

Table 5.3.1 Area-Wise Conditions in Pulau Pinang Scheme

Items	Sub-scheme				Total/ Average
	Sungai Muda	Pinang Tunggal	Sungai Kulim	Sungai Jarak	
Parcel Area (ha)	6,888.0	938.0	1,387.0	388.0	9,601.0
Planted Area (ha)	13,631.4	1,705.8	2,505.6	714.1	18,556.8
Cropping Intensity (%)	197.9	181.85	180.65	184.05	191.50
Yield (t/ha)*1	3.4	3.5	3.5	2.5	3.4
Production (ton)	46,346.6	5,970.1	8,769.7	1,785.3	62,871.7
Irrigation Schedule					
- Main season*2	1, 2, 3 and 4	1, 2 and 3	1, 2 and 3	1, 2 and 3	
- Off season*3	1, 2, 3 and 4	1, 2 and 3	1, 2 and 3	1, 2 and 3	
Planting Method	Wet Direct Seeding is common.				
Land Preparation	Mechanized, 1st and 2nd: by 4W tractor, 3rd: by 2W tractor				
Varieties Used	MR84, MR 103				
Fertilizer Application	Majority of farmers apply subsidy fertilizer only.				
Harvesting	Mechanized (combine harvester)				
Machinery					
-4 W tractors					
-2 W tractors					
-Combin harvester					
Irrigation System	40 m/ha	46 m/ha	28 m/ha	43 m/ha	39 m/ha
Irrigation Condition	Sedimentation in canal but Relatively well				
Drainage System	Drain density 36 m/ha				
Drainage Condition	Sedimentation in drain				
Farm Road	Width : 4 m in average, Laterite and earth surfacing				
Tertiary System	Canal density : 27 m/ha in average, lined with concrete				
Lots (nos.)					
Land Levelling (ha) "done"	527.7	0	121	85.4	734.1
"to be done"	551.4	412	148	216	1327.4
Crop Budget (RM/ha)	Gross Return: RM2,300, Production Cost: RM1,134, Net Return: RM1,165				
Farm Income (RM/year)	Farm Income: RM6,407, Non-Farm Income: RM9,169, Total: RM15,576				
Farmers' Organization					

*1: Estimated figure based on 5 seasons average ('94/95 main - '96/97 main).

*2: schedule 1; 15 Mar.-15 Jul., schedule 2; 25 Mar.-25 Jul., schedule 3; 5 Apr. - 5 Aug., schedule 4; 15 Apr.-15 Aug.

*3: schedule 1; 1 Sep.-20 Dec., schedule 2; 10 Sep.-30 Dec., schedule 3; 20 Sep. - 10 Jan., schedule 4; 30 Sep.-20 Jan.

Table 5.3.2 Rehabilitation and Improvement Plan of System Infrastructure (Pulau Pinang Scheme)

	Work Plan	Remarks
1. Irrigation Canal Concrete lining	Sg. Muda main canal	8 km including removal of sediment
	Sg. Muda main canal	8 km
	Sg. Kulim main canal	7 km
	Pinang Tunggal main canal	14 km
	Sg. Jarak main canal	6 km
	Sg. Muda secondary canals	68 km
	Sg. Kulim secondary canals	8 km
	Sg. Jarak secondary canals	3 km
2. Drainage facilities Desilting of tertiary drains		40 km
3. Farm road Asphalt pavement Widening of tertiary farm road	along Sg. Muda main canal	8 km
	along upper reach of P. Tunggal main canal	3 km
		100 km
4. Related structures Provision of check structures Replacement of CHO gate		Key & secondary monitoring points
	on Sg. Muda main canal	2 nos. Key monitoring point
	on P. Tunggal main canal	1 no. Key monitoring point
	on Sg. Kulim main canal	1 no. Key monitoring point
	on Sg. Muda secondary canals	8 nos. Second monitoring point
	on Sg. Jarak main & secondary	6 nos.
		2 nos.

Table 5.3.3 Required Works for Control and Monitoring Points (Pulau Pinang Scheme)

Point	Location	Required Works			Remarks
		Remote Control Gate Size / Number of Pump	Water Level Gauge nos.	Lining m	
<i>Sg. Muda Sub-Scheme</i>					
Key Control point					
KC1	Bumbong Lama Pump Station	X nos	2		proposed lining portion
KC2	Offtake point to TA. B	2.00 m x 2.00 m x 4 nos.	2	15	CHO, proposed lining portion
KC3	Offtake point to TA. C	2.00 m x 2.00 m x 4 nos.	2	15	CHO, proposed lining portion
KC4	Offtake point to TA. G	1.25 m x 1.70 m x 2 nos.	2	15	proposed lining portion
KC5	Offtake point to TA. H	1.00 m x 0.60 m x 2 nos.	2	15	CHO, proposed lining portion
Secondary Control Point					
SC1	Offtake point to TA. CA	1.70 m x 1.70 m x 4 nos.	2	15	CHO, proposed lining portion
SC2	Offtake point to TA. D	1.70 m x 1.70 m x 4 nos.	2	15	CHO, proposed lining portion
SC3	Offtake point to TA. E	2.00 m x 2.00 m x 4 nos.	2	15	CHO, proposed lining portion
Key Monitoring Point					
KM1	Lower reach of offtake point TA.A on Main canal		1		proposed lining portion
KM2	Lower reach of offtake point TA.F on Main canal		1		
Secondary Monitoring Point					
SM1	Lower reach of offtake for TA. A 9L on TA. A		1	30	
SM2	Beginning of TA. A3		1	30	
SM3	Beginning of TA. B2		1	30	
SM4	Lower reach of offtake for TA. C7L on TA. C		1	30	
SM5	Beginning of TA. F1		1	30	
SM6	Lower reach of offtake for TA. F 8R on TA. F		1	30	
SM7	Lower reach of offtake for TA. H 2R on TA. H		1	30	
SM8	Lower reach of offtake for TA. H3 3R on TA. H3		1	30	
Tertiary Monitoring Point					
TM1	Beginning of TA. A1		1	30	
TM2	Lower reach of offtake for TA. A3-4R on TA. A3		1	30	
TM3	Beginning of TA. B1		1	30	
TM4	Beginning of TA. C1		1	30	
TM5	Beginning of TA. C2		1	30	
TM6	Beginning of TA. C6		1	30	
TM7	Lower reach of offtake for TA. F1 on TA. F		1	30	
TM8	Beginning of TA. F3		1	30	
TM9	Beginning of TA. E1A		1	30	
TM10	Beginning of TA. H1		1	30	
TM11	Beginning of TA. H2		1	30	

Table 5.3.3 Required Works for Control and Monitoring Points (Pulau Pinang Scheme)

Point	Location	Required Works			Remarks
		Remote Control Gate Size / Number of Pump	Water Level Gauge nos.	Lining m	
<i>Pulau Pinang Scheme (2/2)</i>					
<i>Pinang Tunggal Sub-Scheme</i>					
Key Control Point					
KC1	Pinang Tunggal Pump Station	3 nos.	2	15	
Key Monitoring Point					
KM1	Beginning of TA, PS		1	30	
Tertiary Monitoring Point					
TM1	Lower reach of offtake for TA, PS-2R on TA, PS		1	30	
<i>Sungai Kulim Sub-Scheme</i>					
Key Control Point					
KC1	Kulim Headworks	1.00 m x 2.00 m x 4 nos.	2		proposed lining portion
Secondary Control Point					
SC1	Offtake point of TA, 1		2	15	proposed lining portion
Key Monitoring Point					
KM1	Lower reach of offtake for TA, 2 on Main Canal		1		proposed lining portion
Tertiary Monitoring Point					
KM1	Upper reach of offtake for 1-2R on TA, 1		1	30	
<i>Sungai Jarak Sub-Scheme</i>					
Key Monitoring Point					
KM1	Sg. Jarak Headworks		2	15	
KM2	Padang Cempedak Pump Station		2	15	
KM3	Sg. Kreh Headworks		2	15	
KM4	Kreh Pump Station		2	15	

Table 5.3.4 Soil Classification and Suitability for Paddy in Pulau Pinang

Soil Type and Series	Area (ha)	Rate (%)
Class I		
1 Rengam Series	13,740.0	5.37%
2 Selangor Series	2,800.0	1.09%
3 Selangor-Kangkong Association	800.0	0.31%
4 Sedak Series	3,140.0	1.23%
5 Bakau Series	6,040.0	2.36%
6 Serong Series	3,940.0	1.54%
7 Kundor-Tualang Association	15,040.0	5.88%
8 Briah Series	120.0	0.05%
9 Rantau Series	2,400.0	0.94%
Sub-total	48,020.0	18.76%
Class II		
1 Rengam-Bukit Temiang Association	13,220.0	5.16%
2 Akob-Telemong Association	7,380.0	2.88%
3 Manik-Sogomana Association	11,220.0	4.38%
4 Kuala Kedah-Pematang Association	6,480.0	2.53%
5 Sintok Series	5,100.0	1.99%
Sub-total	43,400.0	16.95%
Class III		
1 Seremban Series	1,360.0	0.53%
2 Lunas-Holyrood Association	14,720.0	5.75%
3 Minik-Lunas Association	12,560.0	4.91%
4 Holyrood-Colluvium Association	2,780.0	1.09%
5 Local Alluvium-Colluvium Association	16,080.0	6.28%
6 Telok-Selangor Association	20,920.0	8.17%
Sub-total	68,420.0	26.73%
Class IV		
1 Kranji Series	3,760.0	1.47%
2 Kranji-Linau Association	17,800.0	6.95%
3 Linau-Permatang Association	9,660.0	3.77%
4 Permatang Series	520.0	0.20%
Sub-total	31,740.0	12.40%
Class V		
1 Urban Land	15,080.0	5.89%
2 Steep Land	47,220.0	18.45%
Sub-total	62,300.0	24.34%
Others		
1 Rivers	2,120.0	0.83%
Sub-total	2,120.0	0.83%
Total	256,000.0	100.00%

Source: Reconnaissance Soil Survey of Penang and Province Wellesley, Soil Science Division Research Branch
Division of Agriculture

Class I: no limitations

Class II: few minor limitations

Class III: at least one serious limitation

Class IV: more than one serious limitation

Class V: at least one very serious limitation

Table 5.3.5 Proposed Farming Practices for Pulau Pinang

Days after Seeding	Activities	Input	Wet Direct Seeding Remark
-18	1st Land Preparation	4W Tractor + Rotavator	15 - 10cm
-15	Water Supply		5 - 8cm
-7	Rodent/Rat Control	Check or Draø 125 ml	depend on location, either there are rat attack happen or not.
-4	Puddling and levelling	4W Tractor + Rotavator	(5 - 0 HBT)
		Paddy Harrow	
-2	Selecting and Soaking Seeds		(2 - 1 HBT)
0	Sowing Sprouting Seeds	Tractor + MGA or Turn Table Wide Blower)	
0 - 4	Hervicide application before sprouting		(0 - 4 HLT)
25 - 30	Hervicide application after sprouting		(5 - 15 HLT)
	Water Control		(5 - 10 cm, 5 - 15 HLT)
15	1st Fertilizer Application	N:P2O5:K2O= 40:30:20 kg/ha	(15 - 20 HLT)
45	2nd Fertilizer Application	N:40kg/ha	(45 - 55 HLT)
75	3rd Fertilizer Application	N: 20kg/ha	
95-100	Drainage		
120-125	Harvesting	Harvester	

Source: IADP Pulau Pinang, Agricultural Component, MADRI and DOA recommendation

**Table 5.3.6 Cost of Improvement Works for System Infrastructure
(Pulau Pinang Scheme)**

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	23,640,100
Improvement of Drainage Facilities	98,400
Improvement of Farm Roads	2,066,500
Improvement of Related Structures	229,700
Total	26,034,700
2. Physical Contingency	3,905,200
3. Engineering Cost	2,603,500
4. Administration Cost	1,301,700
Grand Total	33,845,100

**Table 5.3.7 Cost of Improvement Works for In-field Infrastructure
(Pulau Pinang Scheme)**

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	2,665,100
Infield Channel	451,500
Control Box	204,200
Total	3,320,800
2. Physical Contingency	498,100
3. Engineering Cost	332,100
4. Administration Cost	166,000
Grand Total	4,317,000

**Table 5.3.8 Cost for Establishment of Telemetry and Telecontrol Facilities
(Pulau Pinang Scheme)**

Work Item	Construction Cost (RM)
1. Direct Cost	
Central Station	266,300
Repeater Station	0
Water Level Gauge inc. RTU	1,344,600
Rainfall Gauge inc. RTU	29,200
Remote Gate/ Pump	5,582,200
Total	7,222,300
2. Physical Contingency	1,083,400
3. Engineering Cost	722,300
4. Administration Cost	361,200
Grand Total	9,389,200

**Table 5.3.9 Cost for Establishment of Monitoring and Feedback Facilities
(Pulau Pinang Scheme)**

Work Item	Construction Cost (RM)
1. Direct Cost	
Master Station	227,000
Player & TV	390,500
Additional TV	6,000
Wiring	62,300
MOA, DID & DOA HQ	21,800
Total	707,600
2. Physical Contingency	106,200
3. Engineering Cost	70,800
4. Administration Cost	35,400
Grand Total	920,000

**Table 5.3.10 Training Cost for Water Users' Group
(Pulau Pinang Scheme)**

Off-Site Training

Blocks	WUGs (Nos)	Total WUG Leaders	Training day per Leader	Unit RM/day/person	Total Cost (RM)
Sungai Muda	105	210	3	400	252,000
Sungai Kulim	10	20	3	400	24,000
Pinang Tunggai	7	14	3	400	16,800
Padang Menora & Pokok Tampang	3	6	3	400	7,200
Total	125	250			300,000

On-Site Training

Blocks	Farmers (Nos)	WUGs (Nos)	Training day per farmer	Unit RM/day/person	Total Cost (RM)
Sungai Muda		105	2	5	
Sungai Kulim		10	2	5	
Pinang Tunggai		7	2	5	
Padang Menora & Pokok Tampang		3	2	5	
Total	7,301	125			73,010

Table 5.3.11 Disbursement Schedule (Pulau Pinang Scheme)

Unit : x 1000 RM

Scheme	Year	1999	2000	2001	2002	2003	2004	2005	2006	Total
I. Improvement of System Infrastructures										
1. Concrete lining of canals		7,683	7,683	7,683	7,683					30,732
2. Improvement of drainage facilities		128								128
3. Improvement of farm road		1,343	1,343							2,686
4. Improvement of related structures		299								299
Sub-total		9,453	9,026	7,683	7,683					33,845
II. Improvement of In-field Infrastructures										
1. Land leveling/tramline		433	433	433	433	433	433	433	433	3,465
2. In-field structures		107	107	107	107	107	107	107	107	853
Sub-total		540	540	540	540	540	540	540	540	4,317
III. Water Management / Monitoring System										
1. Telemetry and telecontrol system		3,130	3,130	3,130						9,389
2. Feedback system		501	210	104	105					920
Sub-total		3,631	3,340	3,234	105					10,309
IV. Training of Water Users Group										
		100	100	143	15	15				373
Total		13,723	13,006	11,599	8,343	555	540	540	540	48,844

Table 5.3.12 Benefit and Cost Flow of Pulau Pinang Scheme

(RM'000)

Year	Benefit							Cost							B-C	
	Without			With			Incrim. Benefit	System Infra.	Infield Infra.	Training Cost	Telemetry Feedback	O&M Cost	Replace- ment	Total Cost		
	Main	Off	Total	Main	Off	Total										
1	10,031	9,926	19,957	9,379	9,287	18,665	-1,592	9,041	509	94	3,562	1,019		14,255	-15,547	
2	10,031	9,926	19,957	9,359	9,280	18,638	-1,319	8,632	509	94	3,277	2,041		14,553	-15,872	
3	10,031	9,926	19,957	9,962	9,896	19,858	-99	7,348	509	134	3,173	2,917		14,080	-14,179	
4	10,031	9,926	19,957	11,189	11,137	22,326	2,369	7,348	509	14	103	3,537		11,511	-9,142	
5	10,031	9,926	19,957	13,040	13,001	26,041	6,084	0	509	14	0	3,537		4,061	2,024	
6	10,031	9,926	19,957	14,892	14,865	29,757	9,799	0	509	0	0	3,537		4,047	5,753	
7	10,031	9,926	19,957	16,743	16,729	33,472	13,515	0	509	0	0	3,537		4,047	9,468	
8	10,031	9,926	19,957	18,594	18,594	37,187	17,230	0	509	0	0	3,537		4,047	13,184	
9	10,031	9,926	19,957	21,089	21,089	42,177	22,220					3,537		3,537	18,683	
10	10,031	9,926	19,957	22,960	22,960	45,920	25,963					3,537	7,780	11,317	14,645	
11	10,031	9,926	19,957	24,207	24,207	48,415	28,458					3,537		3,537	24,921	
12	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
13	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
14	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
15	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
16	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
17	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
18	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
19	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
20	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537	14,727	18,264	11,441	
21	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
22	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
23	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
24	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
25	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
26	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
27	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
28	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
29	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
30	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537	7,780	11,317	18,388	
31	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
32	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
33	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
34	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
35	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
36	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
37	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
38	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
39	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
40	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537	14,727	18,264	11,441	
41	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
42	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
43	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
44	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
45	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
46	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
47	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
48	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
49	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537		3,537	26,168	
50	10,031	9,926	19,957	24,831	24,831	49,663	29,705					3,537	7,780	11,317	18,388	
							1,281,437		32,368	4,075	349	10,114	172,255	52,795	271,957	19.5%

Sensitivity

		Cost			
		0%	10%	20%	
IRR	19.5%	0%	19.5%	18.6%	17.8%
B/C	2.08	-10%	18.0%	17.1%	16.4%
NPV	80,131	-20%	16.4%	15.6%	14.9%

FIGURES

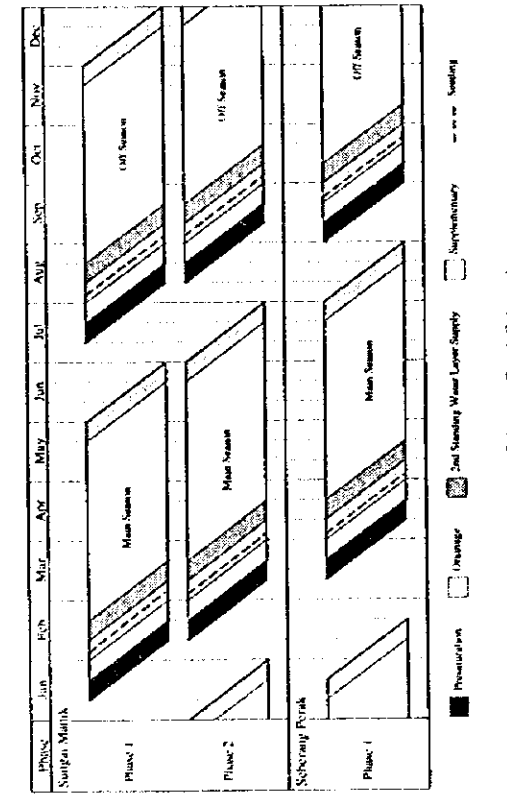
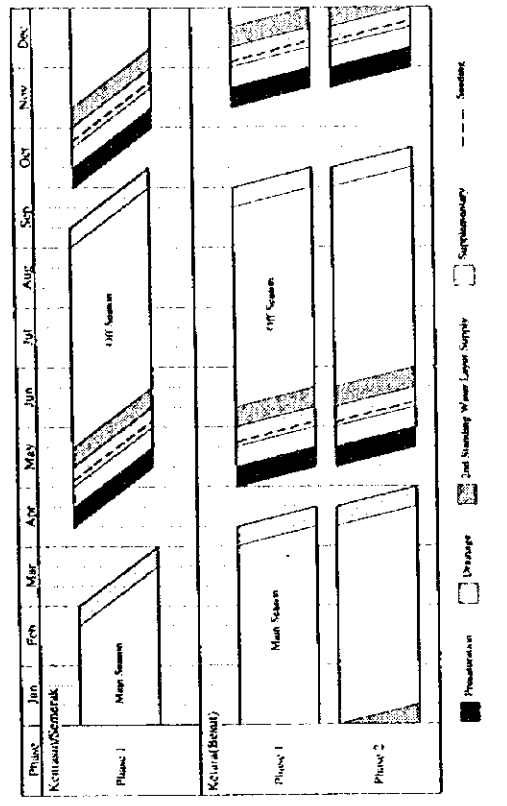
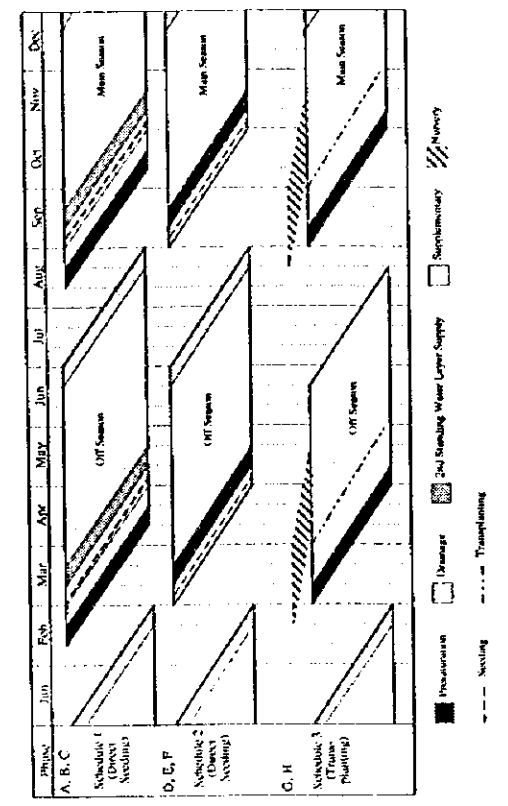
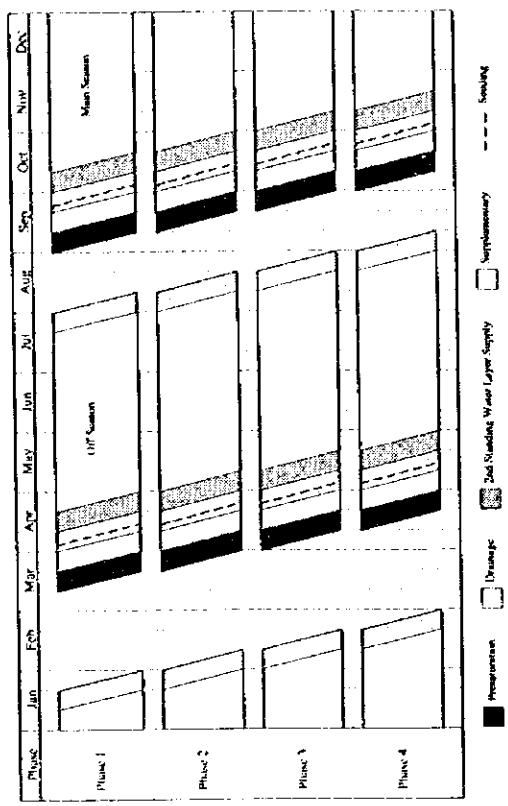


Fig. 2.1.1 Present Cropping Schedule in the Study Area

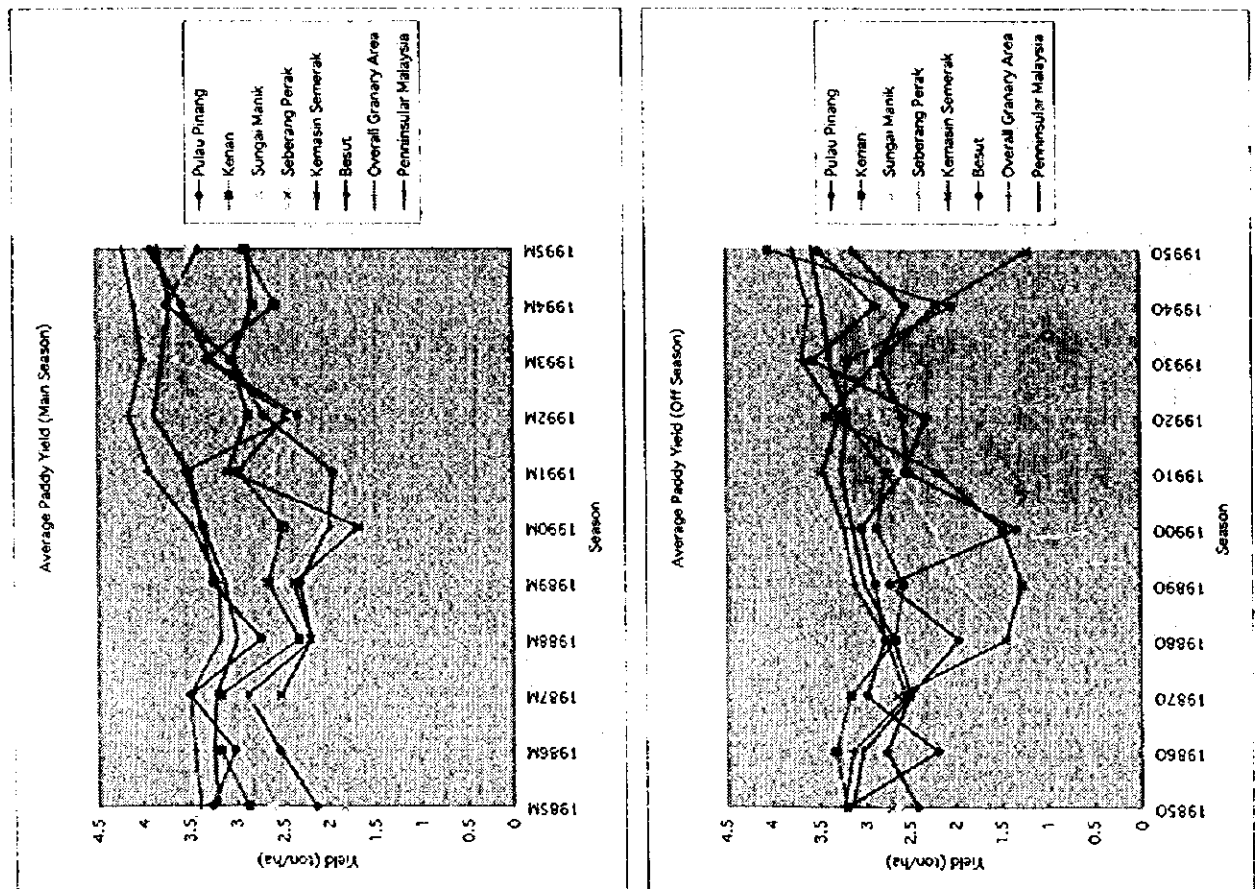


Fig. 2.1.2 Average Paddy Yields of the Study Area

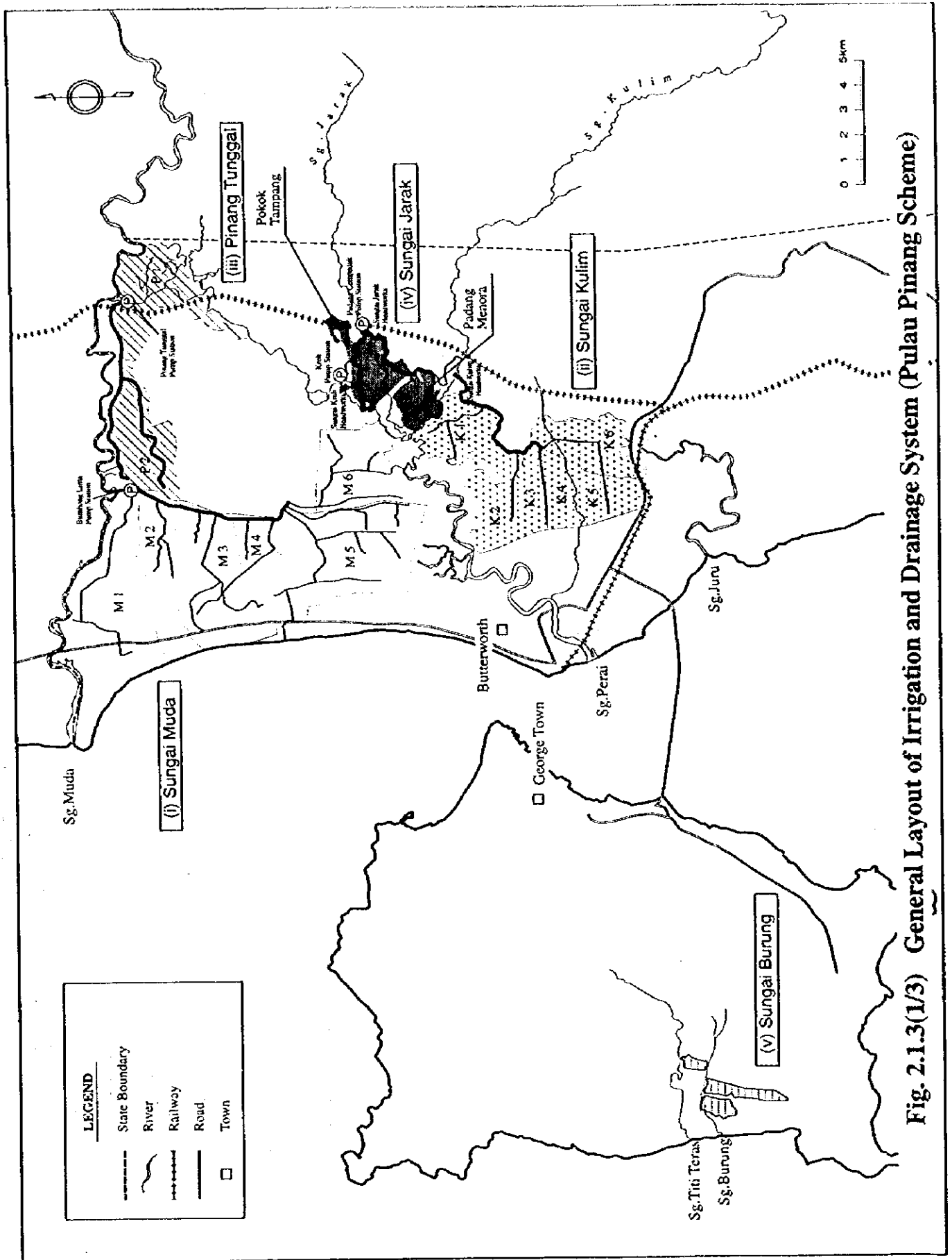


Fig. 2.1.3(1/3) General Layout of Irrigation and Drainage System (Pulau Pinang Scheme)

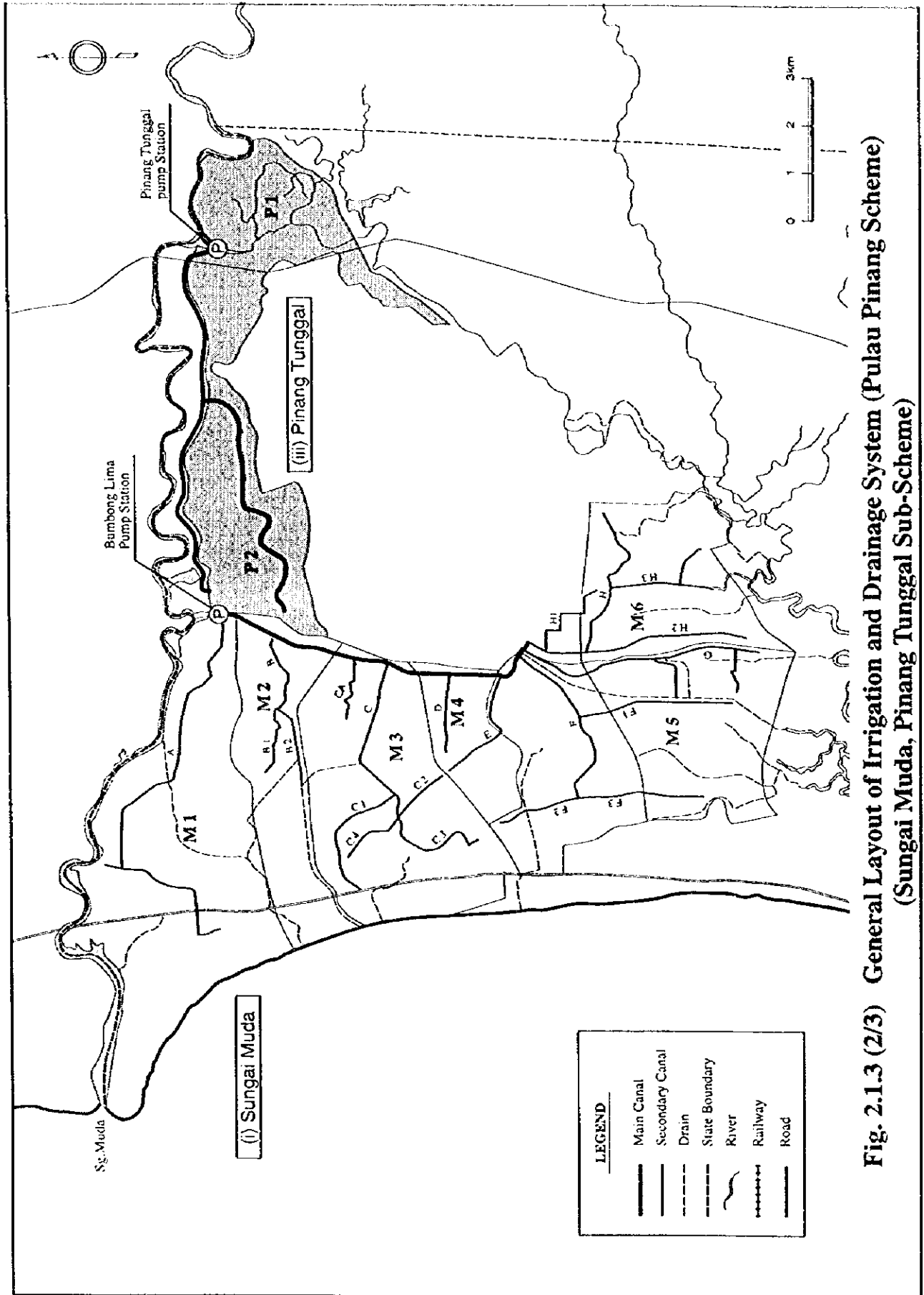
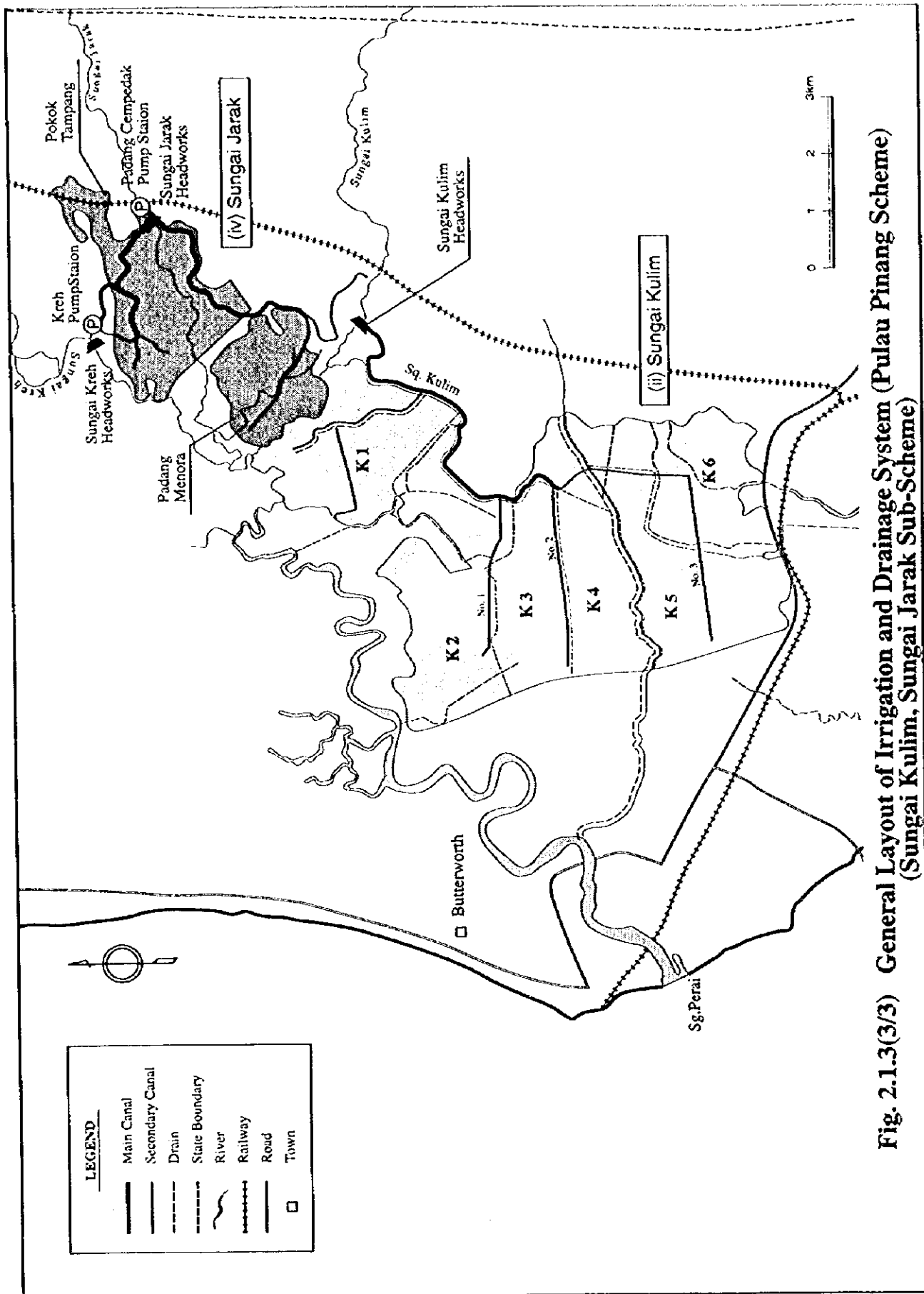


Fig. 2.1.3 (2/3) General Layout of Irrigation and Drainage System (Pulau Pinang Scheme)
(Sungai Muda, Pinang Tunggal Sub-Scheme)



**Fig. 2.1.3(3/3) General Layout of Irrigation and Drainage System (Pulau Pinang Scheme)
(Sungai Kulim, Sungai Jarak Sub-Scheme)**

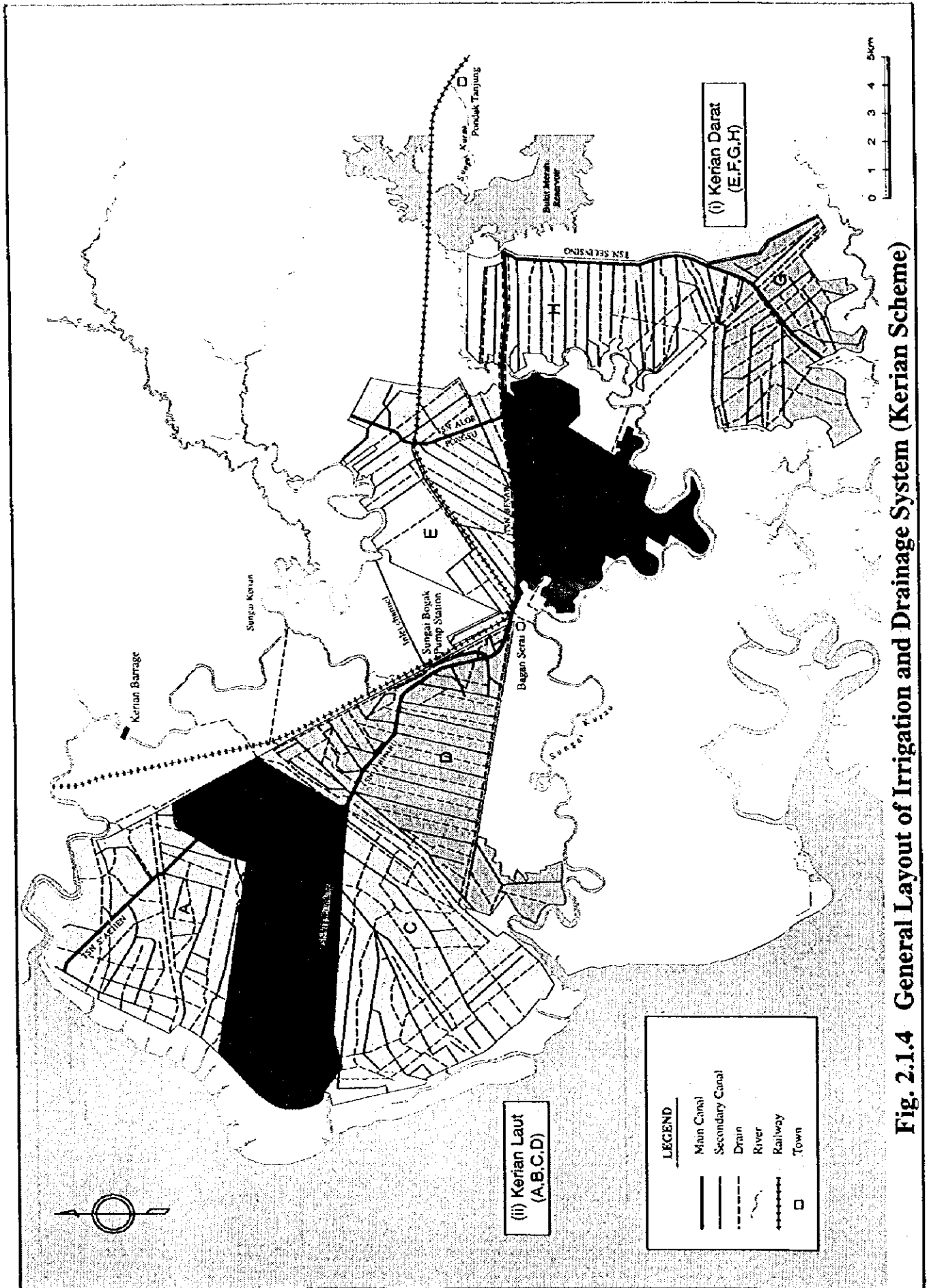


Fig. 2.1.4 General Layout of Irrigation and Drainage System (Kerian Scheme)

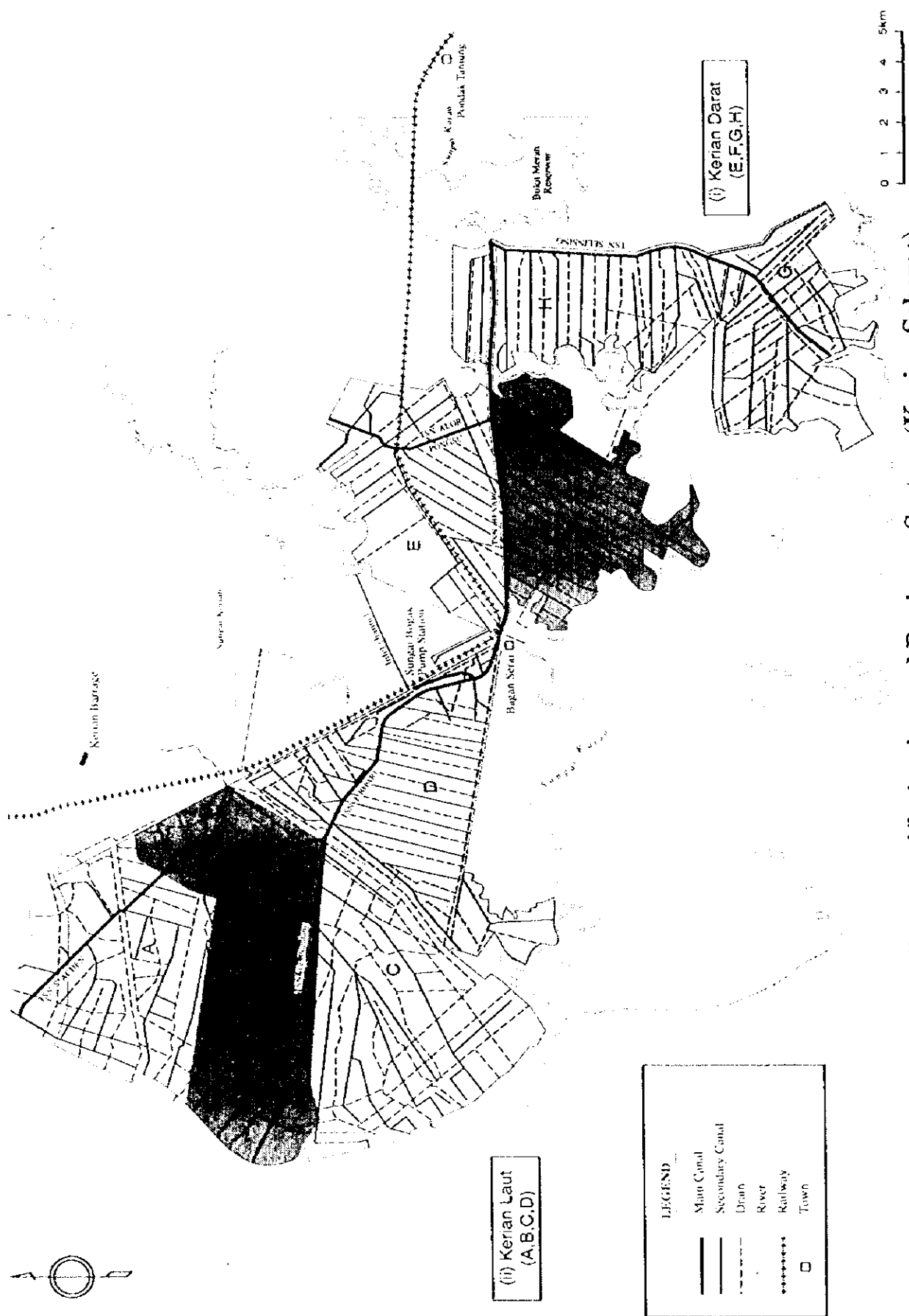


Fig. 2.1.4 General Layout of Irrigation and Drainage System (Kerian Scheme)

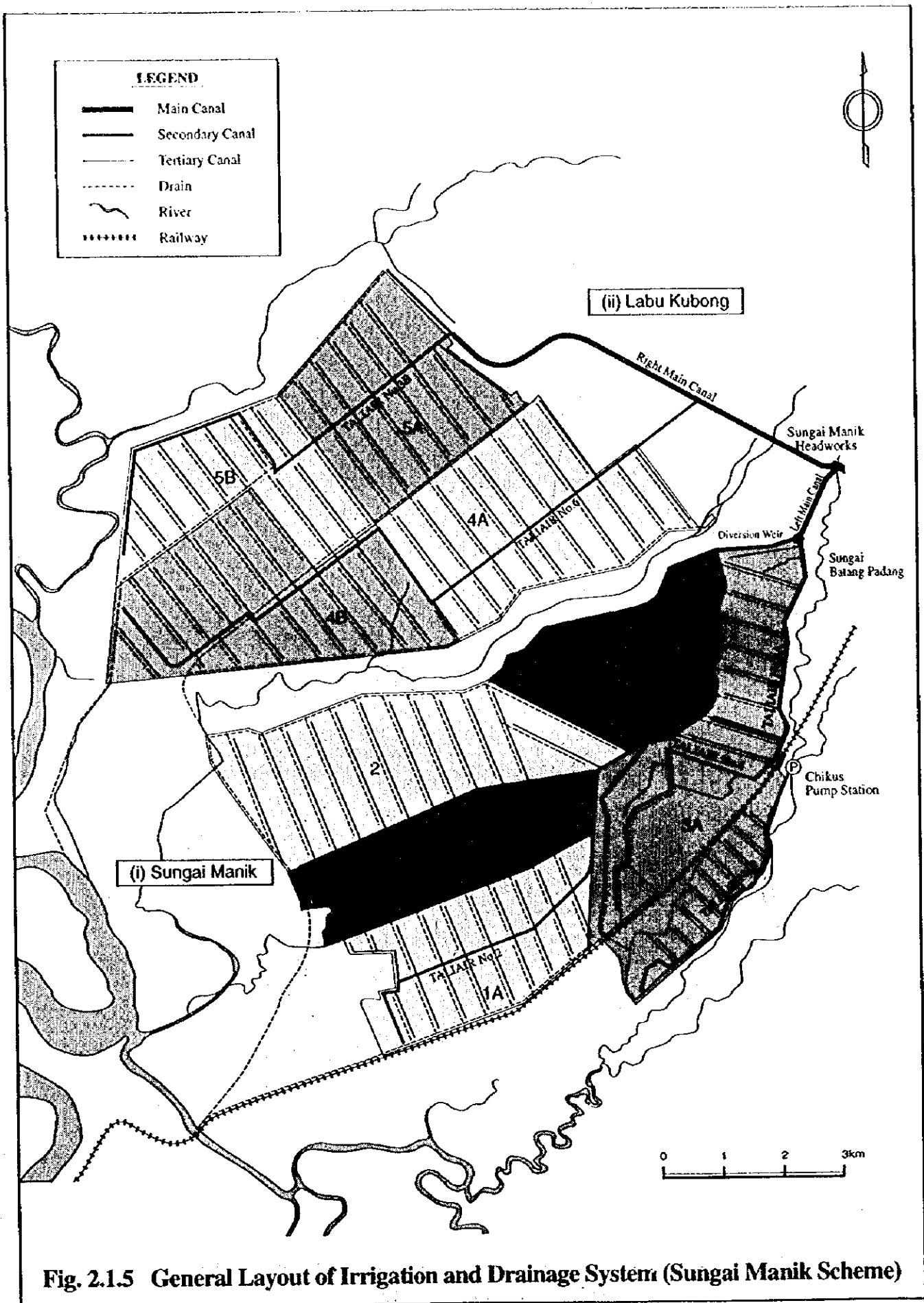


Fig. 2.15 General Layout of Irrigation and Drainage System (Sungai Manik Scheme)

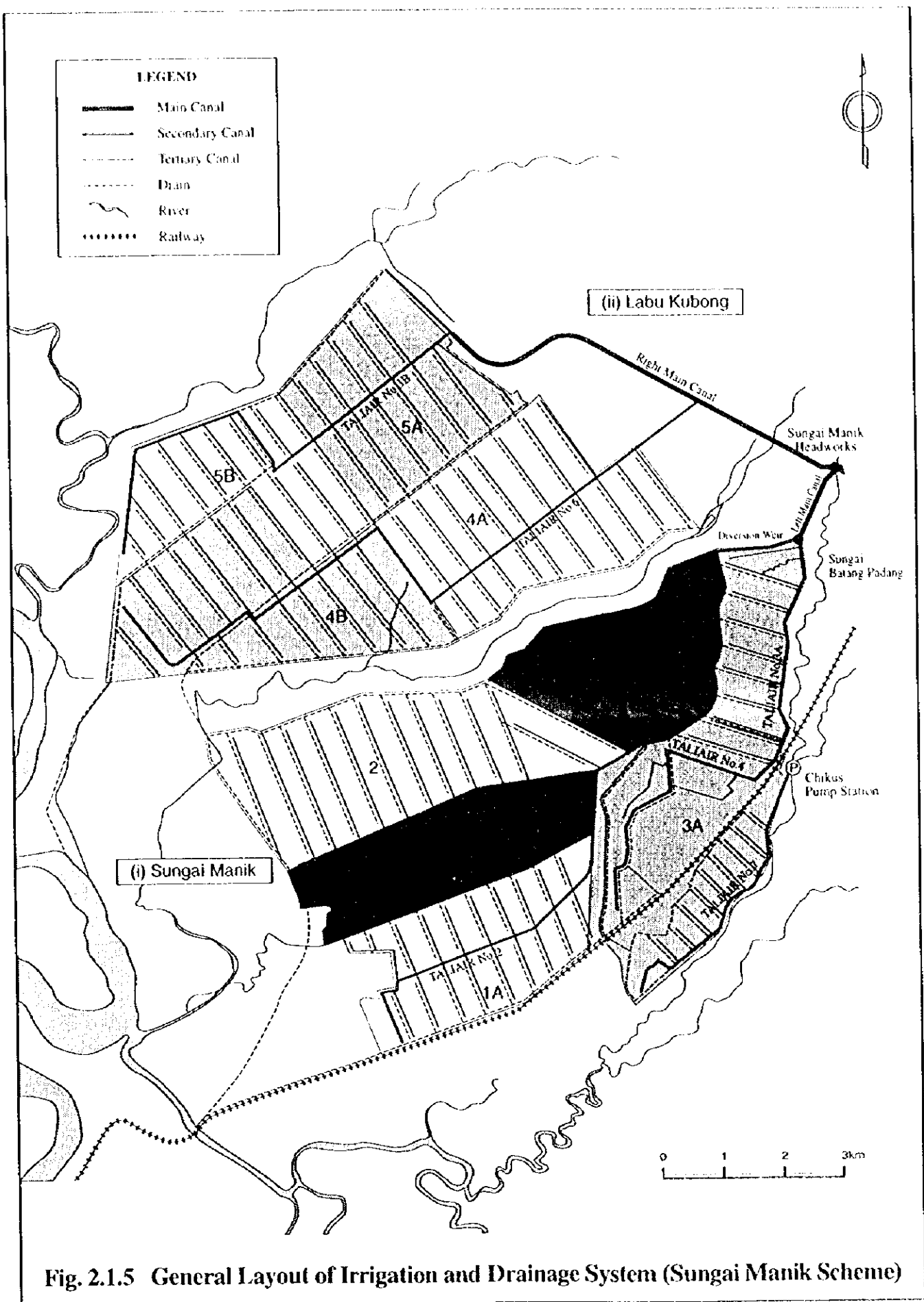
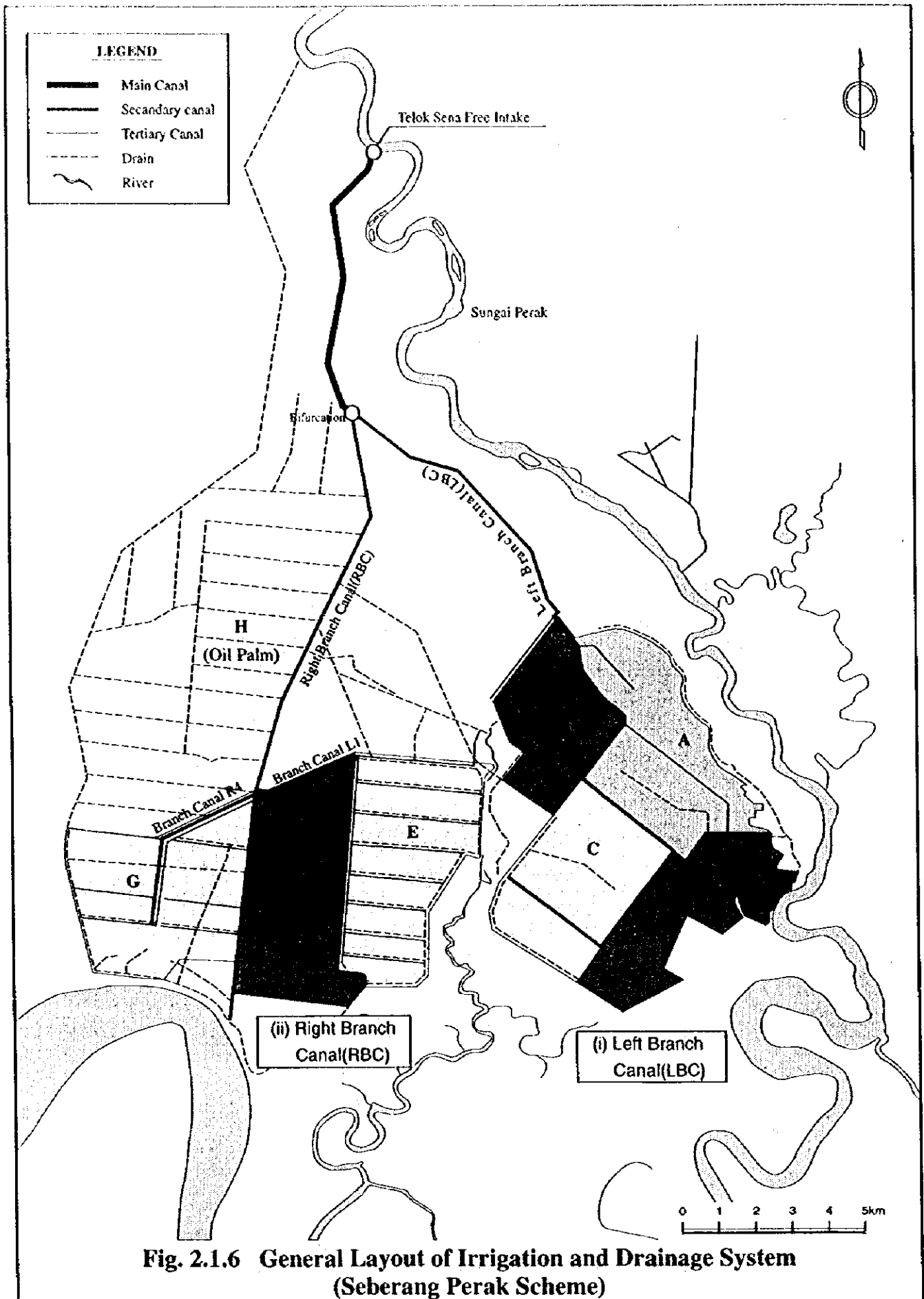


Fig. 2.1.5 General Layout of Irrigation and Drainage System (Sungai Manik Scheme)



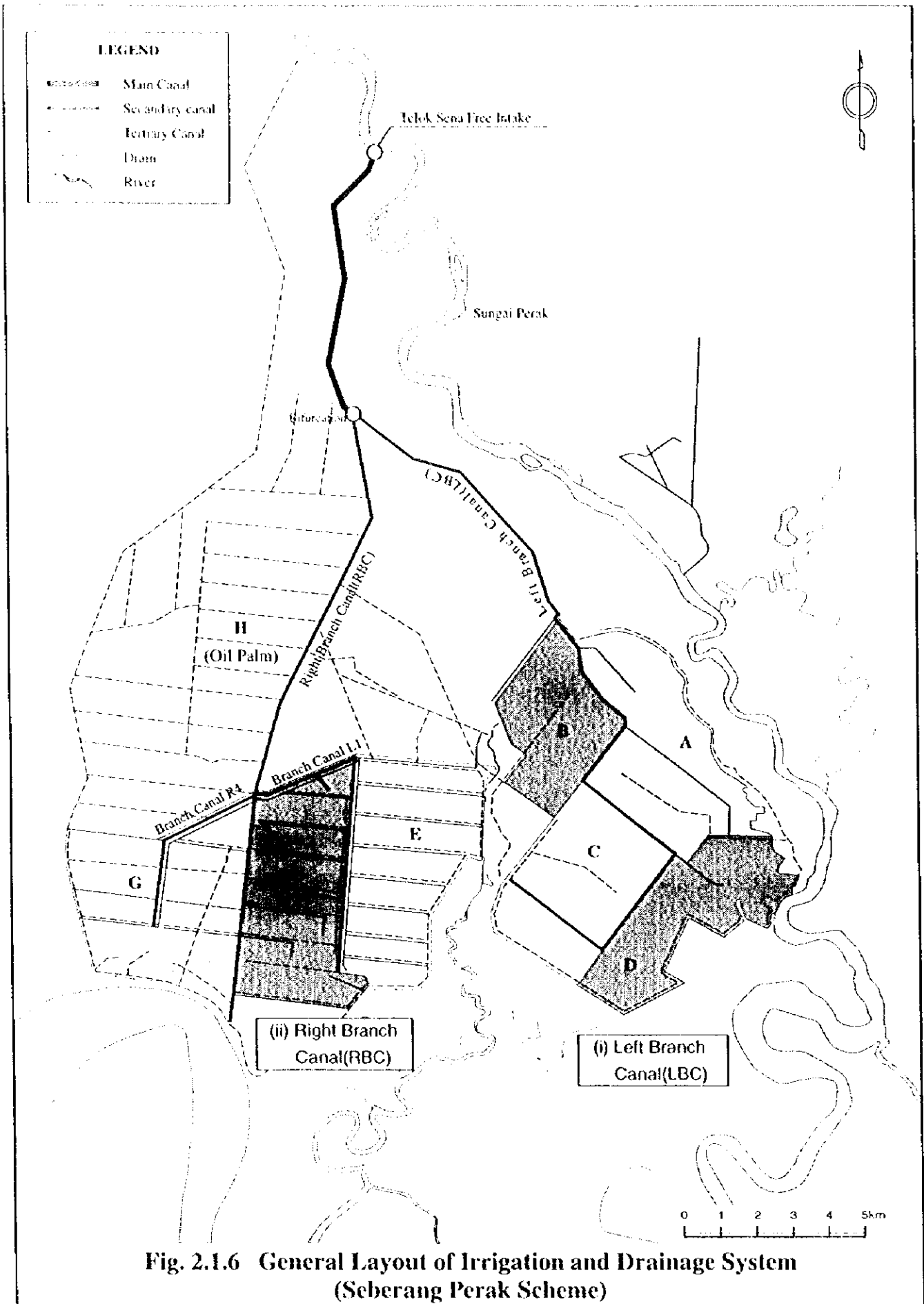
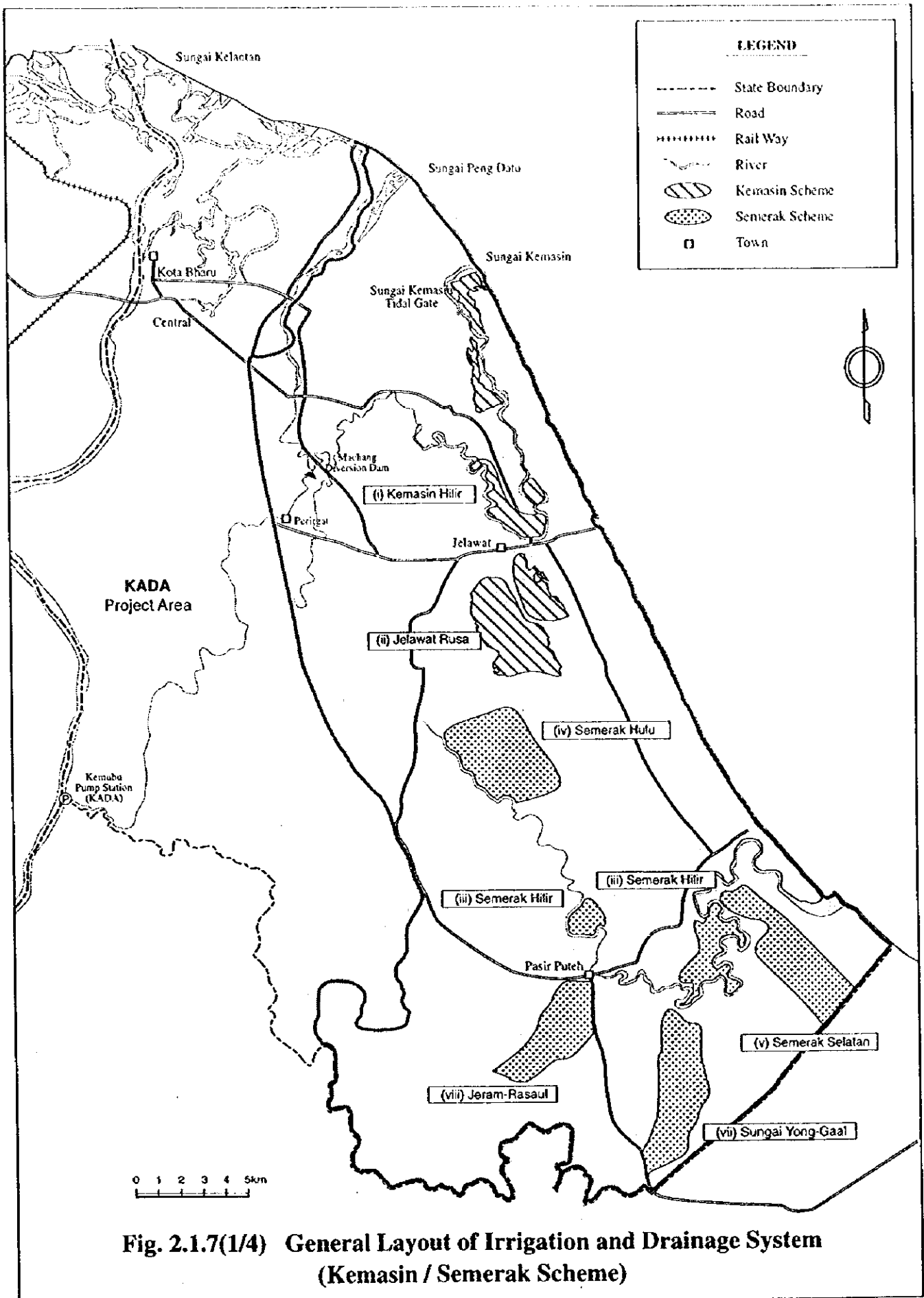


Fig. 2.1.6 General Layout of Irrigation and Drainage System (Seberang Perak Scheme)



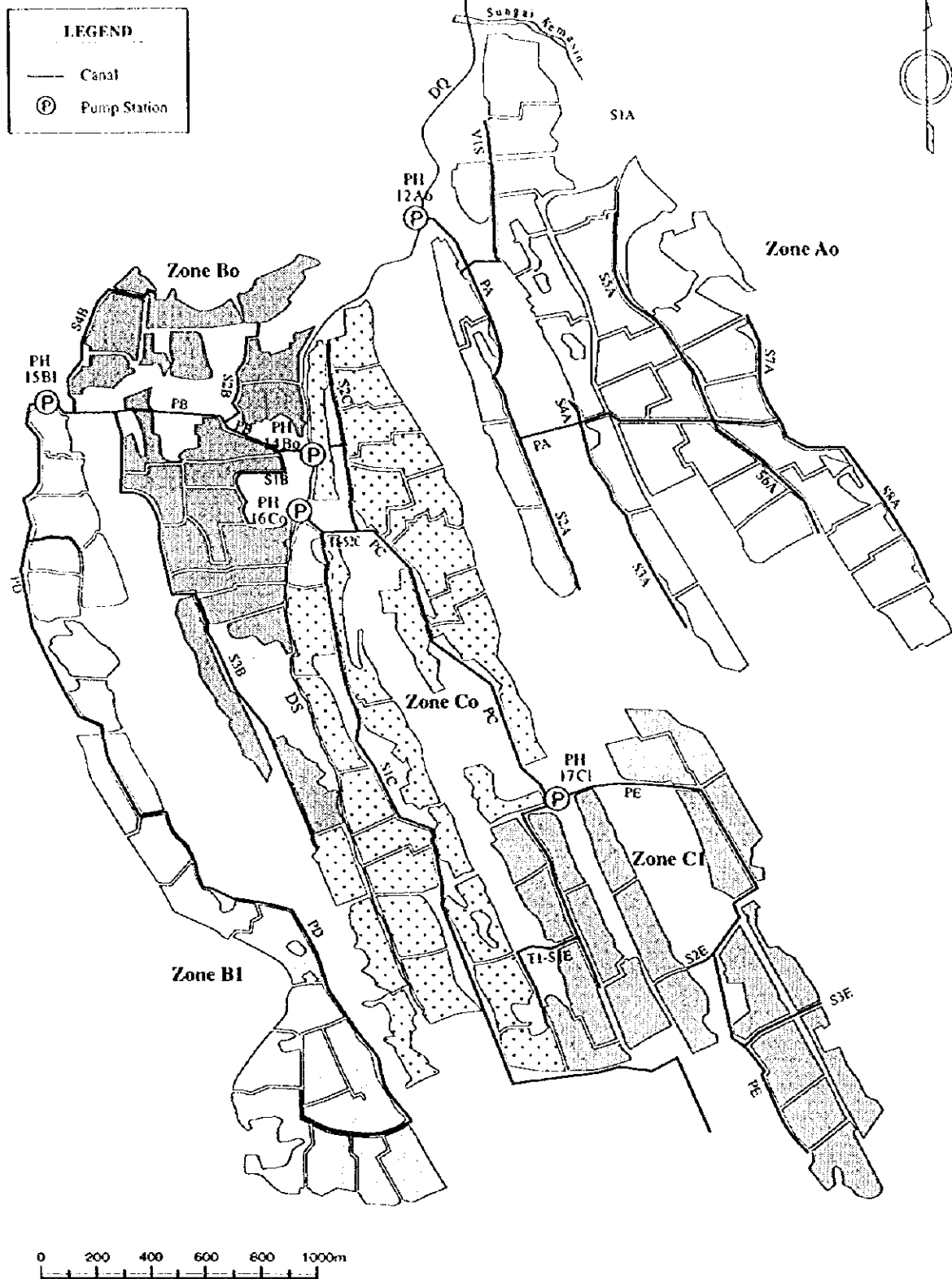
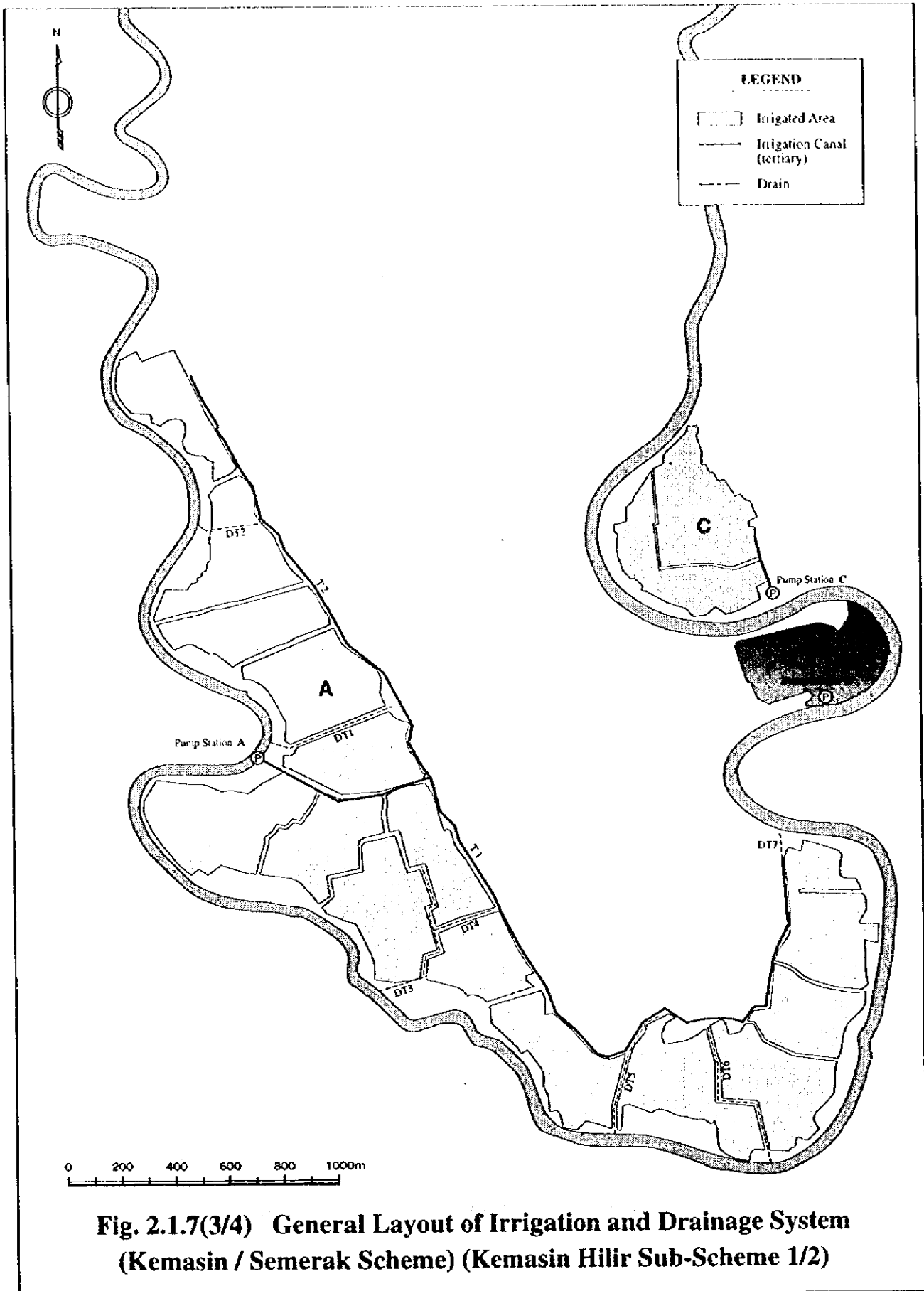


Fig. 2.1.7(2/4) General Layout of Irrigation and Drainage System (Kemasin / Semerak Scheme) (Jelawat Rusa Sub-Scheme)



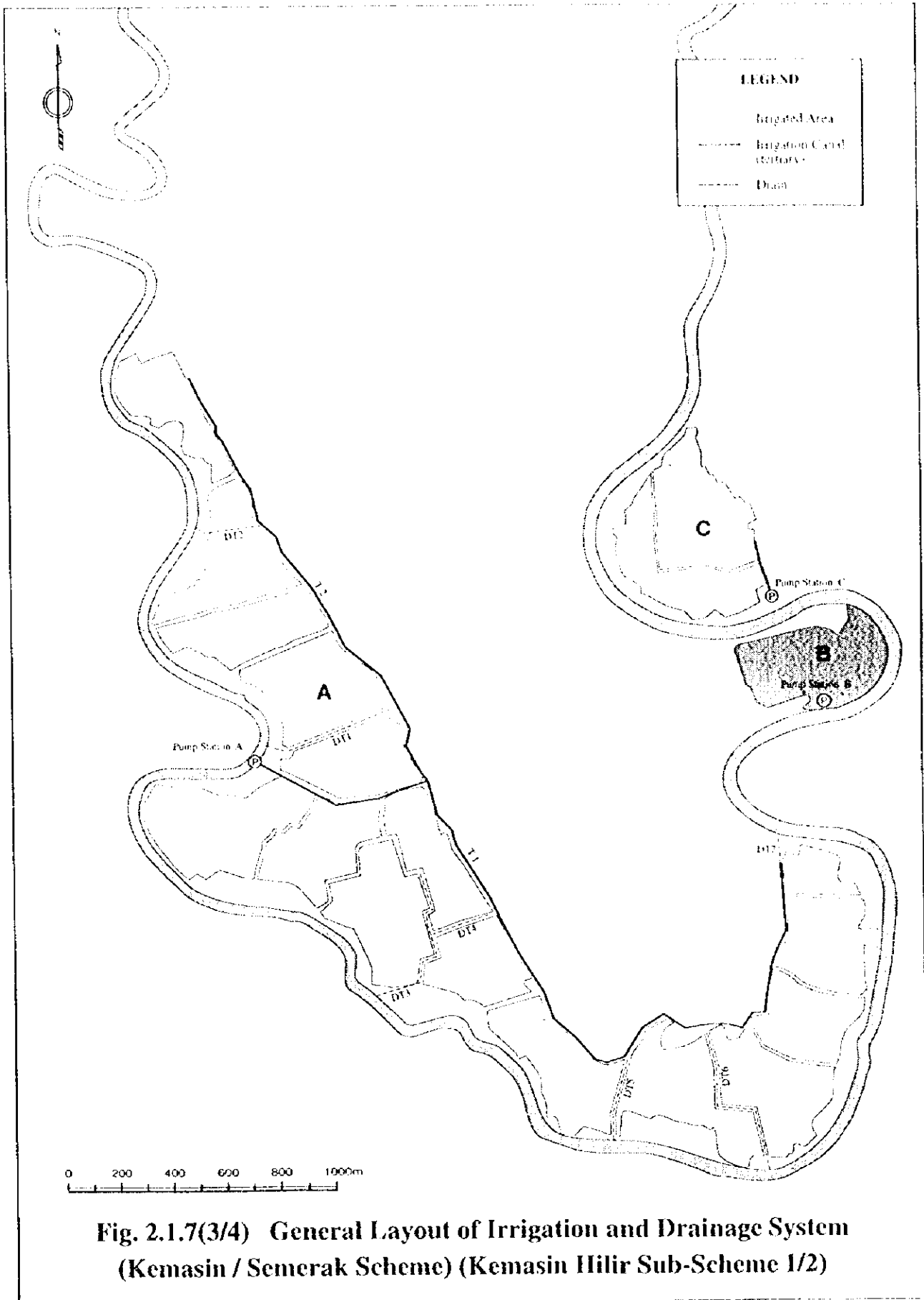


Fig. 2.1.7(3/4) General Layout of Irrigation and Drainage System (Kemasin / Semerak Scheme) (Kemasin Hilir Sub-Scheme 1/2)

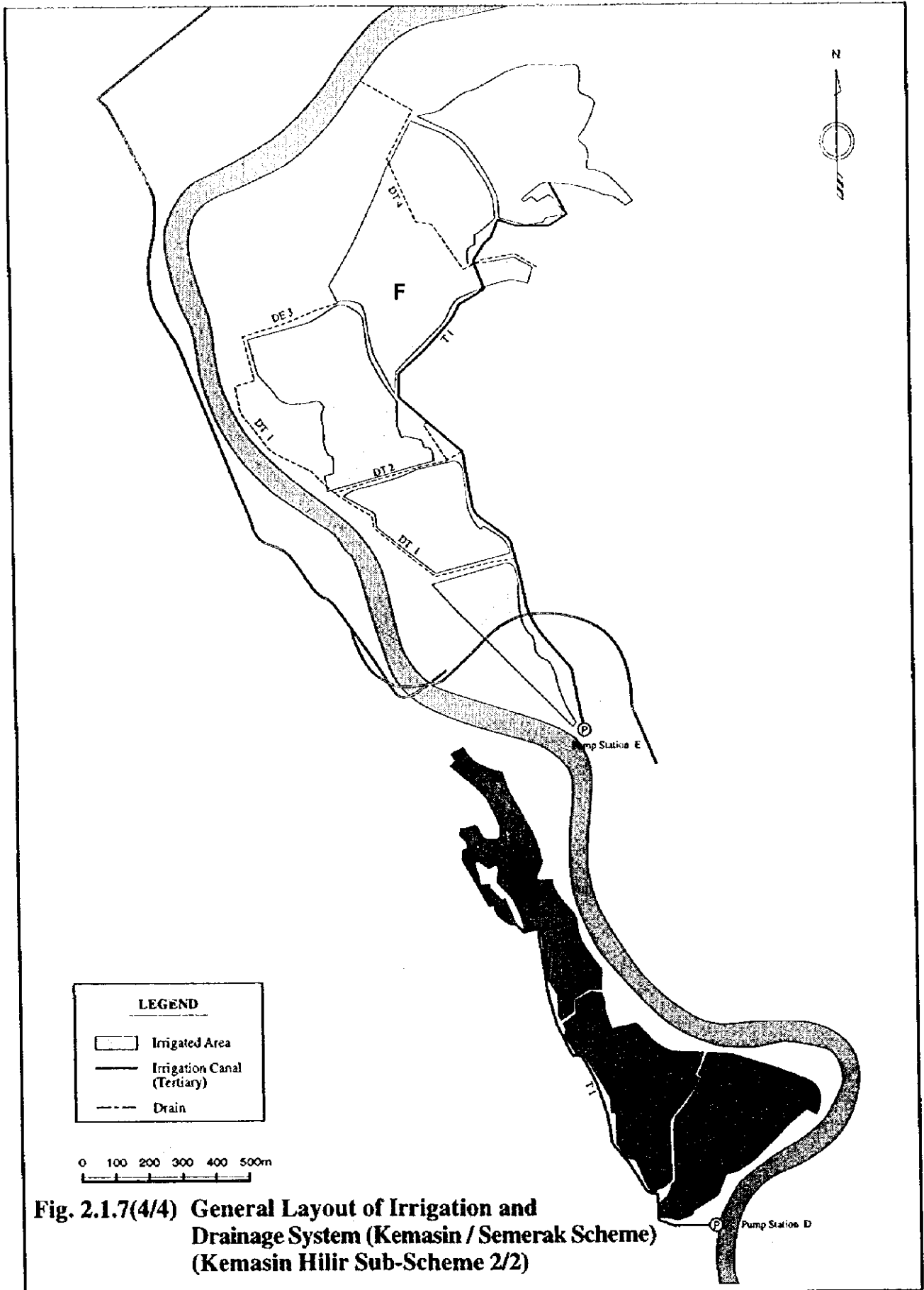


Fig. 2.1.7(4/4) General Layout of Irrigation and Drainage System (Kemasin / Semerak Scheme) (Kemasin Hilir Sub-Scheme 2/2)

N
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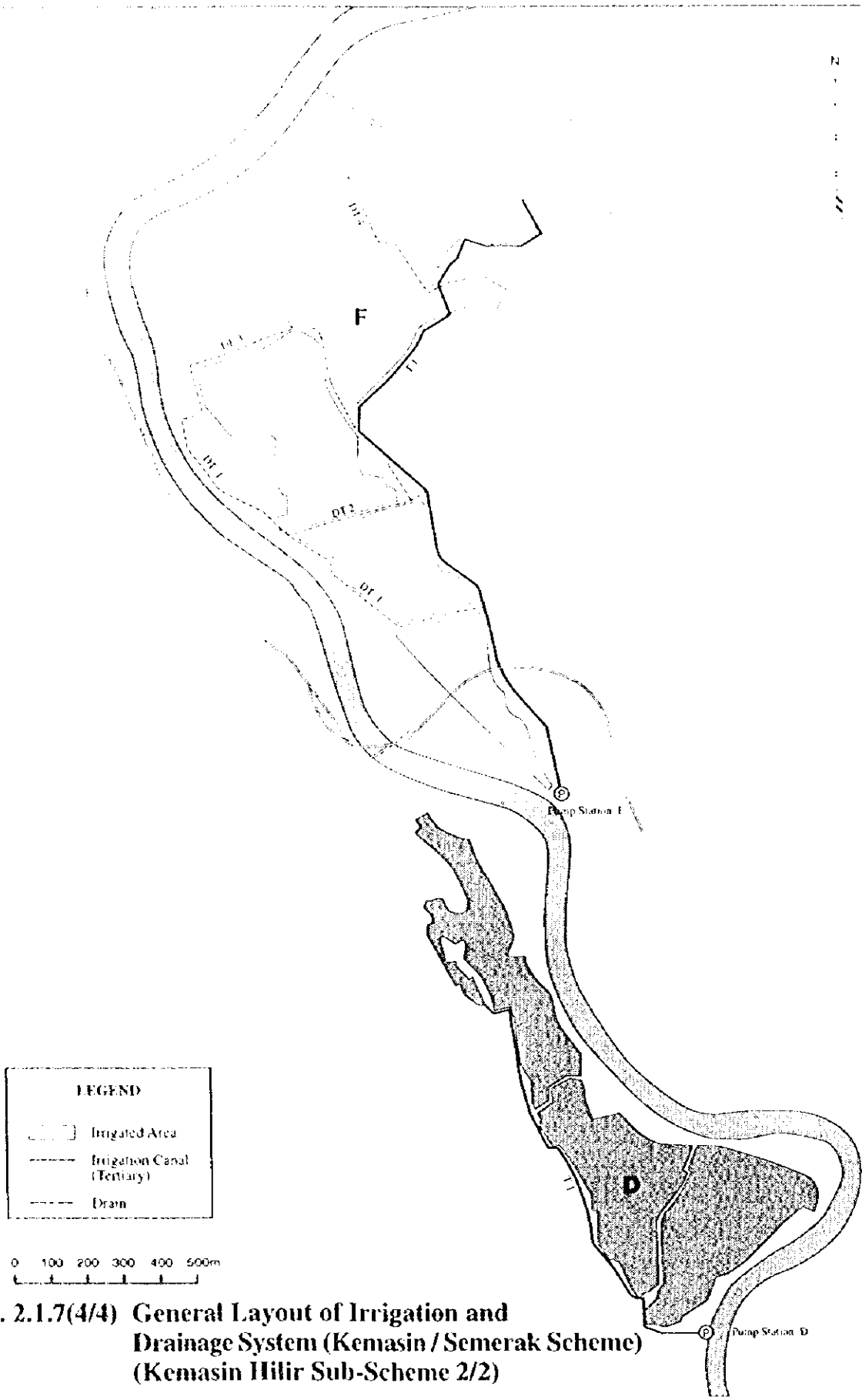


Fig. 2.1.7(4/4) General Layout of Irrigation and Drainage System (Kemasin / Semerak Scheme) (Kemasin Hilir Sub-Scheme 2/2)

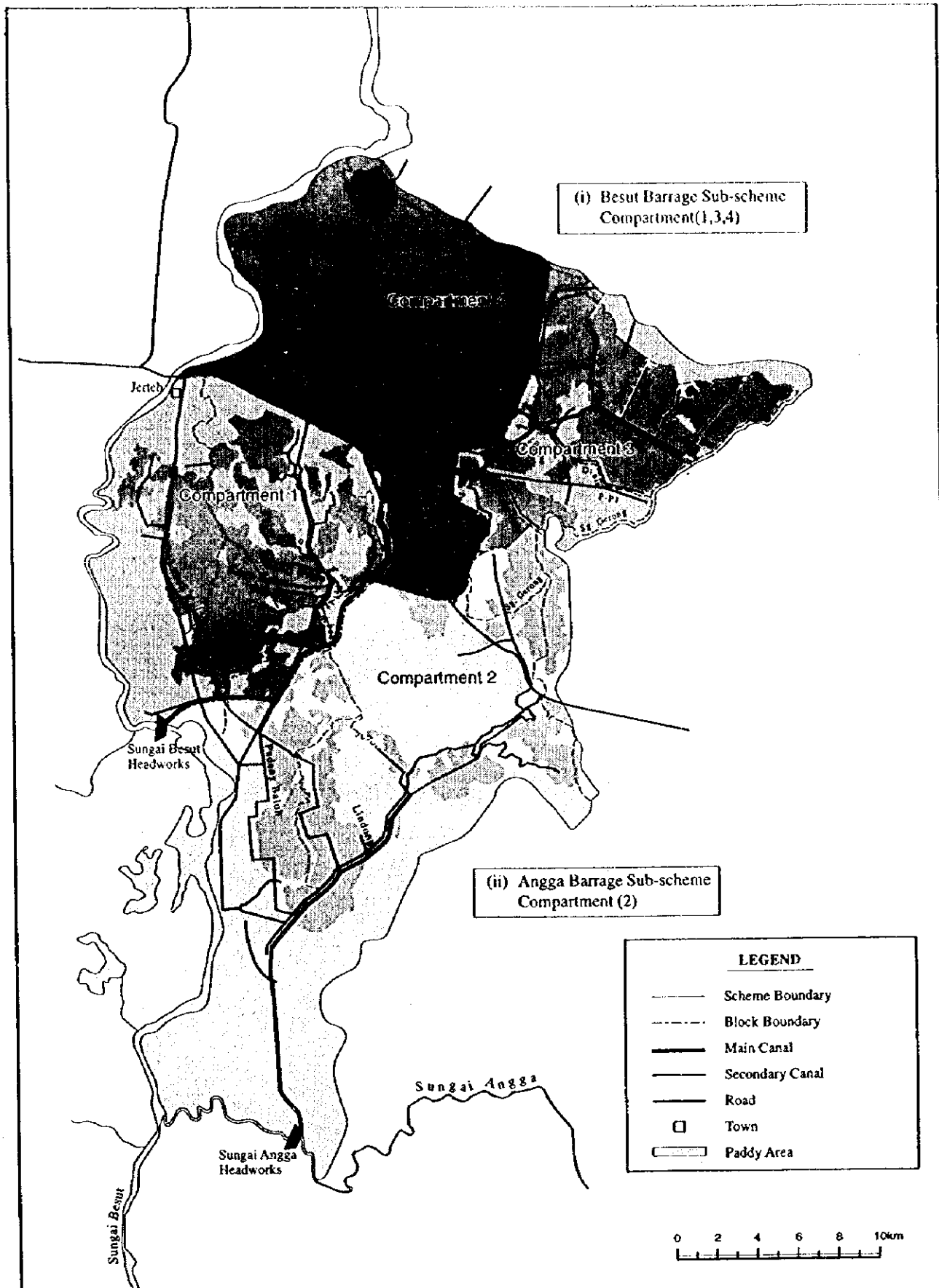


Fig. 2.1.8 General Layout of Irrigation and Drainage System [Ketara(Besut) Scheme]

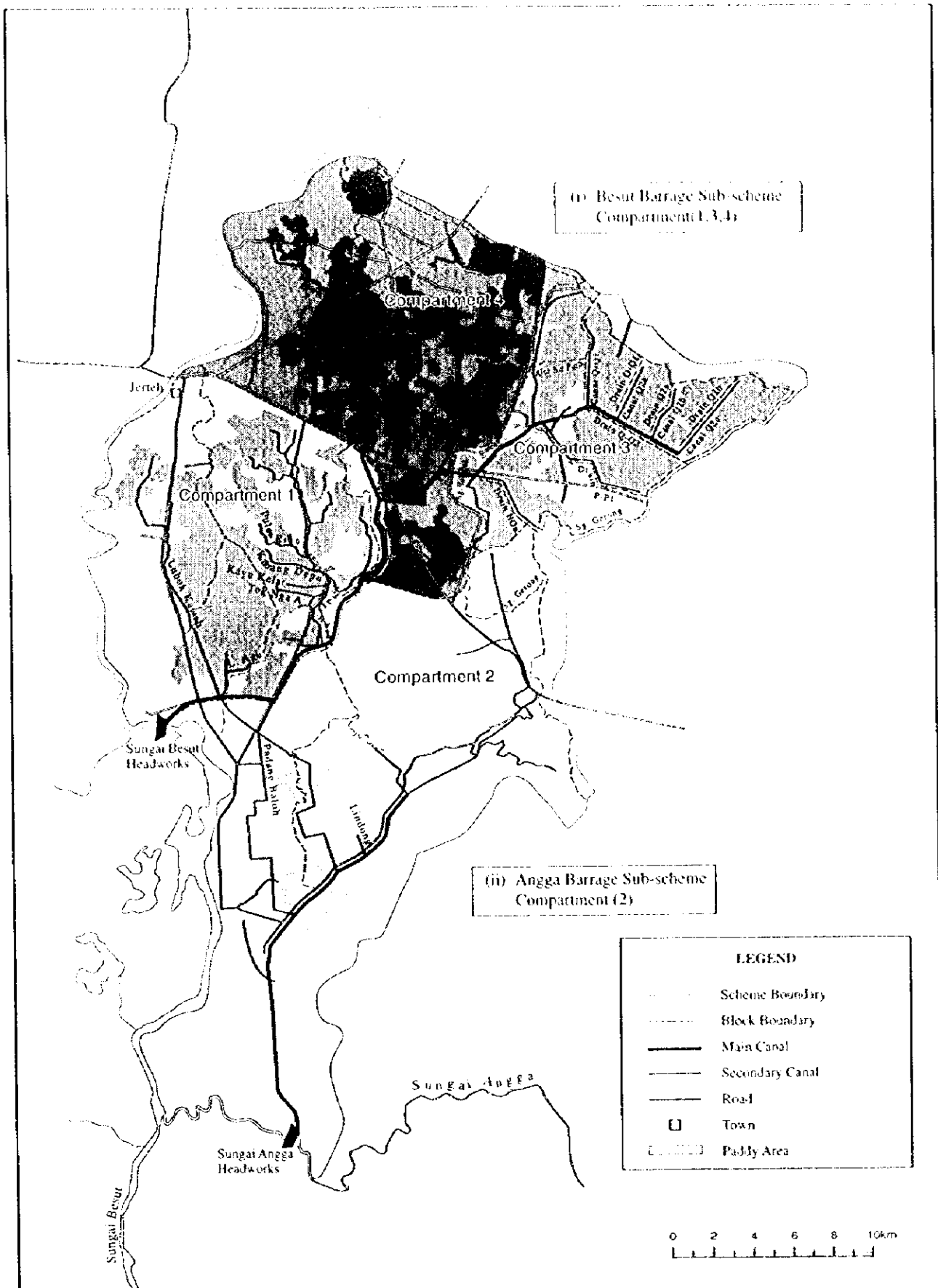


Fig. 2.1.8 General Layout of Irrigation and Drainage System [Ketara(Besut) Scheme]

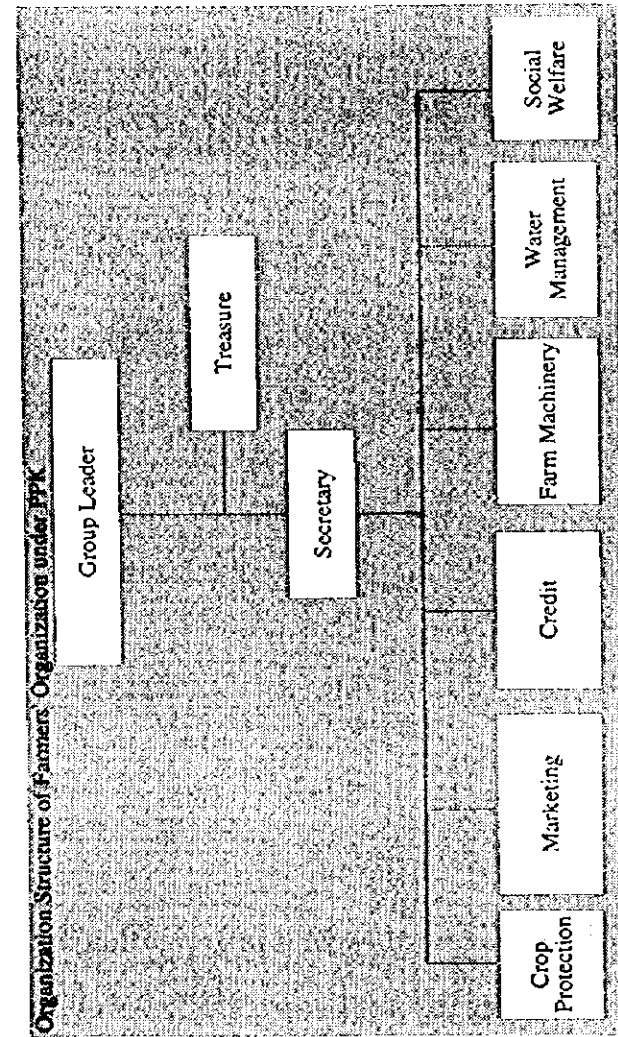
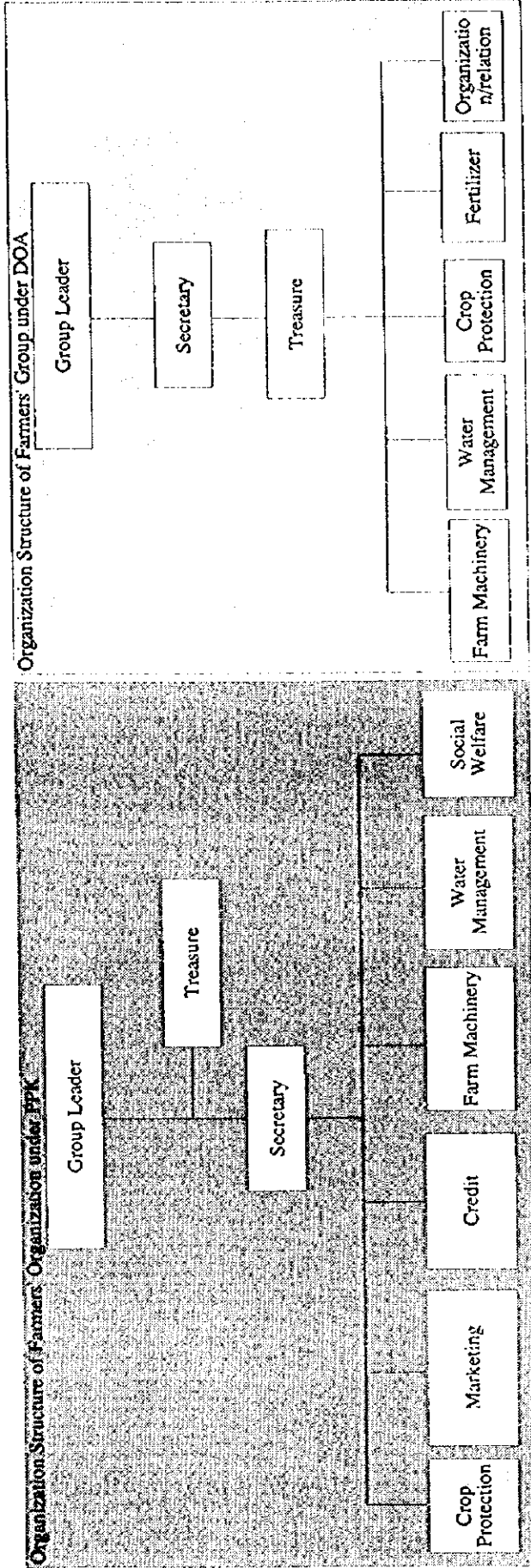
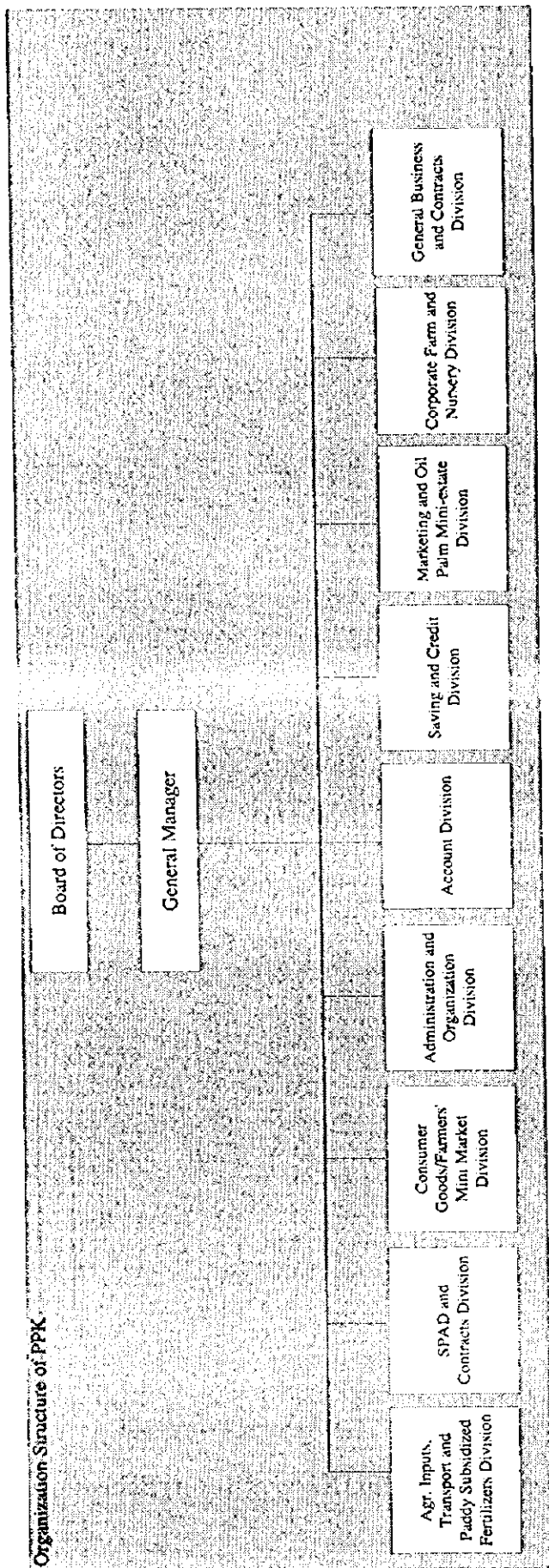


Fig. 2.1.9 Organization Structure of Area Farmers Organization (PPK) and Farmers' Groups

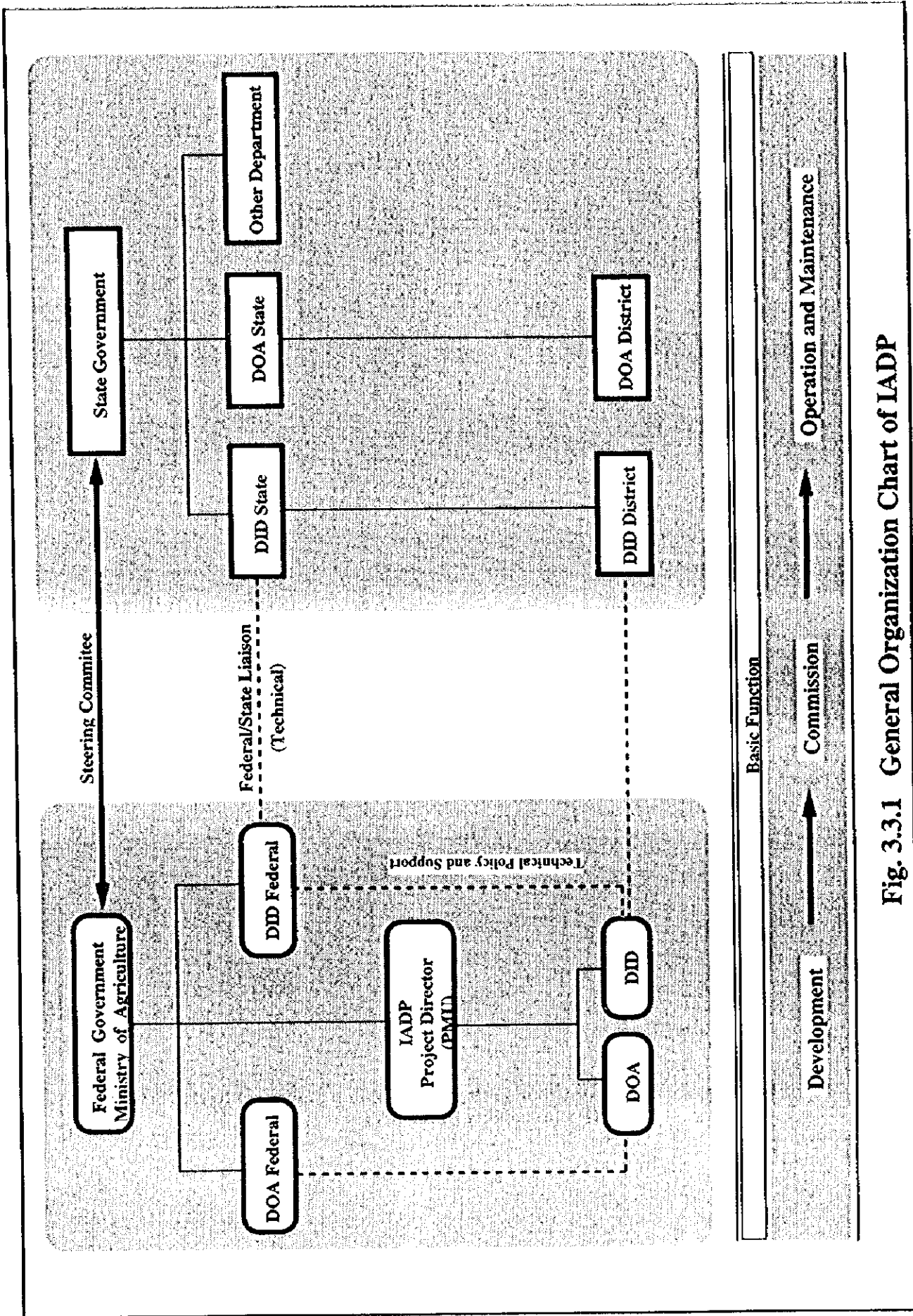
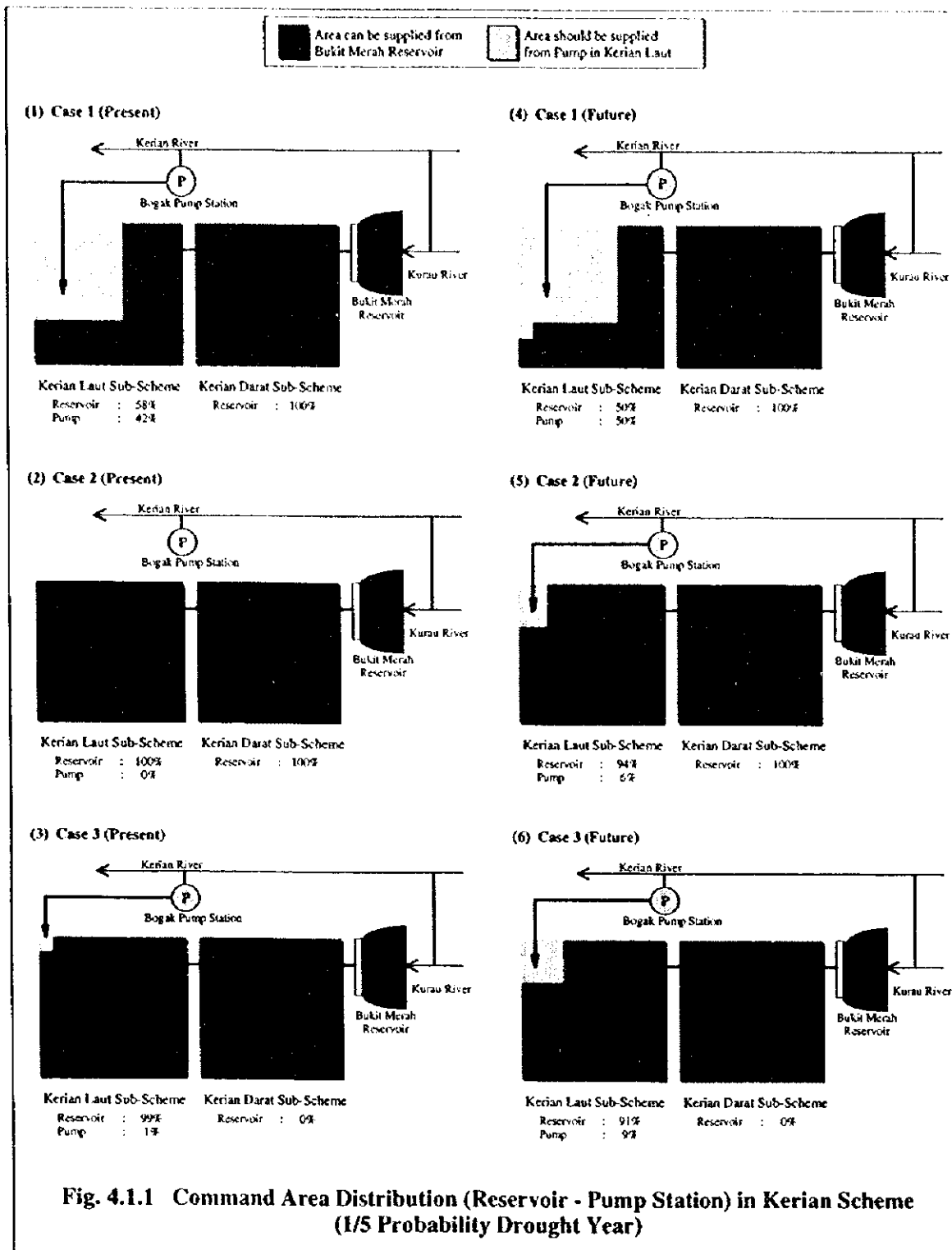


Fig. 3.3.1 General Organization Chart of IADP



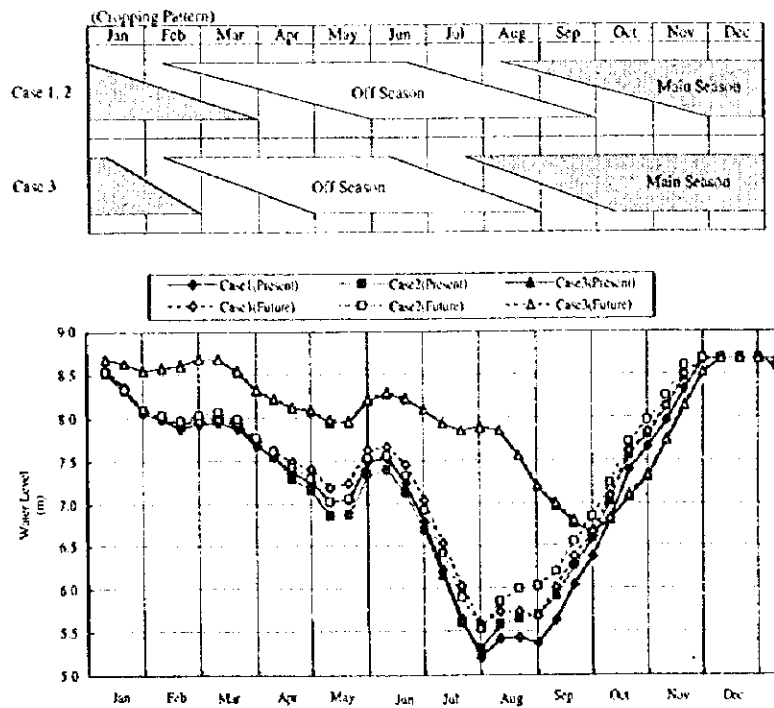


Fig. 4.1.2 10-Days Basis Transition of Bukit Merah Reservoir Water Level (1/5 Probability Drought Year)

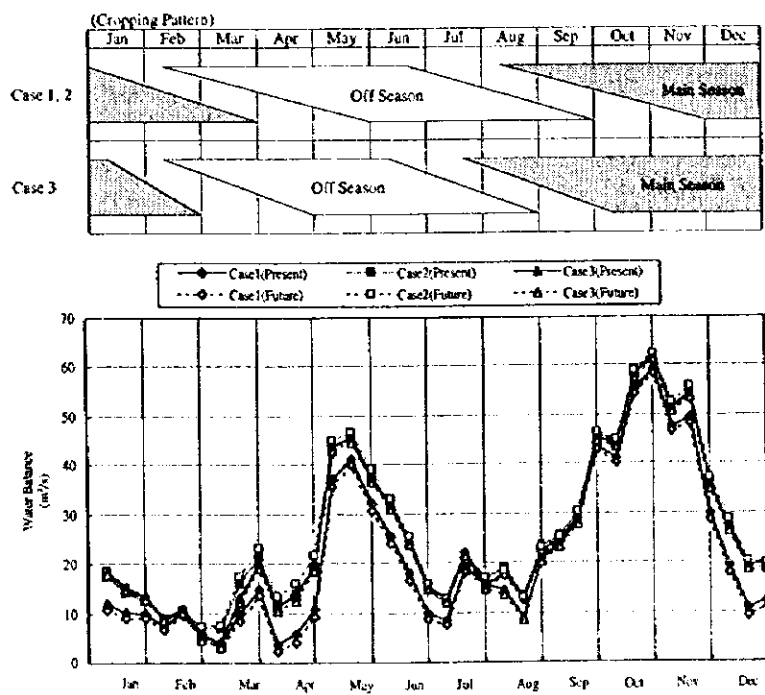
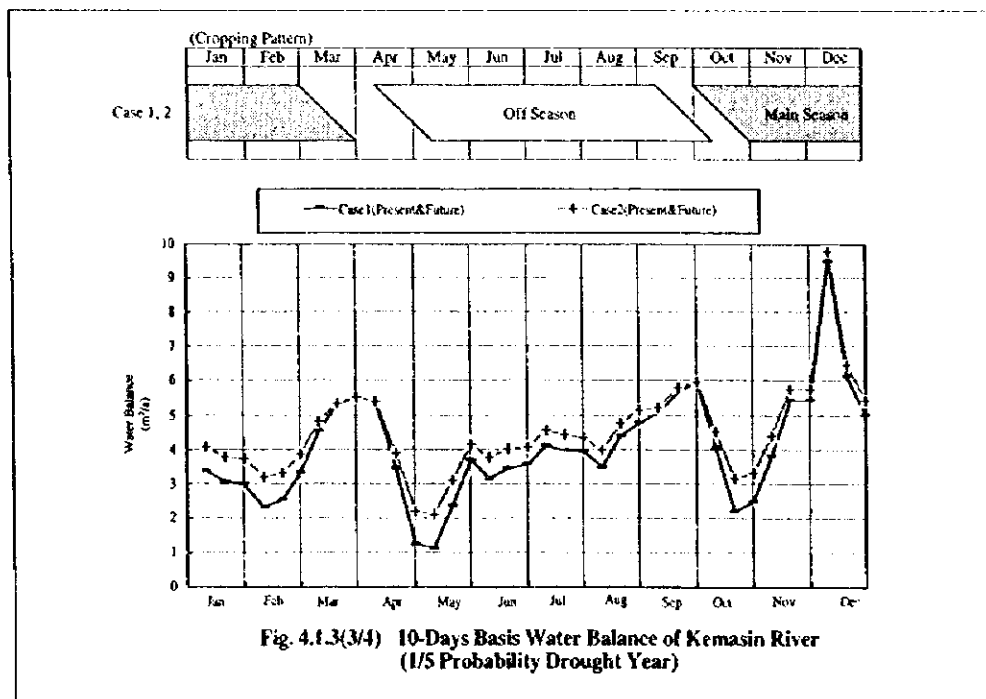
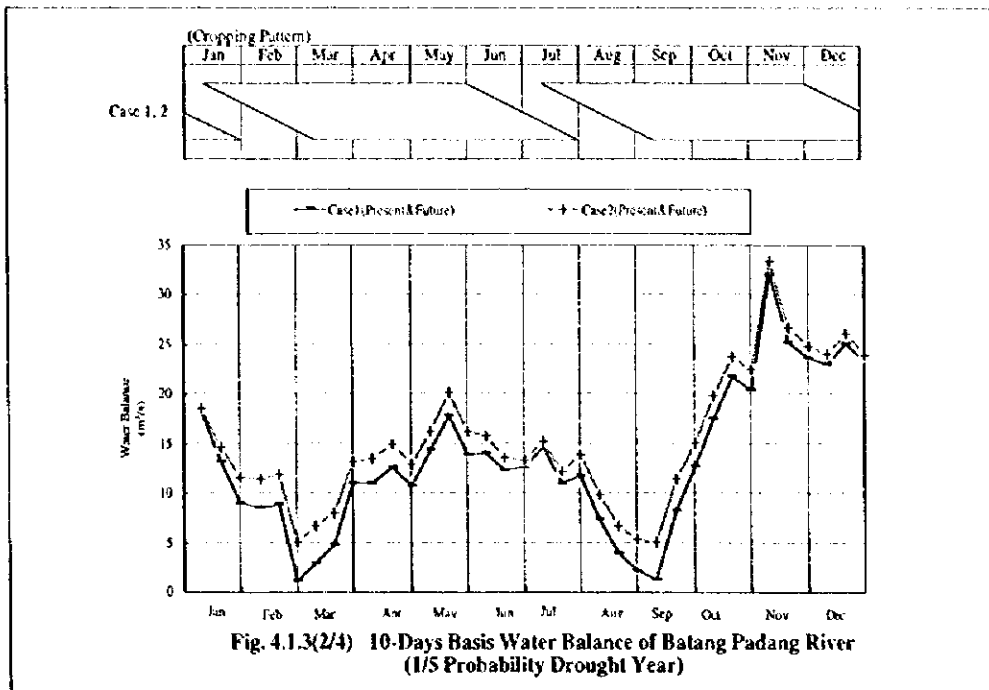


Fig. 4.1.3(1/4) 10-Days Basis Water Balance of Kerian River (1/5 Probability Drought Year)



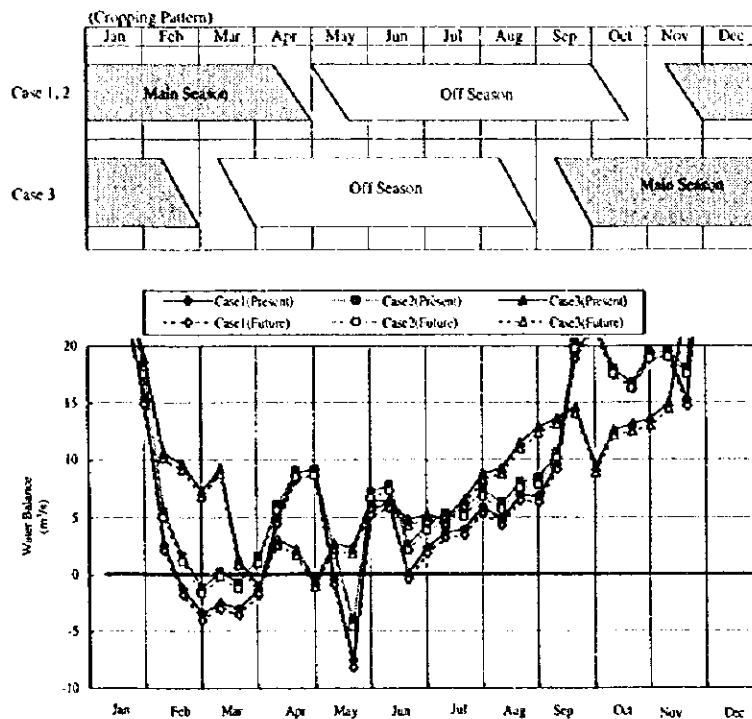


Fig. 4.1.3(4/4) 10-Days Basis Water Balance of Besut Scheme
(1/5 Probability Drought Year)

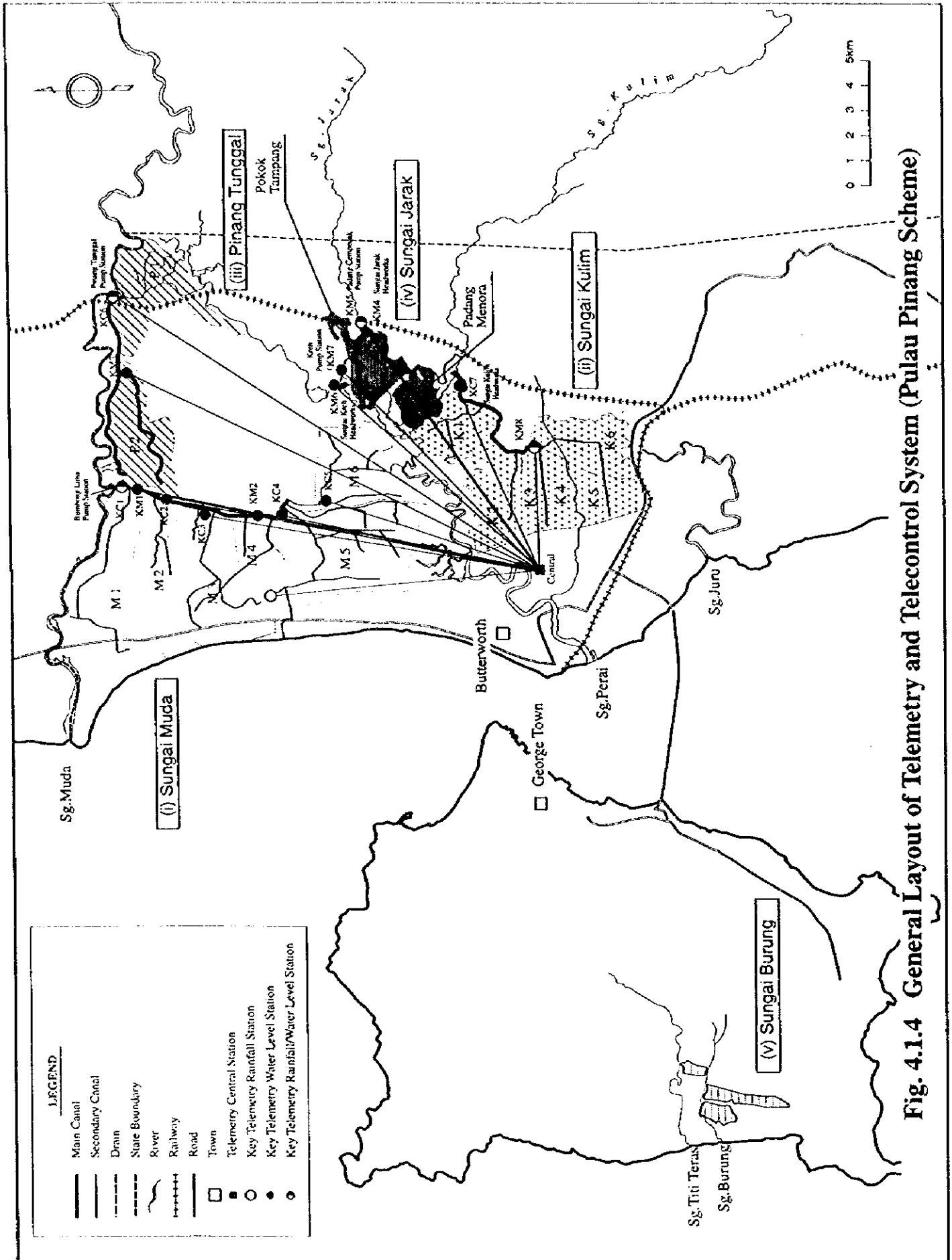


Fig. 4.1.4 General Layout of Telemetry and Telecontrol System (Pulau Pinang Scheme)

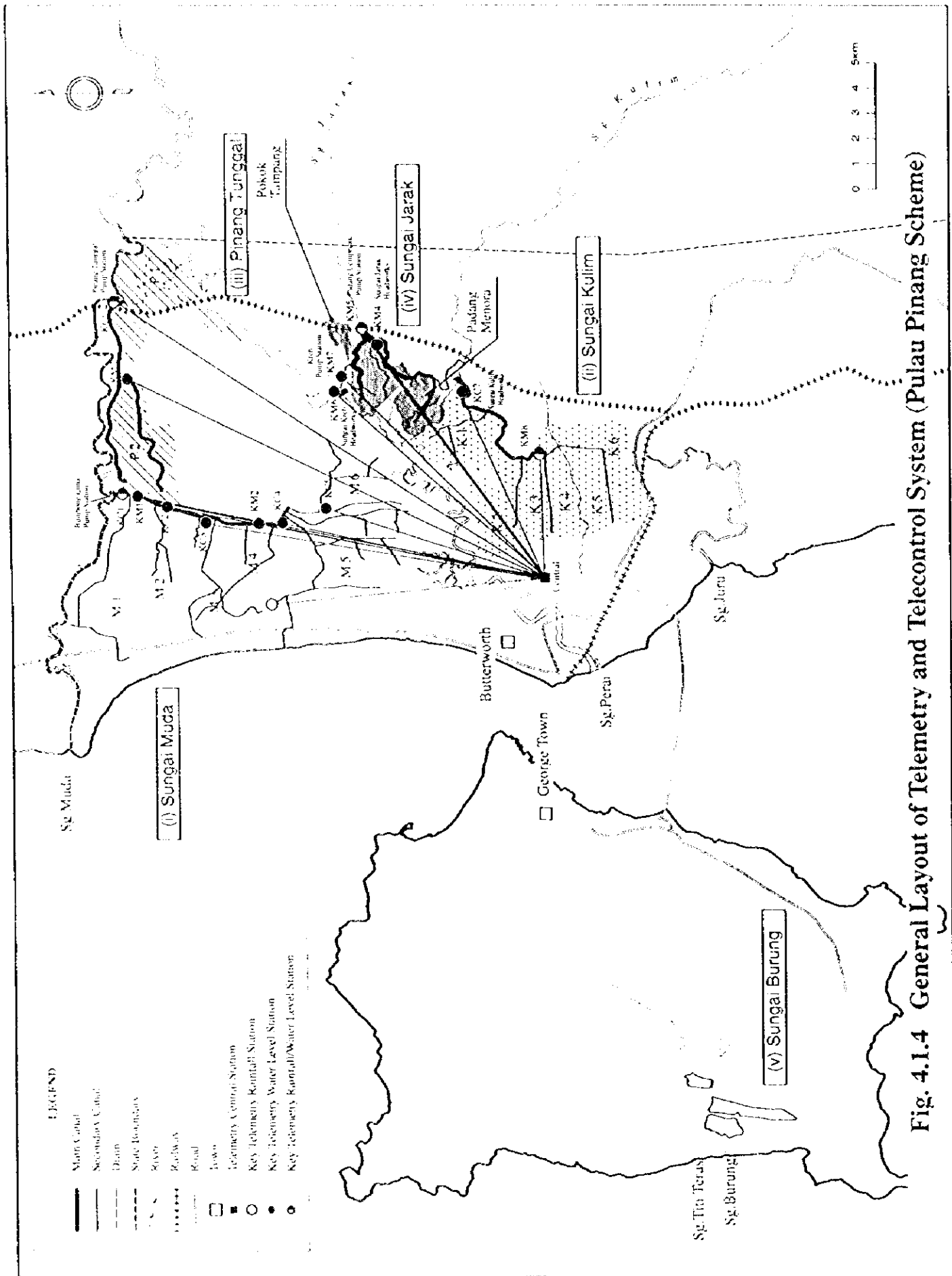


Fig. 4.1.4 General Layout of Telemetry and Telecontrol System (Pulau Pinang Scheme)

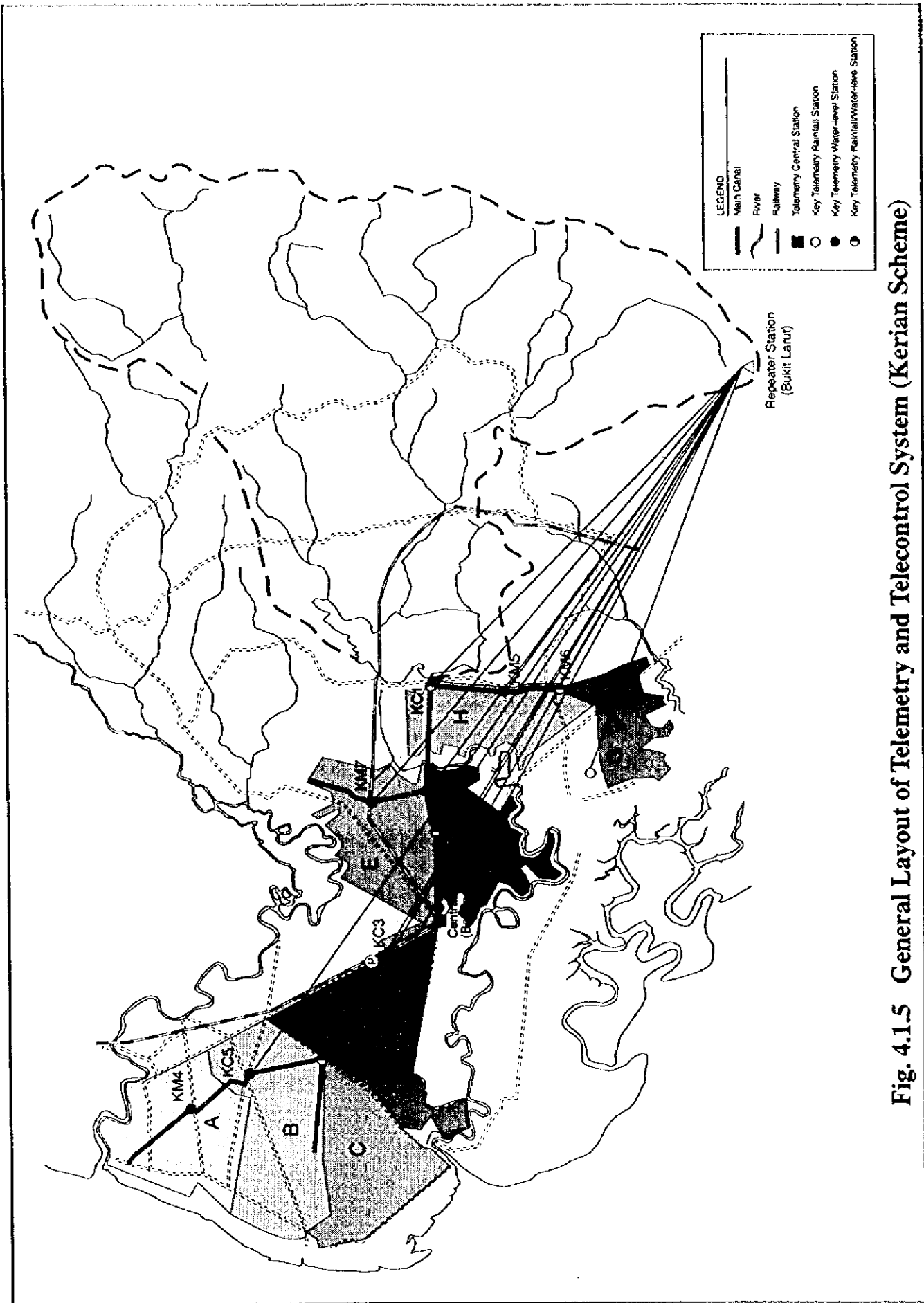


Fig. 4.1.5 General Layout of Telemetry and Telecontrol System (Kerian Scheme)

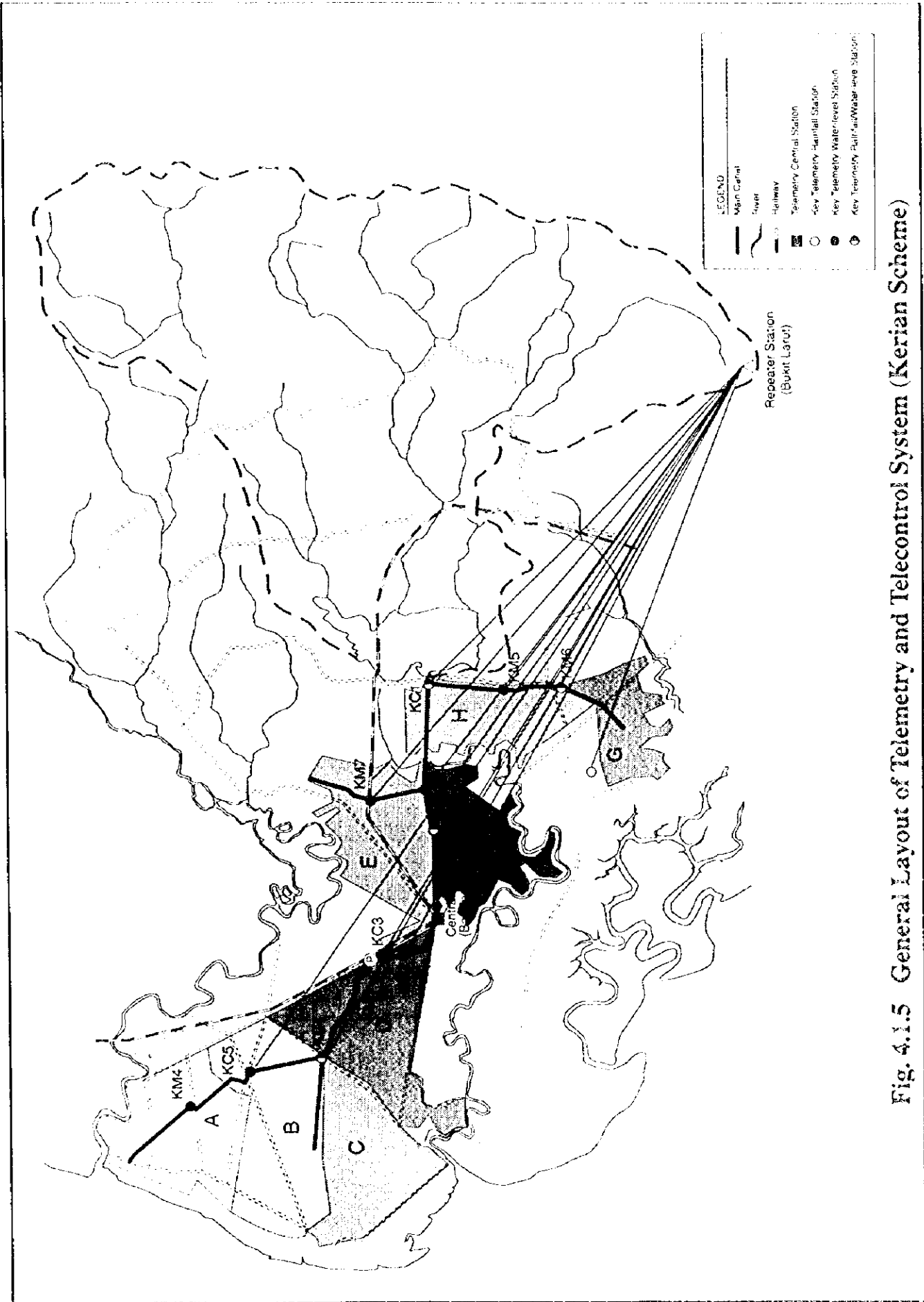


Fig. 4.1.5 General Layout of Telemetry and Telecontrol System (Kerian Scheme)

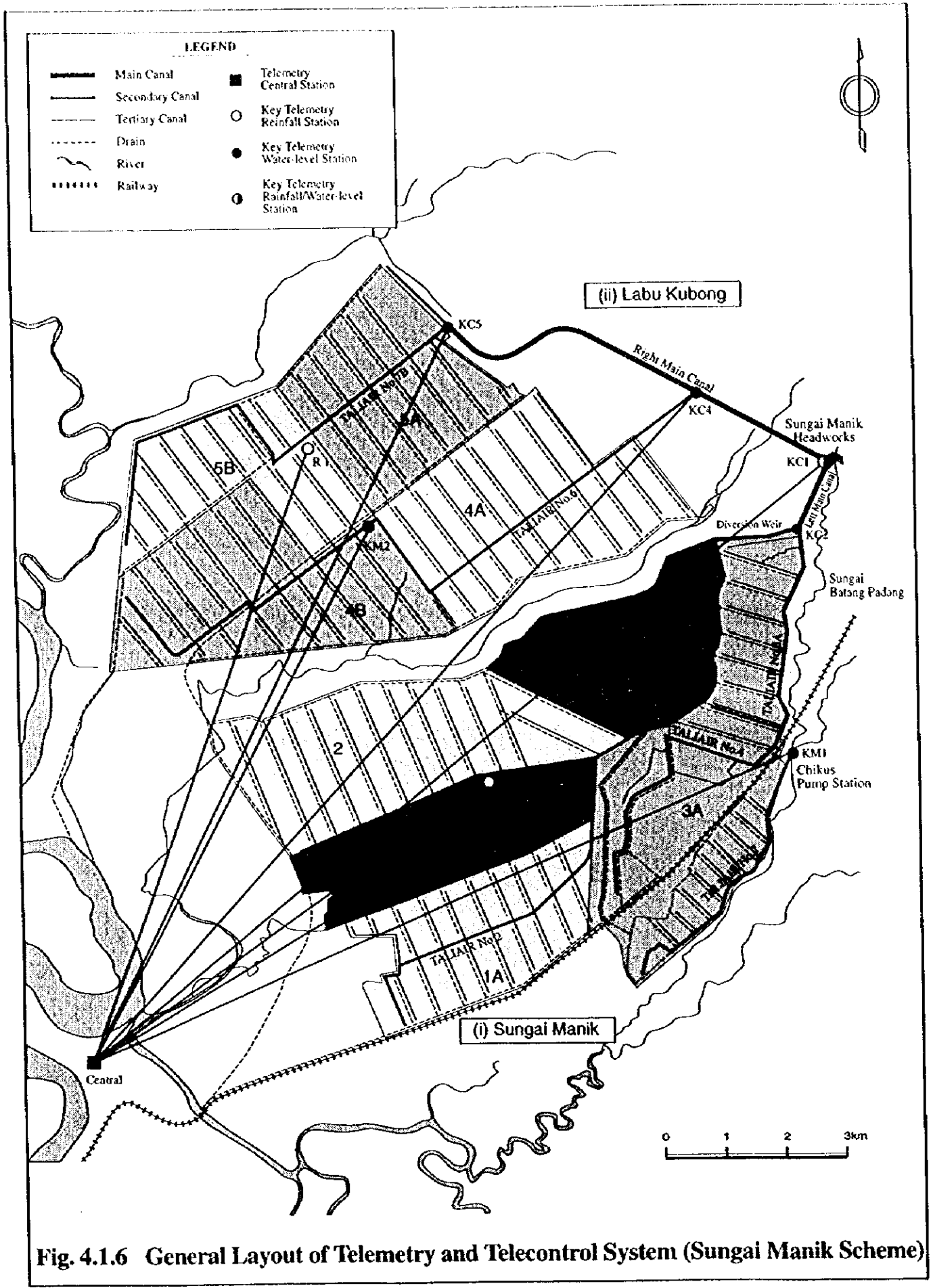


Fig. 4.1.6 General Layout of Telemetry and Telecontrol System (Sungai Manik Scheme)

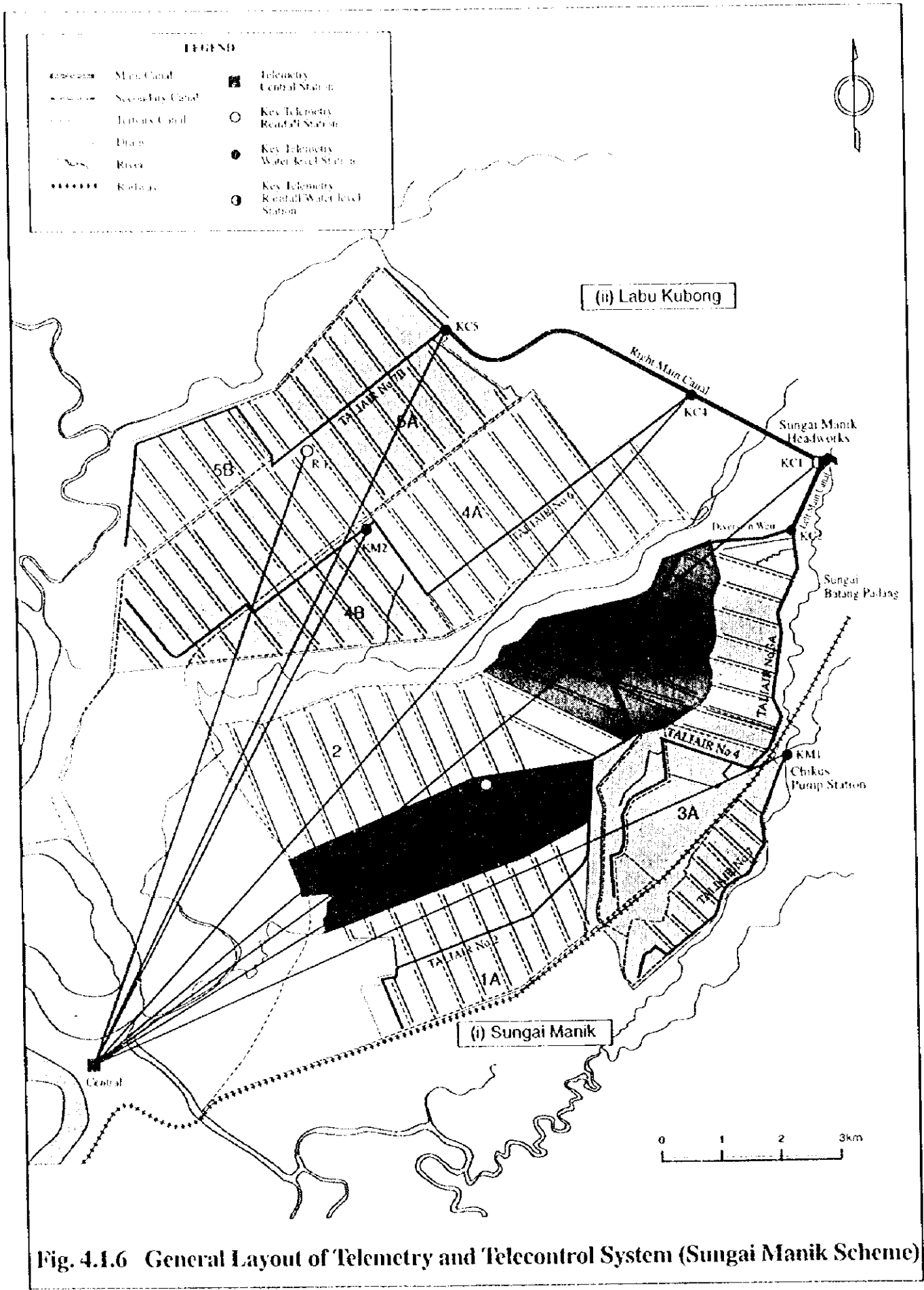


Fig. 4.1.6 General Layout of Telemetry and Telecontrol System (Sungai Manik Scheme)

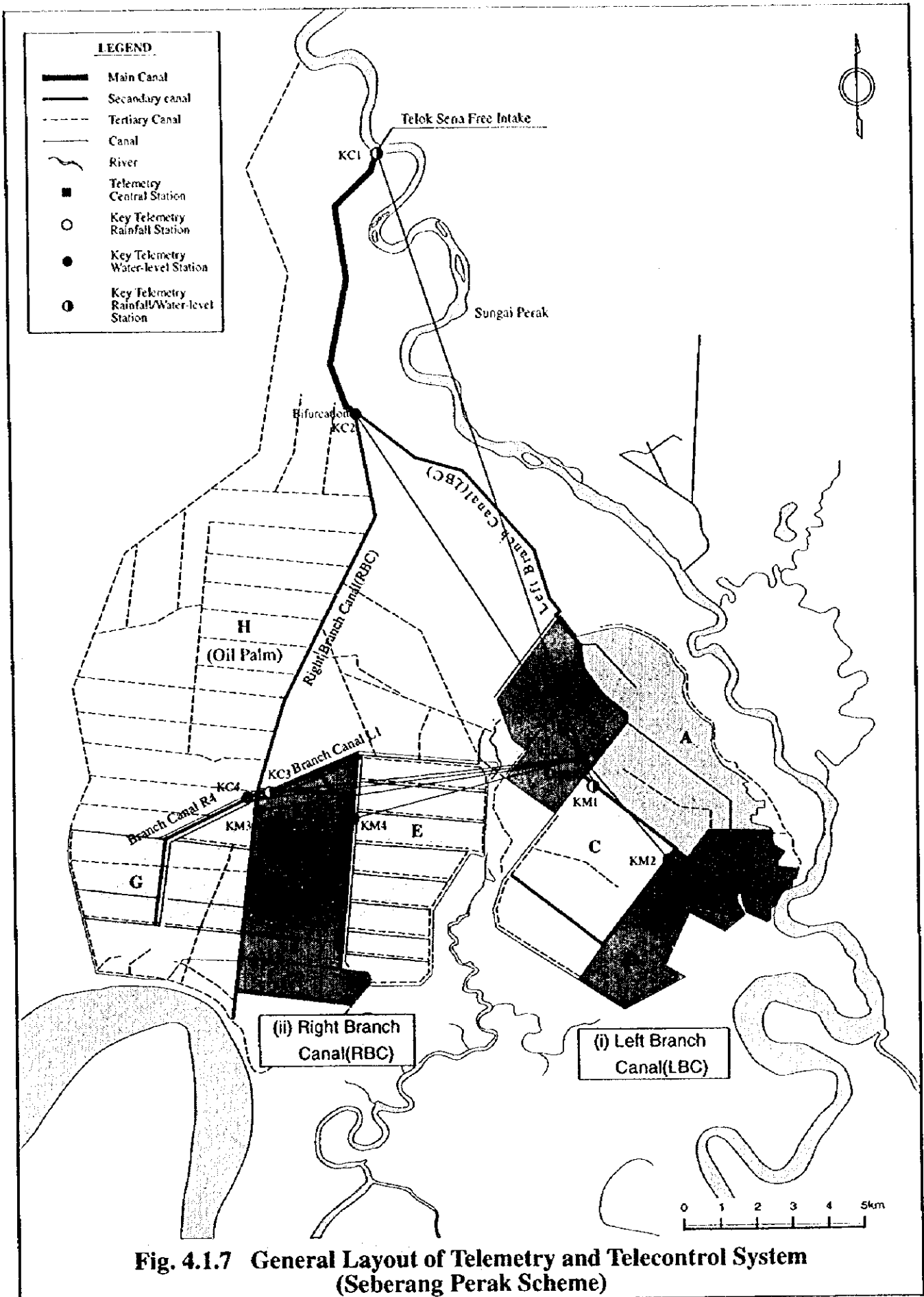


Fig. 4.1.7 General Layout of Telemetry and Telecontrol System (Seberang Perak Scheme)

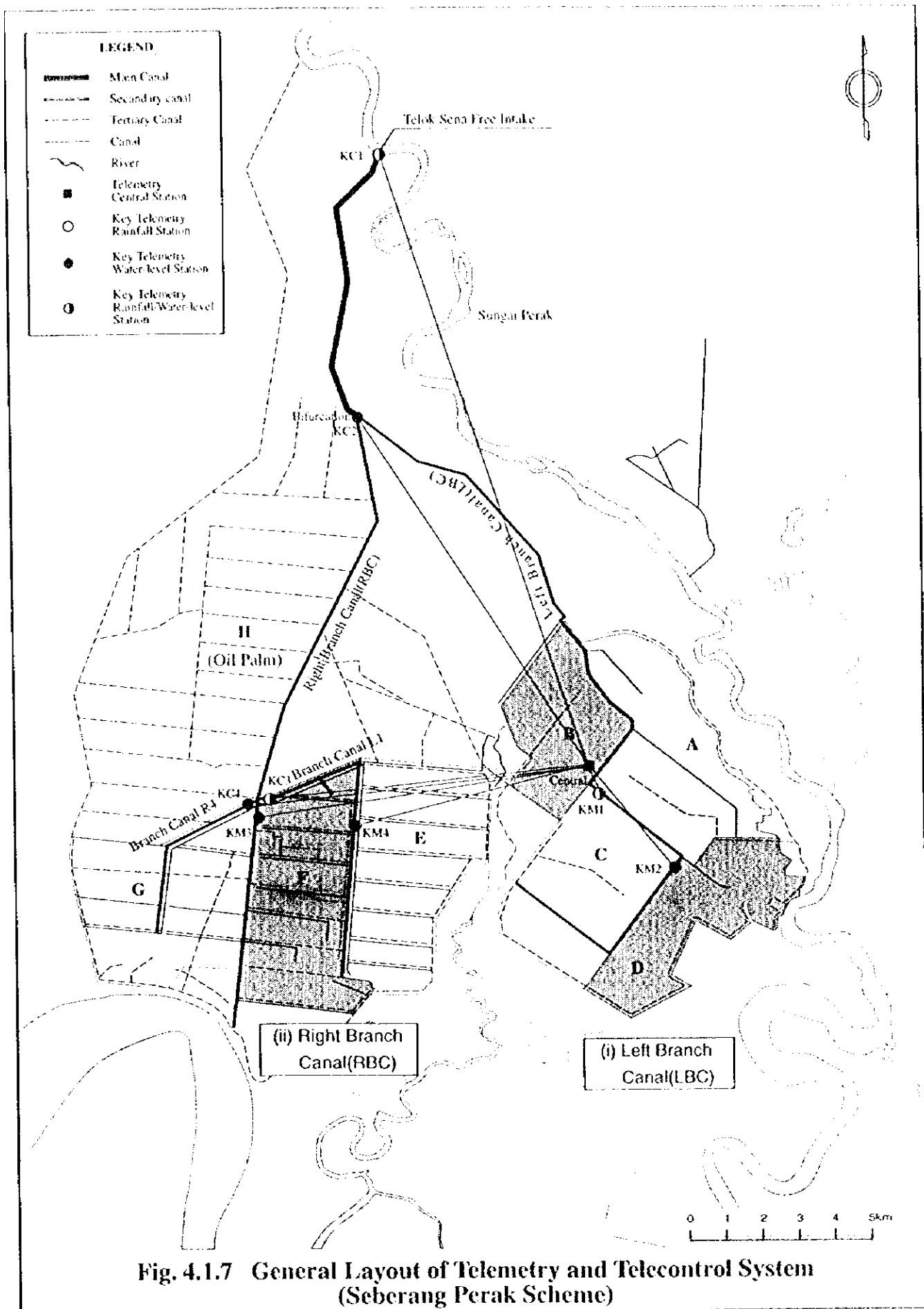


Fig. 4.1.7 General Layout of Telemetry and Telecontrol System (Seberang Perak Scheme)

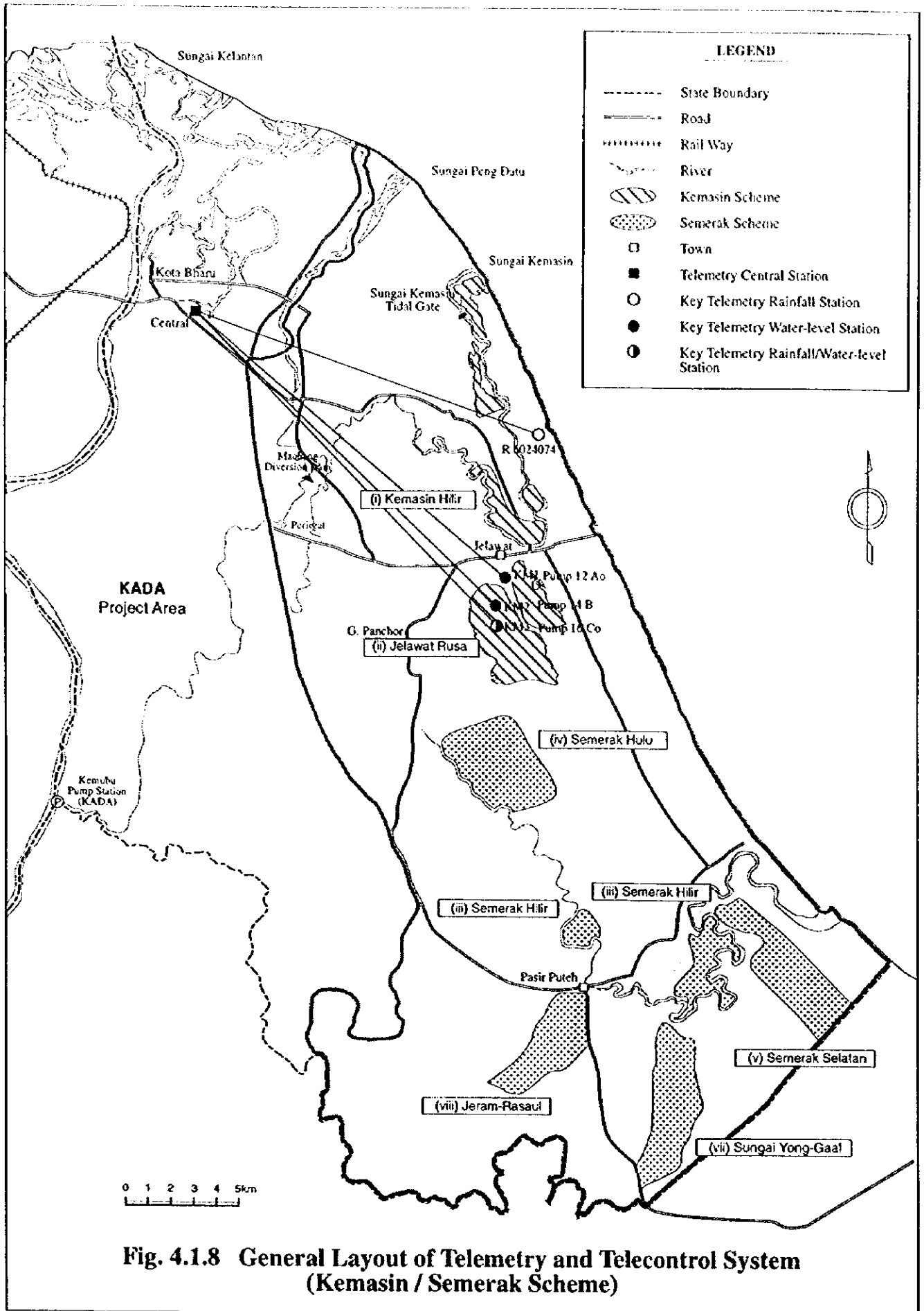
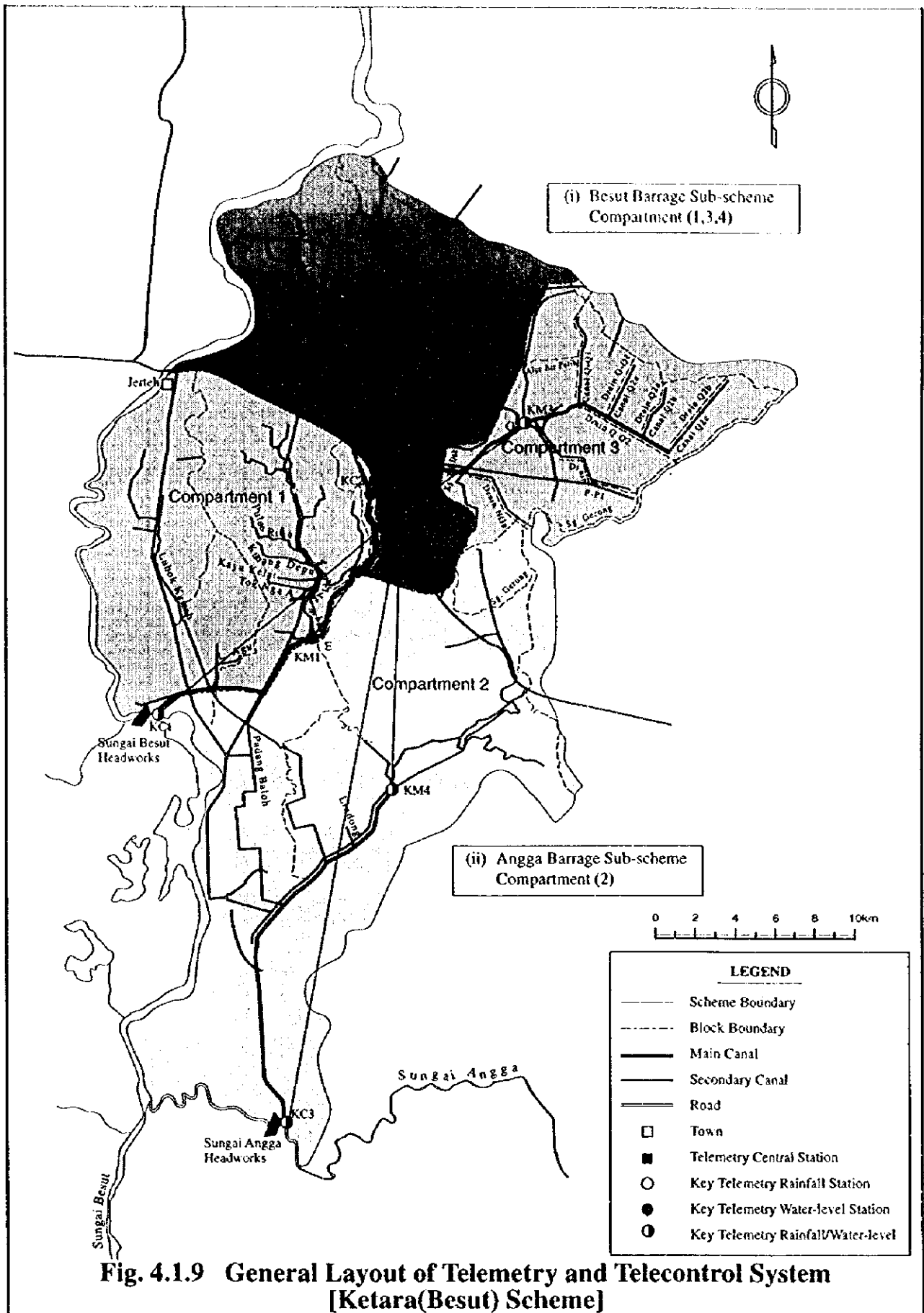
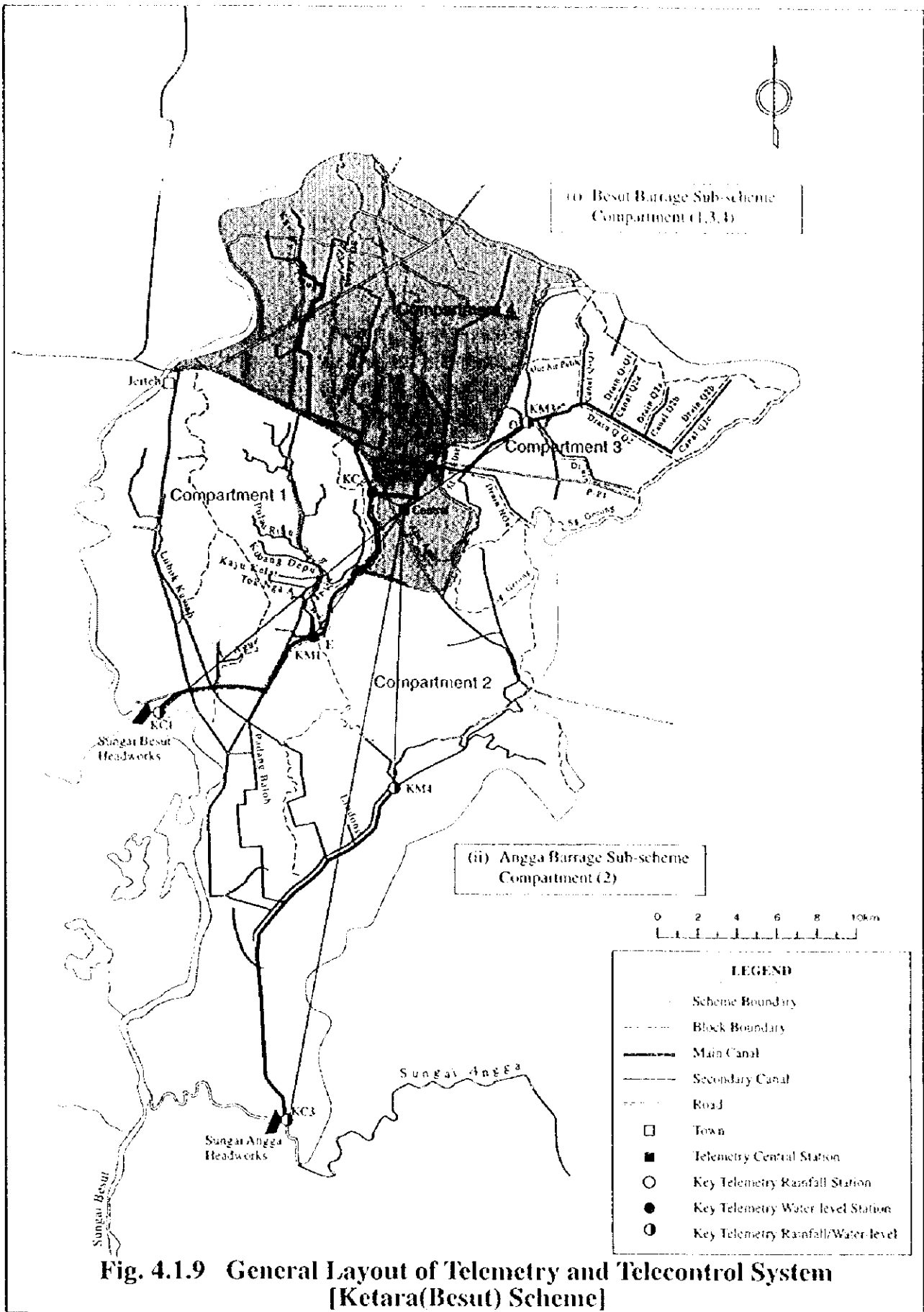
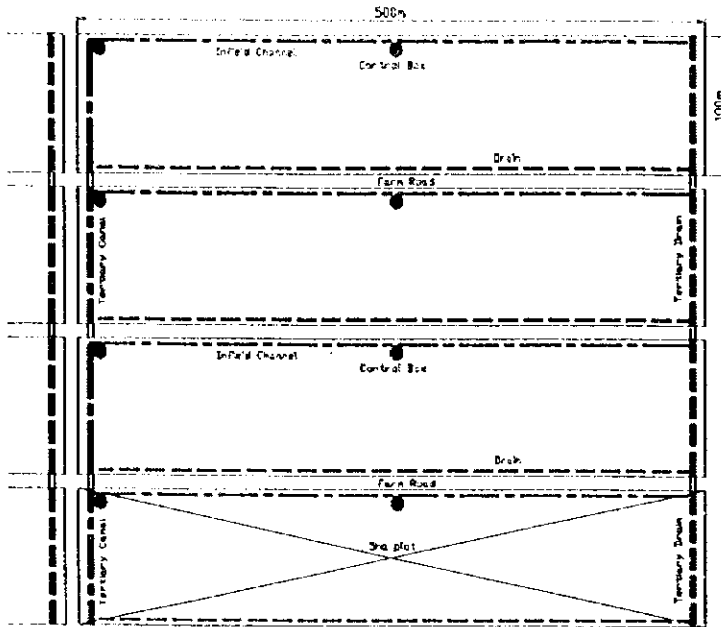


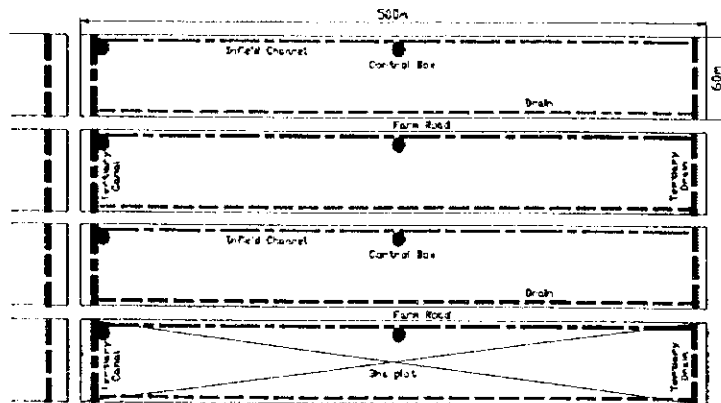
Fig. 4.1.8 General Layout of Telemetry and Telecontrol System (Kemasin / Semerak Scheme)







5ha Paddy Plot for Schemes Located on the West Coast



3ha Paddy Plot for Schemes Located on the East Coast

Fig. 4.1.10 Typical Layout of Farm Lot

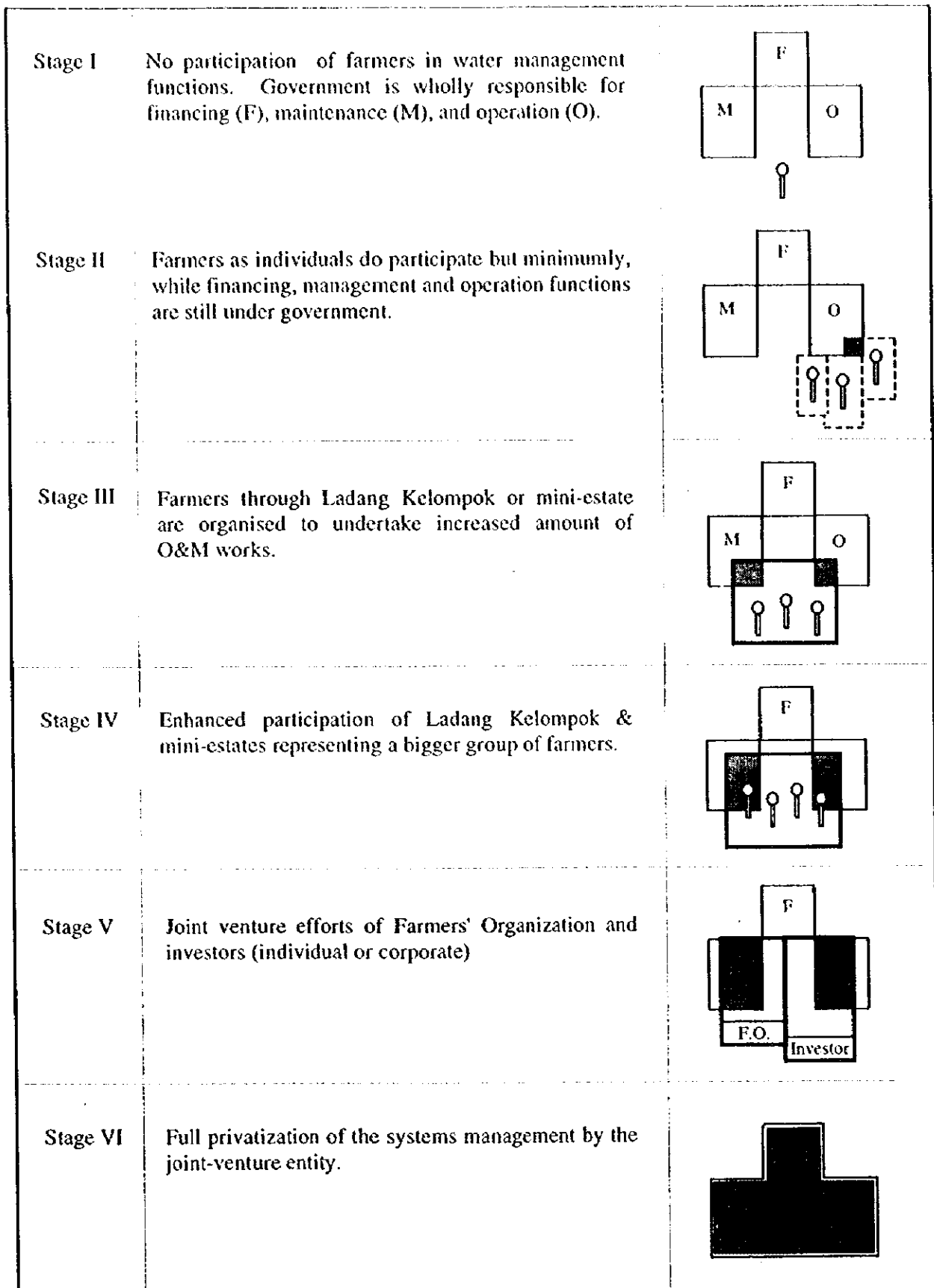
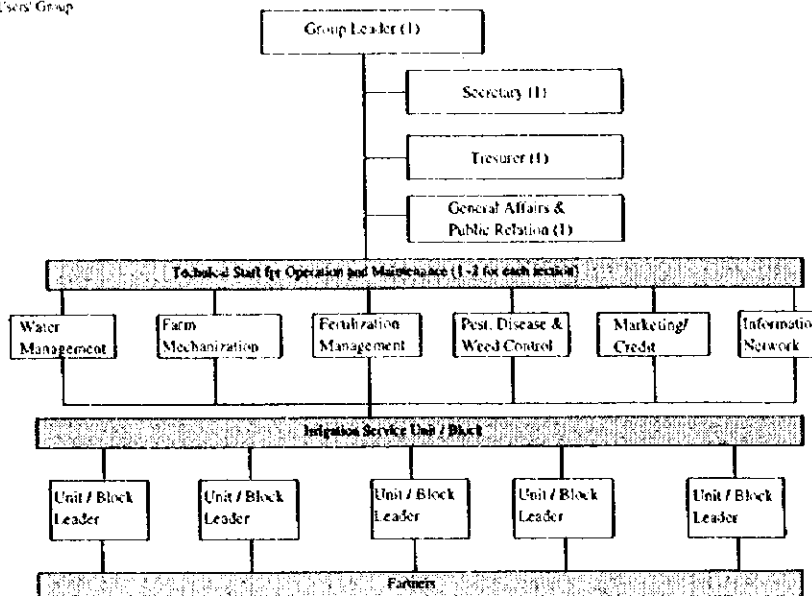


Fig. 4.1.11 Conceptualized Stages & Nature of Farmer Participation in Water Management System

Organization Chart of Water Users' Group



Note: Figures in parenthesis are the number of persons to be required

TOR of Members

Management Committee of a Group

- a representative of a farmers' group
- to inform members of a irrigation and cropping schedule and makes members comply with the schedule
- to lead a group and enhance the group farming activity
- to command committee members of the group and unit/block leaders
- to manage and supervise water management and farming activities of the group
- to grasp the progress and condition of water management and farming activities of the group and to report to PMU
- to call and hold management committee meetings

- to assist the group leader
- to prepare minutes of the meetings and keep them

- to keep the bankbook and checkbook for the group's account opened under the name of the group
- to take charge of revenue and expenditure of the group

- to attend to the general office work
- to negotiate with PPK, DID, DOA and other organizations at the official level

Technical Staffs for Operation and Management

- to manage irrigation water in accordance with the irrigation schedule
- to patrol and inspect irrigation and drainage facility
- to arrange and supervise O&M works of canals

Farm Mechanization

- to prepare machinery use plan submitted by technical staffs
- to supervise working progress of machinery
- to maintain and repair machinery and implements
- to summarize problems on machinery and report to agricultural officers, and to disseminate the solution members
- to arrange and supervise contract works made by FMC or contractors

- to promote the fertilizer application technique recommended by MARDI and DOA
- to calculate necessary amount of farm inputs (seeds and fertilizers) and prepare a cropping plan
- to prepare a machinery use plan according to the cropping plan (land preparation, fertilization, etc.)
- to summarize problems on the fertilizer management and report to agricultural officers
- to inform farmers about solutions and to practice them
- to retain farm inputs (seeds and fertilizers)
- to collect sample soils and plants for DRIS

- to supervise water management and farming activities of the unit/block
- to grasp the condition of water management and farming activities and report to the group leader
- to inform members of irrigation and cropping schedule and make members comply with the schedule

- to promote the pest, disease and weed control technique recommended by MARDI and DOA
- to promote IPM
- to calculate necessary amount of farm inputs (agro-chemicals) and prepare a seasonal crop protection plan
- to make a machinery use plan according to the crop protection plan
- to summarize problems on the pest, disease and weed control and report to agricultural officers
- to inform farmers about solutions and practice them
- to retain agro-chemicals
- to grasp the condition of spreads of pest, disease and weed

- to make an application for group loan and collect repayments
- to order farm inputs and confirm delivered goods
- to arrange sales of paddy

- to manage and maintain Irrigation Monitoring Feedback System
- to provide information to member farmers
- to maintain a communication network in the group
- to collect and input the information for the project data-base

Fig 4.1.12 Organization Chart and TOR of Water Users Group

Fig. 4.5.1 Implementation Schedule (Master Plan)

Scheme	Year		7th Malaysia Plan			8th Malaysian Plan			9th Malaysian Plan			
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2010
I. Kerian Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												
II. Besut Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												
III. Pulau Pinang Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												
IV. Sungai Manik Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												
V. Seberang Perak Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												
VI. Kemasin/Semerak Scheme												
1. Improvement of System Infrastructures												
2. Improvement of In-field Infrastructures												
3. Water Management / Monitoring System												
4. Training of Water Users Group												

Note : Dotted lines in Kemasin/Semerak Scheme show the expected schedule for other than Jelawat Rusa and Kemasin Hilir sub-schemes, where are under implementing Flood Mitigation Project.