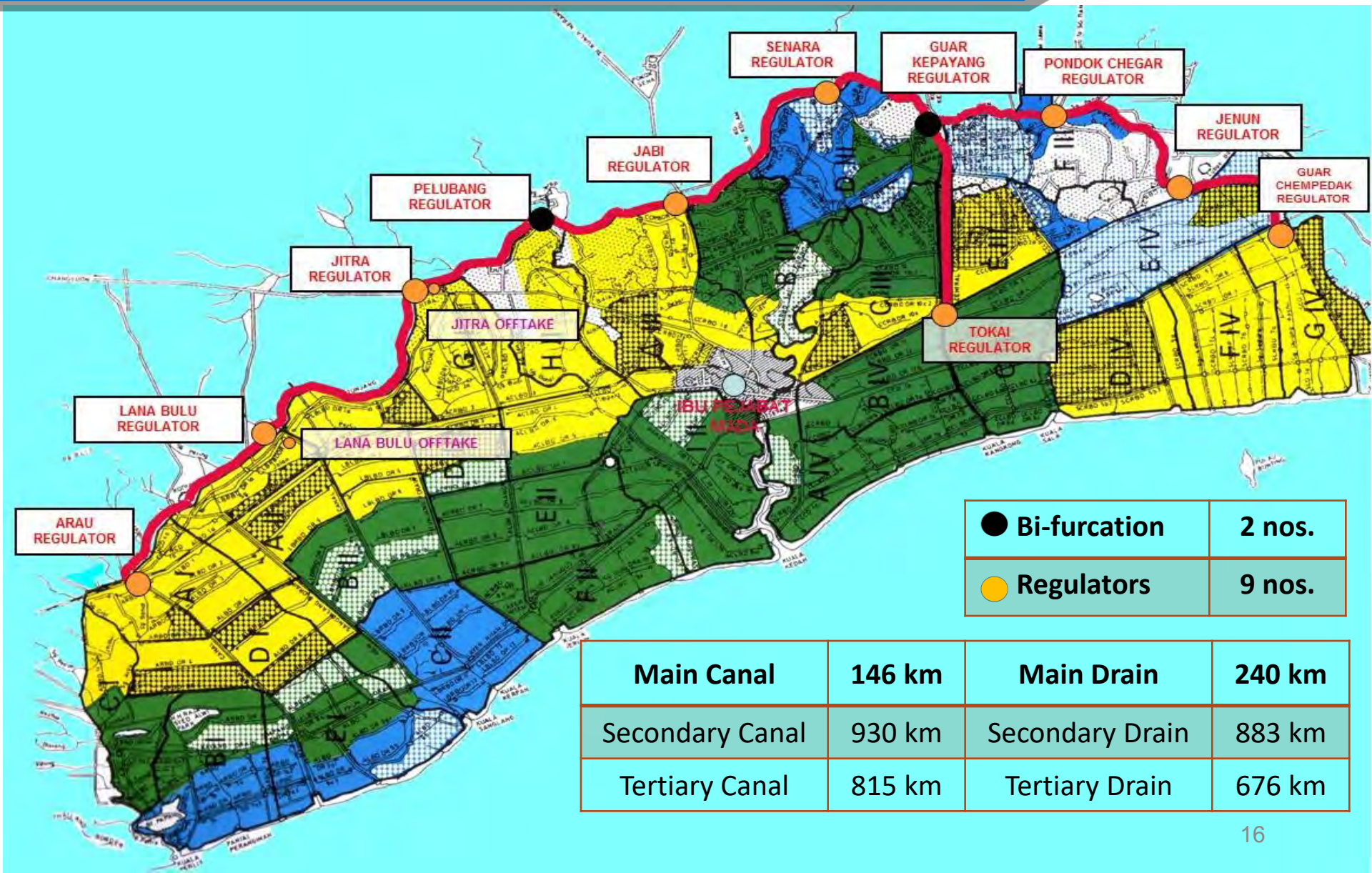
WATER DISTRIBUTION DIAGRAM IN MUDA REGION



RECYCLING

RECYCLING

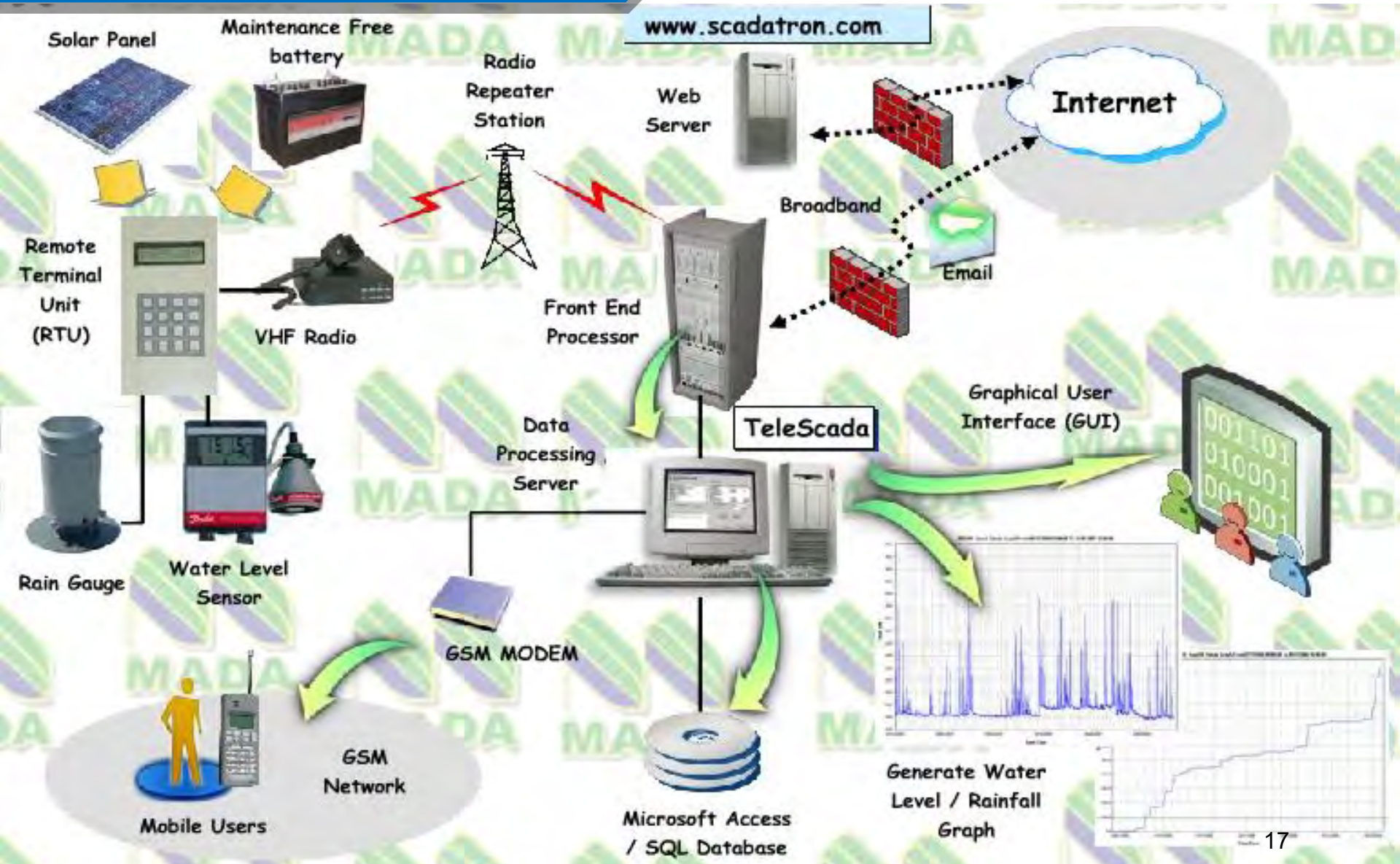
MAIN CANAL AND LOCATION OF BI-FURCATION/REGULATORS



Bi-furcation	2 nos.
Regulators	9 nos.

Main Canal	146 km	Main Drain	240 km
Secondary Canal	930 km	Secondary Drain	883 km
Tertiary Canal	815 km	Tertiary Drain	676 km

TELEMETRY SYSTEM CONFIGURATION



TELEMETRY SYSTEM

Man Machine Interface

Master Controller

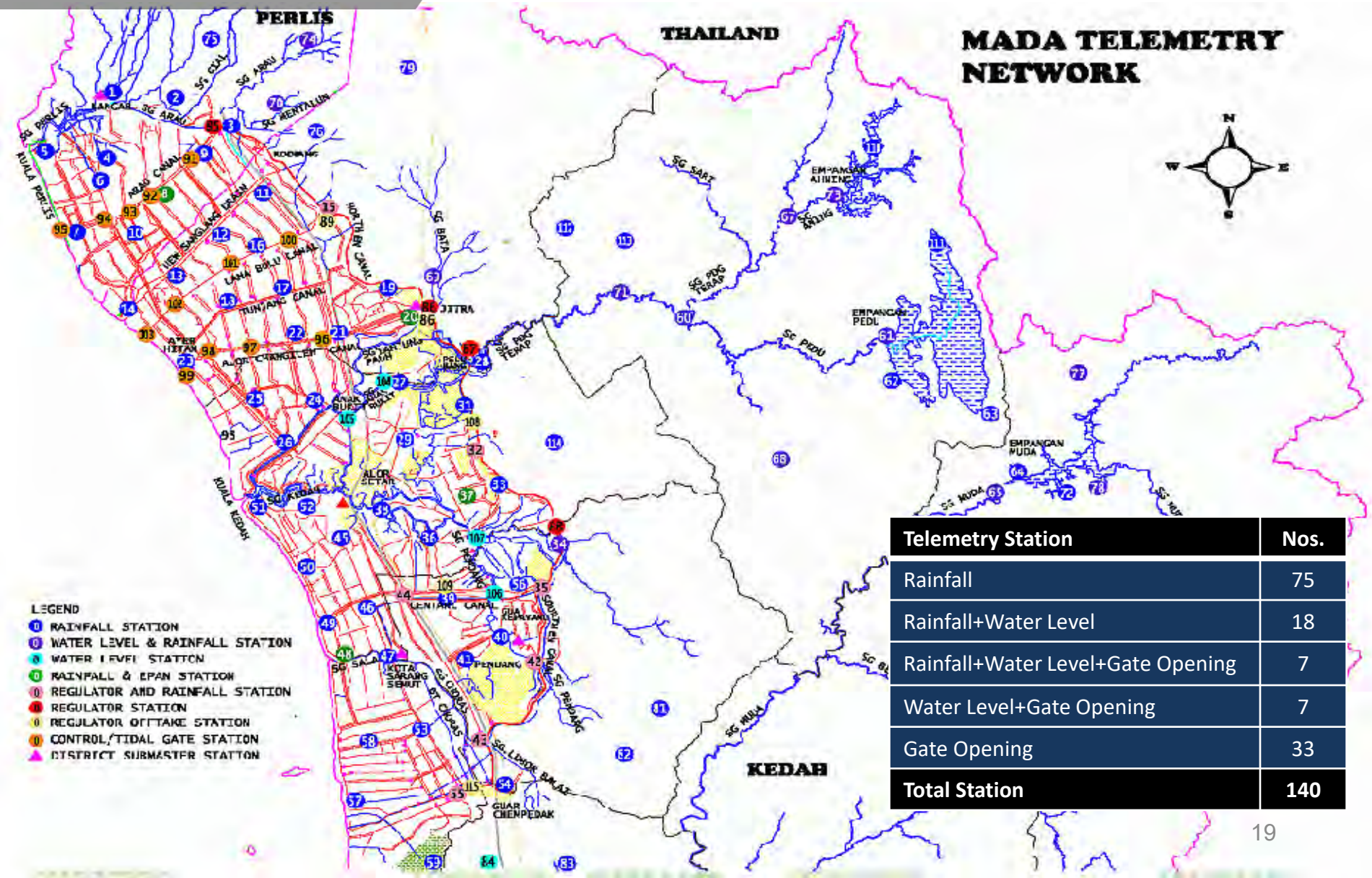
Repeater Station

Rainfall Station

Rainfall & Water Level Station

Regulator & Water Level Station

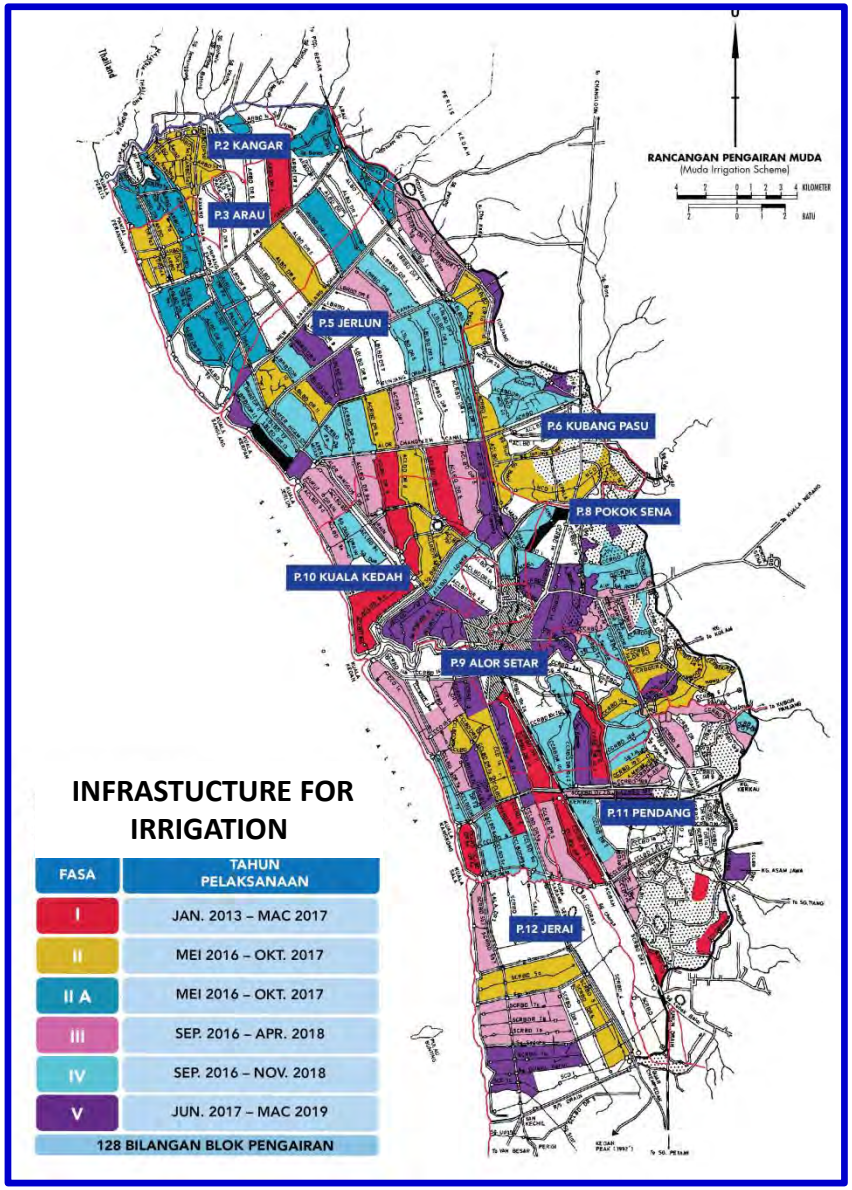
TELEMETRY NETWORK



Telemetry Station	Nos.
Rainfall	75
Rainfall+Water Level	18
Rainfall+Water Level+Gate Opening	7
Water Level+Gate Opening	7
Gate Opening	33
Total Station	**140**

IRRIGATION & DRAINAGE MANAGEMENT

PLANNING AND STATUS OF EPP 10 DEVELOPMENT PROJECT



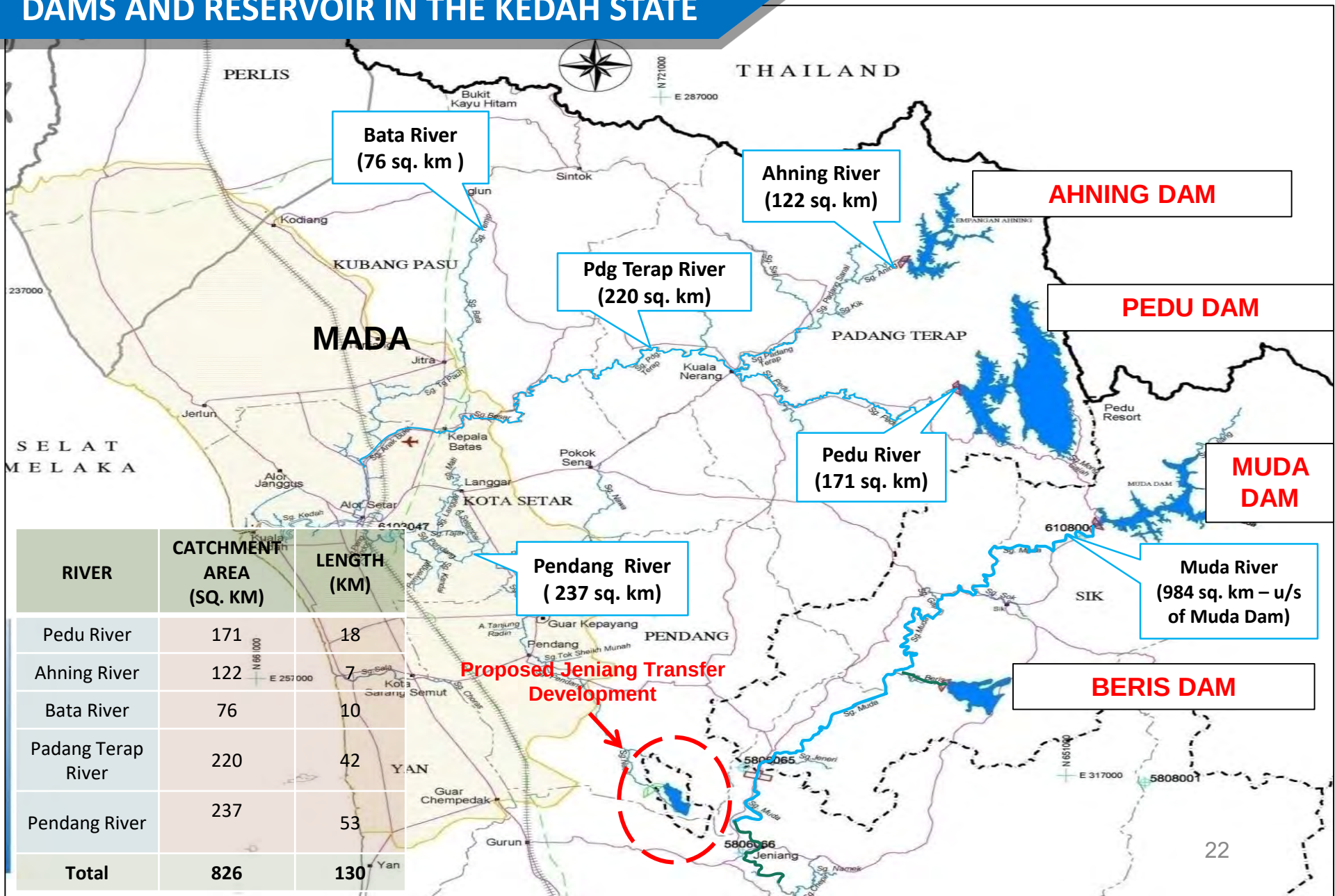
IRRIGATION SYSTEM	AREA (HA)	NO. OF BLOCKS
TERTIARY	34,989 (36%)	44
SECONDARY	61,569 (64%)	**128**
TOTAL (KELUASAN MADA)	96,558 (100%)	172

STATE	BLOCKS WITHOUT TERTIARY SYSTEM
PERLIS	16
KEDAH	112
TOTAL	**128**


FLOOD MITIGATION

DAM MANAGEMENT FOR FLOOD CONTROL

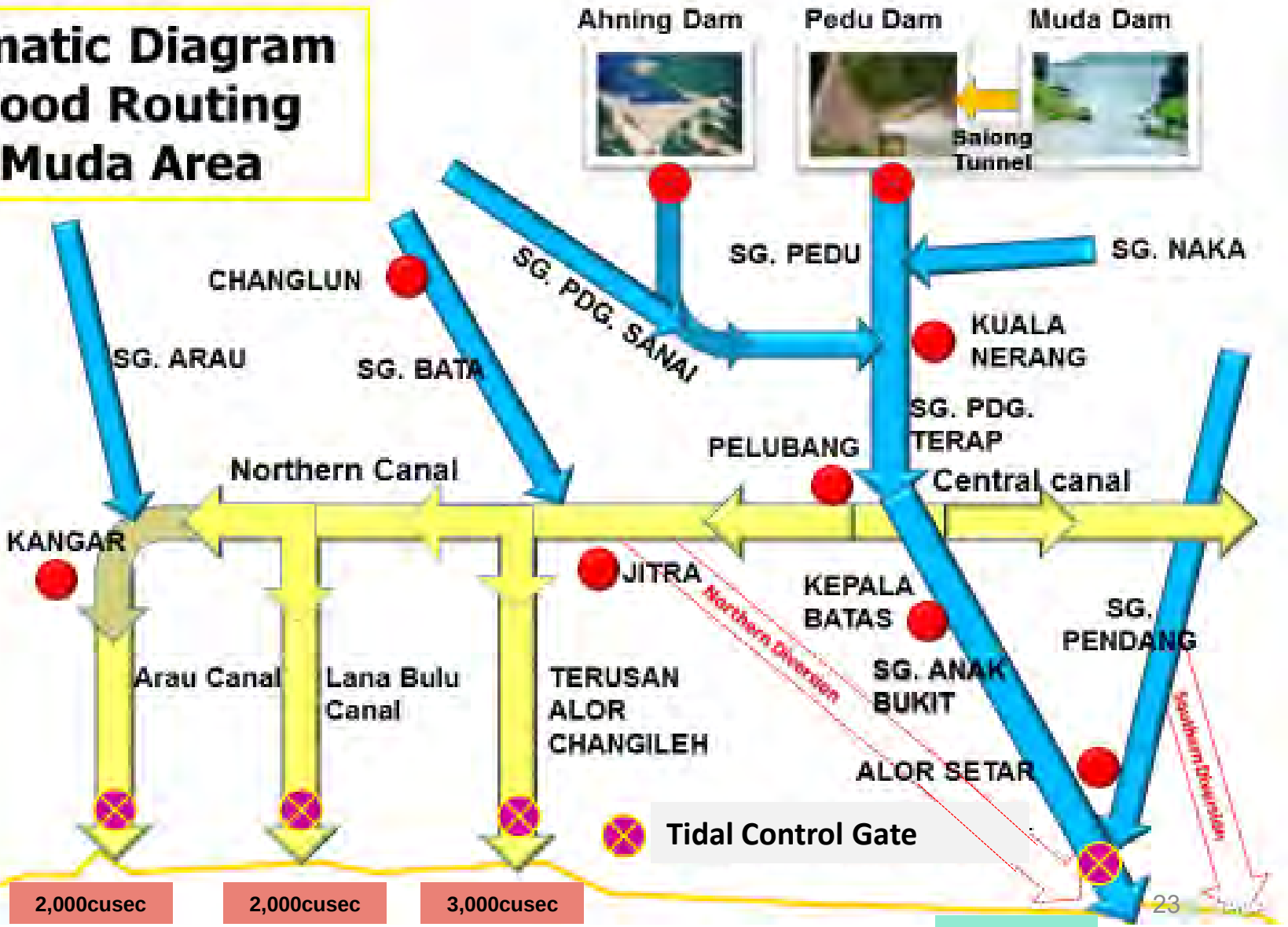
DAMS AND RESERVOIR IN THE KEDAH STATE



RIVER	CATCHMENT AREA (SQ. KM)	LENGTH (KM)
Pedu River	171	18
Ahning River	122	7
Bata River	76	10
Padang Terap River	220	42
Pendang River	237	53
Total	**826**	**130**

HOW MADA MITIGATE FLOOD IN MUDA AREA ?

Schematic Diagram of Flood Routing In Muda Area



FLOOD MITIGATION

PEDU AND MUDA DAM

- ✓ Pedu and Muda Dam were constructed in 1966 and completed in 1969 - The main reservoir for the Muda Area Irrigation Project
- ✓ Pedu and Muda Dam – Also function as Domestic and Industrial Water Supply in North Kedah, Langkawi & Southern Perlis
- ✓ Pedu Reservoir is the major storage reservoir in the Muda Irrigation Project. It stores water from its own limited catchment and recei ves inflow from the Muda Reservoir through the connecting Saiong Tunnel (6.8km).
- ✓ All releases of irrigation water are made from Pedu Reservoir and will flow through the Pedu River / Padang Terap River to to Peluba ng Headworks some 50 km downstream. From here the water is distributed to the Muda Area through a network of canals.

Maximum Discharge:

5,000 cusec (141.6 m^3/sec)

PEDU DAM		
Reservoir	875,000 acre-feet (1,080 MCM)	
Usage Level Range	320' to 220' MSL	
Reservoir Area	20 sq. miles (52 sq. km.)	
Catchment Area	66 sq miles (171 sq. km)	
Type of Dam	Rockfill with up – stream asphaltic concrete membrane (61m height, 220 m length)	
Age of Dam	49 years	
* Factor Of Safety at Spill Le vel 320' MSL	Required	Calculated
	1.5	2.17

Maximum Discharge:

1,600 cusec (45.3 m^3/sec)

MUDA DAM			
Reservoir	125,000 acre-feet (154 MCM)		
Usage Level Range	330' to 270' MSL		
Reservoir Area	6 sq. miles (15.5 sq. km)		
Catchment Area	380 sq. miles (984 sq.km)		
Type of Dam	Concrete ambursen buttress with overflow sp illway (37m height, 250m length)		
Age of Dam	49 years		
* Factor Of Safety at Spill Level 330' MSL	Buttress N o.23	Buttress No .16	Buttress No. 13
	2.23	1.70	2.20

** Factor of Safety based on Dam Safety Review Report 2007*

AHNING DAM

- ✓ The Sg. Ahning Dam project proponent was the Kedah State Public Works Department and the dam is owned by the Kedah State Government.
- ✓ Ahning Dam was constructed in 1985 and operated in 1989.
- ✓ Main function - Domestic and Industrial Water Supply.
- ✓ Water releases from Ahning and Pedu dams flow into Sg. Padang Terap River, the lower reaches are where t he Bukit Pinang and Pelubang water treatment plants are situated at.
- ✓ For better coordination of Ahning and Pedu dam releas es to meet the irrigation and domestic water demand, it is best to place the operation and management of both dams under one entity.
- ✓ Thus the operation and maintenance of Ahning dam was thus officially handed over by Kedah Public Works Department to MADA in 1991.
- ✓ Additional supply of Sungai Padang Terap for irrigation and domestic purposes

Maximum Discharge:

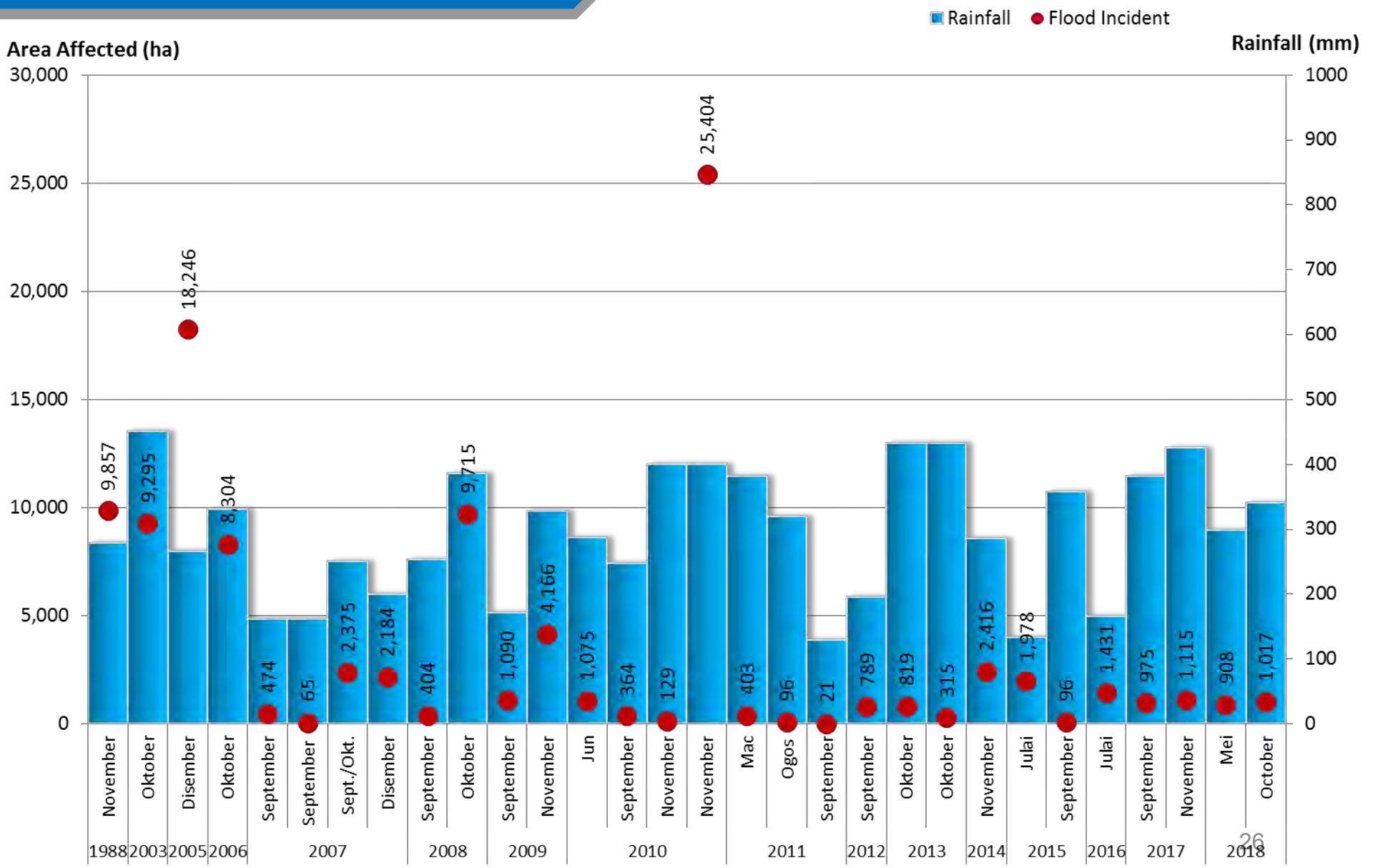
400 cusec (12 m^3/sec)

AHNING DAM		
Reservoir	223,000 acre-feet (275 MCM)	
Usage Level Range	112.9 m to 73 m MSL	
Reservoir Area	4.6 sq.miles (12 sq.km)	
Catchment Area	47 sq.miles (122 sq.km)	
Type of Dam	Rockfill with reinforced concrete im permeable face (74m height, 270m l ength)	
Age of Dam	29 years	
* Factor Of Safety at Spil l Level 113m MSL	Required	Calculated
	1.5	4.68

** Factor of Safety based on Dam Safety Review Report 2007*

FLOOD MITIGATION

FLOOD INCIDENT 1988 TO 2018



FLOOD INCIDENT IMAGES 2010

OVERVIEW OF TIDAL BARRAGE OPERATION AT SG. KEDAH

OVERVIEW OF TIDAL BARRAGE OPERATION AT SG. KEDAH

IMAGE

BACKGROUND

- **Important component** in Muda Irrigation Project.
- **Largest tidal control structures** built in Malaysia during **1960s**.
- **Located** on the right bank of the Sg. Kedah approximately **1km from City of Alor Setar**.
- The **functions** are to **control drainage/excessive water** for most of Muda Area and to **prevent sea water intrusion** into paddy fields.
- **Officiated** by the late **Y.B. Tan Sri Hj. Mohd Ghazali bin Hj. Jawi, Minister of Agriculture and Land on 19 Sept 1971**.

FUNCTION OF TIDAL BARRAGE

- **To stop the inland flow of saline water** via the Sg. Kedah into low-lying lands within the Muda Irrigation Area.
- **To reclaim the inundated low lands** adjacent to the Sg. Kedah for paddy cultivation by lowering the water table.
- **To improve the drainage of paddy lands** which are drained by Sg. Kedah and its tributaries.
- **To reduce the occurrences and severity of floods** in the agricultural lands upstream of the Barrage.
- **To improve the town drainage and sewerage systems** of Alor Setar through lowering of water tables.
- **To allow recyling pump operation** during irrigation period (Sg. Tajar, Tanah Merah, Alor Madi, Alor Gunung and Alor Ganu)

TECHNICAL FEATURES

- The Barrage is a **reinforced concrete structure** consisting of 7 bays & each bay incorporating a 45' 0" wide (13.7 m) and 20' 0" deep (6.1m) roller gate.
- In addition, there is a boat lock on the left side of the structure with 2 lock-gates each measuring 30' 0" x 20' 0" deep (10m x 6.1m) on the upstream and downstream sides.
- The lock gates can be operated to allow passage of boats through the Barrage.
- The barrage and lock gates are electrically operated.
- Designed to cater for peak flow (100 ARI) estimated about 750 m^3/sec.

TECHNICAL SPECIFICATIONS

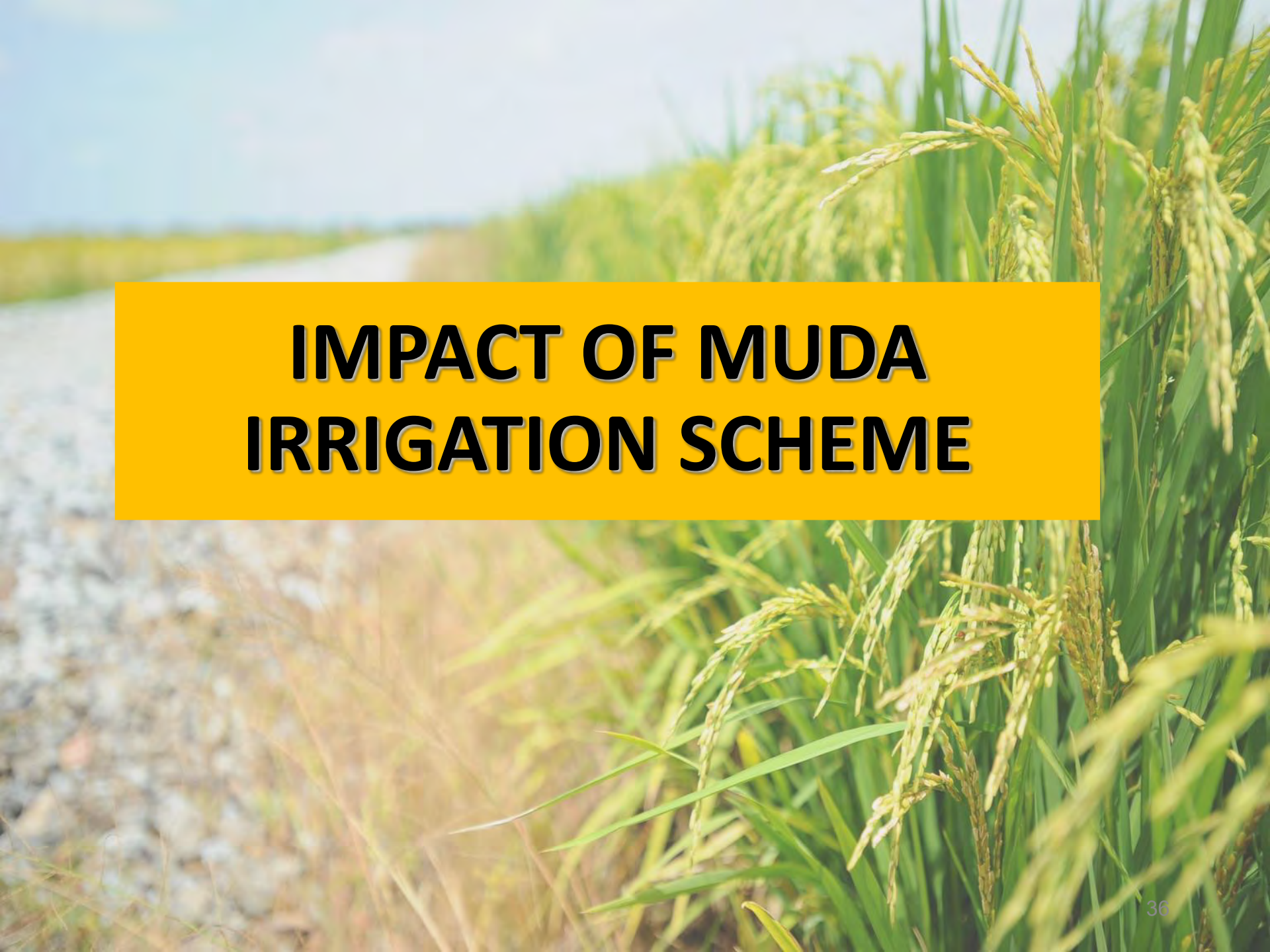
Width of Barrage	:	400 ft. (122m)
Length	:	120 ft. (36.6m)
No. Of gates	:	7 Nos. of roller gates 45 ft. (W) x 20 ft. (H) x 7 Nos. 13.7m (W) x 6.1m (H) x 7 Nos
Top of Gates	:	R.L. +8.00ft (2.44m)
Road Width	:	24 ft. (7.30m)
Cycle Track	:	2 Nos. x 6 ft. wide
Lock for boats	:	1 No. x 30 ft. (W) x 220 ft. (L) 1 No. x 10 m (W) x 67 m (L)

TIDAL BARRAGE OPERATION

CONDITION	UPSTERAM WATER LEVEL
Non Irrigation Period / Normal	2.70-3.00ft / 0.8-1.0m
Irrigation Period	3.00-3.30ft / 0.9-1.0m
Flood	All gates are fully open

OVERVIEW OF TIDAL BARRAGE OPERATION AT SG. KEDAH

TIDAL BARRAGE IMAGES



IMPACT OF MUDA IRRIGATION SCHEME

IMPACT OF MUDA IRRIGATION SCHEME

THE IMPACTS OF MADA/ GOVERNMENT POLICY TOWARDS INCREASING PADDY IN MUDA AREA (1965-2017)

PHASE	YEAR	MADA'S PROGRAMME/ GOVERNMENT POLICY	AVERAGE GROSS YIELD (TONNE/HEC)	TOTAL PRODUCTION (METRIC TONNE)	% INCREMENT		NOTE
					AVERAGE YIELD	TOTAL PRODUCTION	
I	1965	BEFORE RPM	3.370	316,992	-	-	SINGLE CROPPING/ YEAR
II	1976	- IMPLEMENTATION OF RPM - DOUBLE CROPPING / YEAR	4.178	770,815	23.9	143.2	DOUBLE CROPPING ENTIRELY THE WHOLE MUDA AREA
III	1980	PADDY FERTILIZER SUBSIDY SCHEME	4.674	866,183	11.9	12.4	THE SCHEME STARTED IN YEAR 1979
IV	2004	IMPLEMENTATION THE 10 TONNE PACKAGE	5.475	1,055,457	17.1	21.8	THE PACKAGE STARTED IN SEASON 2/2001 (FOCUS ON TECHNOLOGY)
V	2008	PADDY PRODUCTION IN SENTIVE SCHEME	5.700	1,100,695	4.1	4.3	THE SCHEME STARTED IN SEASON 1/2007 (FOCUS ON TECHNOLOGY AND MANAGEMENT)
VI	2009	NATIONAL FOOD SECURITY GUARANTEED POLICY	6.150	1,187,663	7.9	7.9	STARTED IN SEASON 2/2008
VII	2011-2020	NATIONAL KEY ECONOMIC AREA (NKEA) EPP10	5.688[1]	1,140,440	(8.1)	(4.1)	STARTED IN YEAR 2011

Note: [1] The performance yield for Phase VII is year 2017 (Season 2/2016 & 1/2017)

(Source : BPTM, MADA)

IMPACT OF MUDA IRRIGATION SCHEME

5

GROSS PADDY YIELD PERFORMANCE IN MUDA AREA (1966-2018)

YEAR	AVERAGE YIELD (TONNE / HEC)	YEAR	AVERAGE YIELD (TONNE / HEC)
1966 - 1970	3.268	**2011**	5.970
1971 - 1975	3.927	**2012**	5.729
1976 - 1980	4.202	**2013**	5.942
1981 - 1985	4.030	**2014**	6.494
1986 - 1990	3.954	**2015**	5.725
1991 - 1995	4.684	**2016**	6.194
1996 - 2000	4.778	**2017**	5.661
2001-2005	5.374	**2018**	5.901
2006-2010	5.667	**2019**	NA

(Source : BPTM, MADA)

IMPACT OF MUDA IRRIGATION SCHEME

5

IMPACT ON THE TARGET GROUP (FARMERS) SINCE MADA WAS ESTABLISHED

Impact	Before Project	After Project
Average yield (Ton/hec)	3.4 (1965)	5.661 (2017)
Total Production (ton)	316,992 (1965)	974,387 (2017)
Value of production (RM)	8.5 mil	1,169 mil (based on GMP RM1,200/ tonne)
Cropping Intensity	100 %	199.9 %
Labour (man/hours)	615 (1974) Transplanting	199.4 Direct seeding
Net Household Income (RM/yr)	1,092	29,259
Net Household Income (RM/mth)	91	2,438
Monthly Per Capita Income (RM)	18.20	487.60
% Poverty Level		
Poor	72	1.0
Hard Core Poor	5	0.5

(Source : BPTM, MADA)

IMPACT OF MUDA IRRIGATION SCHEME

5

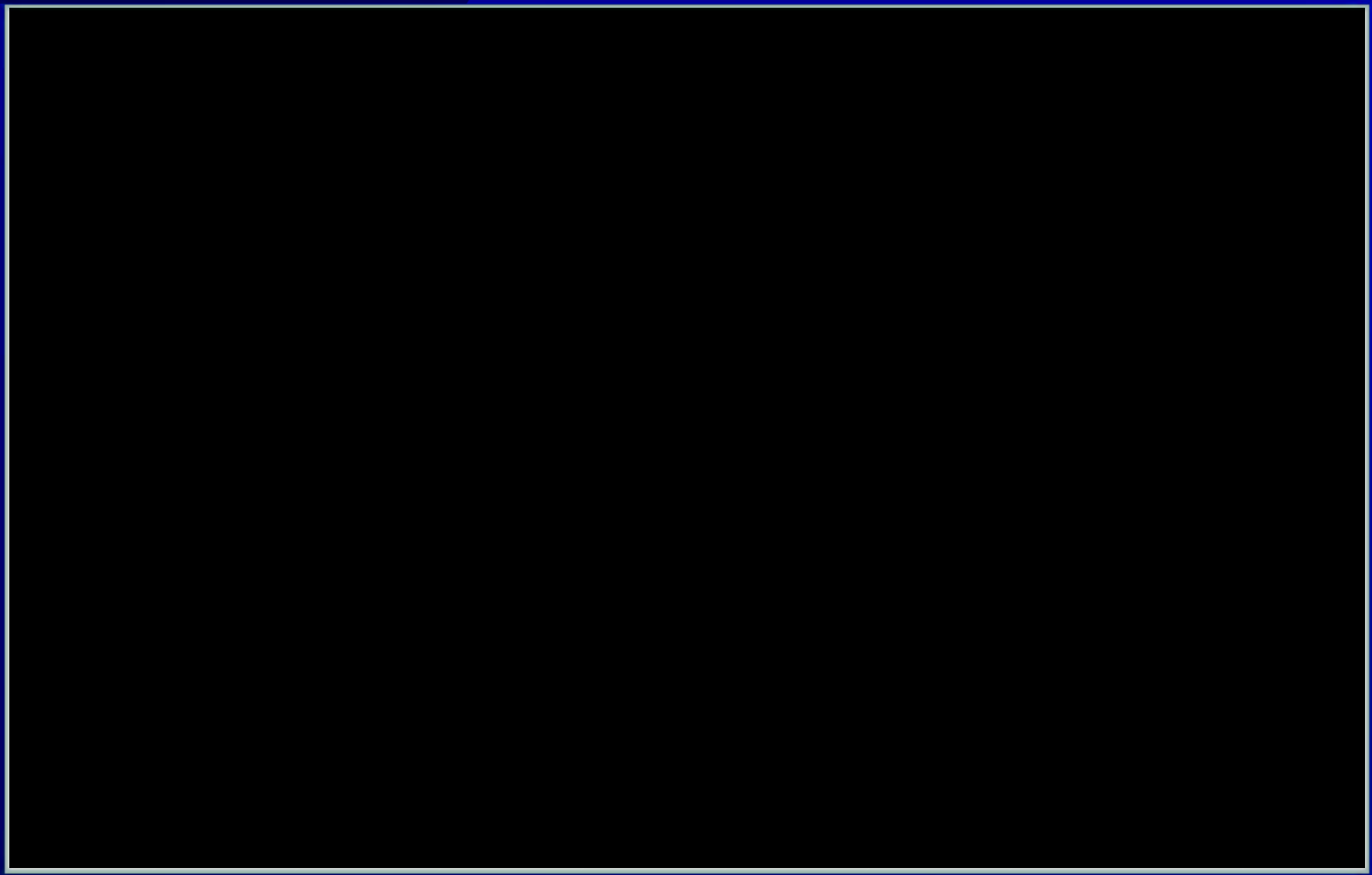
RICE PRODUCTION FROM GRANARY AND NON-GRANARY AREA

Granary Area	Parcel Paddy Area (ha)	Parcel Area (%)	Contribution to National Production (ton)					
			2015	%	2016	%	2017	%
MADA	100,685	35.43	936,955	35.07	1,063,247	39.77	974,387	38.93
KADA	28,072	9.88	229,515	8.59	248,172	9.28	240,490	9.61
IADA KERIAN	21,108	7.43	189,063	7.08	165,027	6.17	171,237	6.84
IADA BARAT LAUT SELANGOR	19,057	6.71	240,290	8.99	222,033	8.31	165,571	6.61
IADA PULAU PINANG	12,782	4.50	149,971	5.61	148,297	5.55	146,660	5.86
IADA SEBERANG PERAK	14,140	4.98	109,572	4.10	103,388	3.87	88,198	3.52
IADA KETARA	4,876	1.72	51,921	1.94	54,836	2.05	50,438	2.02
IADA KEMASIN SEMERAK	5,056	1.79	28,236	1.06	27,456	1.03	26,938	1.08
IADA PEKAN	5,555	1.95	17,387	0.65	13,425	0.50	10,286	0.41
IADA ROMPIN	2,920	1.00	20,944	0.78	14,437	0.54	17,028	0.68
IADA KOTA BELUD	-	-	-	-	-	-	22,805	0.91
JUMLAH JELAPANG	**205,806**	**72.43**	**1,973,854**	**73.88**	**2,060,318**	**77.07**	**1,914,038**	**76.47**
JUMLAH LUAR JELAPANG	**78,356**	**27.42**	**697,759**	**26.12**	**612,943**	**22.93**	**589,071**	**23.53**
Total Malaysia	**284,162**	**100.00**	**2,671,613**	**100.00**	**2,673,261**	**100.00**	**2,503,109**	**100**

(Source : BPTM, MADA)

OVERVIEW OF TIDAL BARRAGE OPERATION AT KEDAH RIVER

TIDAL BARRAGE CLIP




MADA
THANK YOU