

付 表

表2.1.1 水稻作付け面積之作付け率

(Unit: ha)

	Pulau Pinang			Kerian			Sungai Manik			Seberang Perak			Kemasin Semarak			Kctara (Besut)		
	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off
1985 Planted area	13,866	6,794	7,072	40,803	23,267	17,536	7,966	6,070	1,896	9,423	5,782	3,641	0	0	0	6,048	2,716	3,332
Cropping Intens	113%	56%	58%	172%	98%	74%	126%	96%	30%	108%	66%	42%	0%	0%	0%	117%	53%	65%
1986 Planted area	16,021	7,859	8,162	35,976	21,812	14,164	11,269	5,313	5,956	7,627	5,610	2,017	0	0	0	5,591	2,119	3,472
Cropping Intens	131%	64%	67%	152%	92%	60%	178%	84%	94%	88%	64%	23%	0%	0%	0%	108%	41%	67%
1987 Planted area	18,959	8,981	9,978	44,013	23,498	20,515	12,260	5,954	6,306	9,105	3,508	5,597	13,654	4,561	9,093	6,671	3,813	2,858
Cropping Intens	155%	73%	82%	186%	99%	87%	194%	94%	100%	105%	40%	64%	128%	43%	85%	129%	74%	55%
1988 Planted area	20,216	10,209	10,007	41,498	23,582	17,916	12,059	6,145	5,914	11,718	4,918	6,800	5,475	5,259	216	5,889	4,184	1,705
Cropping Intens	165%	83%	82%	175%	100%	76%	191%	97%	94%	135%	57%	78%	51%	49%	2%	114%	81%	35%
1989 Planted area	20,275	10,168	10,107	36,395	21,542	14,853	9,575	3,480	6,095	15,078	7,465	7,613	5,794	4,968	826	7,756	3,910	3,846
Cropping Intens	166%	83%	83%	154%	91%	63%	152%	55%	96%	173%	86%	87%	54%	47%	8%	150%	76%	74%
1990 Planted area	21,805	10,275	11,530	38,974	23,293	15,681	12,086	5,978	6,108	17,130	8,505	8,625	3,916	3,899	17	7,975	4,199	3,776
Cropping Intens	178%	84%	94%	165%	98%	66%	191%	95%	97%	197%	98%	99%	37%	37%	0%	154%	81%	73%
1991 Planted area	22,334	11,427	10,907	39,259	22,747	16,512	12,166	6,104	6,062	17,094	8,531	8,563	4,379	4,191	188	8,116	4,233	3,883
Cropping Intens	182%	93%	89%	166%	96%	70%	193%	97%	96%	196%	98%	98%	41%	39%	2%	157%	82%	75%
1992 Planted area	23,918	11,723	12,195	42,492	19,512	22,980	11,929	5,916	6,013	15,476	7,185	8,291	5,302	4,955	347	7,945	4,221	3,724
Cropping Intens	195%	96%	100%	180%	82%	97%	189%	94%	95%	178%	83%	95%	50%	46%	3%	154%	82%	72%
1993 Planted area	20,412	9,491	10,921	40,219	22,732	17,487	12,031	5,975	6,056	16,610	7,972	8,638	7,520	6,413	1,107	9,263	4,819	4,444
Cropping Intens	184%	95%	89%	170%	96%	74%	190%	95%	96%	191%	92%	99%	71%	60%	10%	179%	93%	86%
1994 Planted area	18,864	9,183	9,681	32,974	17,130	15,844	12,085	6,069	6,016	16,944	8,599	8,345	9,168	7,381	1,787	8,868	4,894	3,974
Cropping Intens	190%	92%	97%	139%	72%	67%	191%	96%	95%	195%	99%	96%	86%	69%	17%	172%	95%	77%
1995 Planted area	19,278	9,552	9,726	36,503	21,939	14,564	12,114	6,027	6,087	17,134	8,591	8,543	7,481	6,447	1,034	9,522	4,949	4,573
Cropping Intens	194%	96%	98%	154%	93%	62%	192%	95%	96%	197%	99%	98%	70%	60%	10%	184%	96%	89%

Source: Paddy Statistics of Malaysia, 1994
IADP Kerian/Sungai Manik Office

表2.1.2 水稻生產量之單位收量

	IADP Pulau Pinang		Kerian		Sungai Manik		Seberang Perak		Kemasin Semerak		Kerian (Besut)		
	Annual	Off	Annual	Off	Annual	Off	Annual	Off	Annual	Off	Annual	Off	
	Main		Main		Main		Main		Main		Main		
1985 Production	31,673	14,594	123,156	66,783	20,892	15,899	4,992	20,516	10,645	9,871	19,542	8,846	10,696
Average Yields	2.28	2.15	3.02	2.87	2.62	2.62	2.63	2.18	1.84	2.71	3.23	3.26	3.21
1986 Production	42,489	19,946	116,121	68,953	32,840	15,704	17,137	18,101	13,750	4,351	13,987	6,376	7,611
Average Yields	2.65	2.54	3.23	3.16	2.91	2.96	2.88	2.37	2.45	2.16	2.50	3.01	2.19
1987 Production	50,605	25,740	139,390	74,268	34,189	17,534	16,654	24,041	10,121	13,920	21,806	13,281	8,525
Average Yields	2.67	2.87	3.17	3.16	2.79	2.94	2.64	2.64	2.89	2.49	3.27	3.48	2.98
1988 Production	41,900	22,286	102,389	54,677	21,168	13,428	7,740	29,183	12,693	16,490	16,158	11,410	4,748
Average Yields	2.07	2.18	2.47	2.32	1.76	2.19	1.31	2.49	2.58	2.43	2.74	2.73	2.79
1989 Production	51,131	23,559	95,126	57,016	20,714	8,842	11,873	46,087	20,073	26,014	23,803	12,684	11,119
Average Yields	2.52	2.32	2.61	2.65	2.16	2.54	1.95	3.06	2.69	3.42	3.07	3.24	2.89
1990 Production	55,869	20,488	102,759	57,875	25,929	12,288	13,641	70,511	35,381	35,130	25,523	14,025	11,498
Average Yields	1.65	1.99	2.64	2.48	2.15	2.06	2.23	4.12	4.16	4.07	3.20	3.34	3.05
1991 Production	49,614	22,237	113,078	67,388	31,882	15,963	15,919	67,226	36,922	30,304	24,840	14,896	9,944
Average Yields	2.22	1.95	2.88	2.96	2.62	2.62	2.63	3.93	4.33	3.54	3.06	3.52	2.56
1992 Production	62,843	31,465	121,994	47,636	31,514	14,312	17,202	48,669	23,481	25,188	18,428	9,848	8,580
Average Yields	2.63	2.68	2.87	2.44	2.64	2.42	2.86	3.15	3.27	3.04	2.32	2.33	2.30
1993 Production	59,578	28,682	130,505	74,627	39,324	21,771	17,553	58,763	29,472	29,291	31,538	15,695	15,843
Average Yields	2.92	3.02	3.24	3.28	3.27	3.64	2.90	3.54	3.70	3.39	3.41	3.26	3.57
1994 Production	58,627	34,115	75,908	43,955	40,219	22,069	18,150	62,656	26,038	36,618	28,832	17,423	11,409
Average Yields	3.11	3.72	2.30	2.57	3.33	3.64	3.02	3.70	3.03	4.39	3.25	3.56	2.87
1995 Production	62,708	32,295	121,856	63,488	41,101	20,913	20,188	56,952	29,837	27,115	35,296	19,281	16,015
Average Yields	3.25	3.38	3.34	2.89	3.39	3.47	3.32	3.32	3.47	3.17	3.71	3.90	3.50

Source: Paddy Statistics of Malaysia, 1994
IADP Kerian/Sungai Manik Office

表2.1.3 地区別肥料並びに種子投入量

Scheme	IADP Purau Pinang	Kertian	Sungai Manik	Seberang Perak	FELCRA	Kemasin Semarak	Besut	Chui Chak (sample)
1. Average Yield*1								
Annual	2.80t/ha	2.94t/ha	3.05t/ha	3.53t/ha		2.82t/ha	3.18t/ha	6 - 7t/ha
Main season	2.90t/ha	2.86t/ha	3.16t/ha	3.57t/ha		2.91t/ha	3.34t/ha	
Off season	2.71t/ha	3.05t/ha	2.94t/ha	3.50t/ha		2.22t/ha	3.00t/ha	
2. Seed rate								
	75 - 80kg/ha (WDS)	40-100kg/ha (WDS, app. 40%)	40-100kg/ha (DDW and WDS)	80-100kg/ha (WDS)	80-100kg/ha (WDS)	40-60kg/ha (WDS)	50kg/ha (WDS)	80-100kg/ha (WDS)
		100-150kg/ha (DDS, app. 60%)						
		25kg/ha (TP, app. 70 - 80%)						
3. Fertilizer Application								
	1) 17.5:15.5:10 200kg/ha 1SDAS	1) Mixture 35:3:20 80kg/ha 20DAS	1) 17.5:15.5:10 200kg/ha 20DAS	1) 17.5:15.5:10 200kg/ha 15DAS	1) 17.5:15.5:10 200kg/ha 15DAS	1) 17.5:15.5:10 100kg/ha 15DAS	1) 17.5:15.5:10 200kg/ha 20DAS	1) 17.5:15.5:10 150kg/ha 24DAS
	2) Urea 40kg/ha 45DAS	2) Urea 40kg/ha 45DAS	2) Urea 100kg/ha 40DAS	2) Urea 100kg/ha 25DAS	2) Urea 100kg/ha 25DAS	2) 17.5:15.5:10 100kg/ha	2) Urea 75kg/ha 45DAS	2) 17.5:15.5:10 50kg/ha 31DAS
	3) Urea 60kg/ha 55DAS	3) 15:15:15 125kg 80DAS	3) 15:15:15 50kg 75DAS	3) Urea after 100kg/ha flowering	3) Urea 100kg/ha 65DAS	Urea 40kg/ha 45DAS	3) 12:12:17 125kg/ha 55DAS	3) Urea 100kg/ha 46DAS
	4) 16:16:16 150kg/ha 75DAS		4) 12:9:22.3 150kg/ha PAI	4) Urea 100kg/ha 80-90DAS	4) Urea 100kg/ha 80-90DAS	3) Urea 80kg/ha 65DAS	4) Urea 84kg/ha 56DAS	4) Urea 84kg/ha 72DAS
	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)	Total N (Nkg/ha)
	105 (Recommendation)	84	89	145	150-170	109	119	119
	Actual*2	Actual	Actual	Actual	Actual	Actual	Actual	Actual
	80	80	80	80	80	80	80	80
	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)	(Nkg/ha)
	Total N	Total N	Total N	Total N	Total N	Total N	Total N	Total N
	177	177	177	177	177	177	177	177

DAS: Days after seeding *1: 5 years average (1991-1995)

PAI: Panicle Initiation *2: Government Subsidy fertilizer

表2.1.4 推定農業生産資材投入量と投下労働力

(Unit: per ha)

Items	Unit	Direct Seeding						
		Flau Pinang	Kerian		Sungai Manik	Seberang Perak exc. FELCRA	Besut	Kemasin Semerak
			DS	TP				
1. Seed Material	(kg)	80	80	25	100	100	80	50
Fertilizer								
1. Subsidy								
NPK	(kg)	200	200	200	200	200	200	200
Urea	(kg)	100	100	100	100	100	100	100
NPK								
2. Additional								
NPK	(kg)							
Urea								
Compost	(kg)							
2. Agrochemicals								
Insecticide	(kg/ha)		0.75	0.5				
	(lit./ha)		1	0.85	0.63		2.47	10
	(lit./ha)				1.25		0.12	
Fungicides	(kg/ha)						19.77	
	(lit./ha)	0.1						
Herbicides	(kg/ha)		0.75	1.65		0.04	2.47	2.5
	(lit./ha)	6	8.7	6.6	7.5	1.65	4.9	
Rat control	(lit./ha)				0.63	0.80	0.6	
	(kg/ha)	1						1
3. Machinery (Contract)								
Tractor	(times)	3	2		3	3	2	3
Combine	(times)	1	1		1	1	1	1
Transport		1	1	1	1	1	1	1
4. Labour								
Land Prepn.	(md)			10.3			0.4 *	
Nursery	(md)			2.7				
Planting	(md)							
Direct Seedin	(md)	2.7	0.6		0.8	3.2	0.5	3.0
Transplanting	(md)			14.5				
Replanting	(md)		3.7	1.3	2.1		2.5	
Fertilizer Application	(md)	2.3	1.6	2.3	2.1	6.5	4.6	5.0
Chemical Application	(md)	5.4	1.8	2.0	2.3	6.9	2.4	5.4
Manual Weeding	(md)		1.0	1.2				
Water Management	(md)	2.6	2.2	2.2	2.9	2.2	2.5	12.0
Crop Watching	(md)							
Harvesting	(md)			21.5				
Processing	(md)							
Total	(md)	13.0	10.9	58.0	10.3	18.8	12.9	25.4
	(mh)	104.0	86.8	464.3	82.3	150.4	103.6	203.2

Remarks: Figures were revised and up-dated by the Consultancy Team, based on the collected data and result of field survey.

1 man-day = 8 man-hrs

*: 2W tractor

表 2.1.5 灌漑・排水施設の現況 (プラウ・ピナン地区)

Description	Features	Remarks
1. Number and Name of Sub-Scheme	5 sub-schemes - Sungai Muda - Sungai Kulim - Pinang Tunggal - Sungai Jarak - Sungai Burung	
2. Number and Name of Irrigation Block	17 blocks	
- Sungai Muda	6 blocks (Block M1, M2, M3, M4, M5&M6)	Block M1A under rehabilitation partly Block M6 under commissioning process
- Sungai Kulim	6 blocks (Block K1, K2, K3, K4, K5, K6)	K1A, K2A, K5, K6 non-granary
- Pinang Tunggal	2 blocks (Block P1 & P2)	P1B non-granary
- Sungai Jarak	2 blocks (Pokok Tampang & Padang Menora)	
- Sungai Burung	1 block	
3. Net Irrigation Area		
- Sungai Muda	9,832 ha	
- Sungai Kulim	6,888 ha	
- Pinang Tunggal	1,387 ha	
- Sungai Jarak	938 ha	
- Sungai Burung	388 ha	
4. Water Source		
- Sungai Muda	Sungai Muda	
- Pinang Tunggal	Sungai Muda	
- Sungai Kulim	Sungai Kulim	
- Sungai Jarak	Sungai Jarak	
- Sungai Burung	Sungai Burung, Sungai Titi Teras	
5. Intake Method		
- Sungai Muda	Pumping	1 main P/S and 1 Booster P/S
- Pinang Tunggal	Pumping	1 main P/S and 1 Booster P/S
- Sungai Kulim	Gravity	
- Sungai Jarak	Gravity + Pumping	Supplemented from Pinang Tunggal
- Sungai Burung	Gravity	
6. Designed Intake Discharge		
- Sungai Muda		
Bumbung Lima Pump Station	2.8 m ³ /sec/each x 3 nos. 5.6m ³ /sec/each x 1 nos.	under construction of 3 new pumps (2.8 m ³ /sec/each)
- Pinang Tunggal		
Pinang Tunggal Pump Station	3.8 m ³ /sec/each x 2 nos. 2.8m ³ /sec/each x 1 nos.	
- Sungai Kulim Headworks	2.50 m ³ /sec	
- Sungai Jarak Headworks	0.84 m ³ /sec	
- Sungai Burung Headworks	0.50 m ³ /sec	
7. Unit Field Water Requirement		
- Sungai Muda	2.6 lit/sec/ha at peak	
- Sungai Kulim	2.6 lit/sec/ha at peak	
- Pinang Tunggal	2.6 lit/sec/ha at peak	
- Sungai Jarak	2.6 lit/sec/ha at peak	
- Sungai Burung	2.5 lit/sec/ha at peak	
8. Irrigation Facilities		
Main canal		
- Sungai Muda	7.8 km	Sedimentation in main canal
- Sungai Kulim	6.7 km	
- Pinang Tunggal	13.9 km	
- Sungai Jarak	5.8 km	
Secondary canal		
- Sungai Muda	67.9 km	
- Sungai Kulim	7.7 km	
- Pinang Tunggal		
- Sungai Jarak	3.0 km	
Tertiary canal		lined by concrete
- Sungai Muda	202.4 km	
- Sungai Kulim	24.2 km	
- Pinang Tunggal	29.6 km	
- Sungai Jarak	7.8 km	
Related Structures		
- Sungai Muda	407 nos.	
- Sungai Kulim	60 nos.	
- Pinang Tunggal	100 nos.	
- Sungai Jarak		
9. Drainage Facilities		
Main & secondary drains	95 km	
Tertiary drain	207 km	
10. Farm Road	340 km	4-5 width with laterite surfacing

表 2.1.6 灌漑・排水施設の現況 (クリアン地区)

Description	Features	Remarks
1. Number and Name of Sub-Scheme	2 sub-schemes - Kerian Laut Sub-Scheme - Kerian Darat Sub-Scheme	
2. Number and Name of Irrigation Block - Kerian Laut Sub-Scheme - Kerian Darat Sub-Scheme	8 Blocks 4 Blocks (Block A, B, C and D) 4 Blocks (Block E, F, G and H)	
3. Net Irrigation Area	23,560 ha	
- Kerian Laut Sub-Scheme	11,726 ha	
Compartment A	2,403 ha	
Compartment B	4,001 ha	
Compartment C	3,960 ha	
Compartment D	3,362 ha	
- Kerian Darat Sub-Scheme	9,834 ha	
Compartment E	2,344 ha	
Compartment F	2,697 ha	
Compartment G	2,143 ha	
Compartment H	2,650 ha	
4. Water Source	Bukit Merah Reservoir and Kerian River Bukit Merah Reservoir	
- Kerian Laut Sub-Scheme		
- Kerian Darat Sub-Scheme		
5. Intake Method	Gravity (Bukit Merah Reservoir) + pump (Bogak P.S.) Bukit Merah Reservoir Storage capacity : 56 million m ³ Catchment area : 480 km ² Reservoir area : 34 km ² Intake gate : 1.83 m x 2.13 m x 6 nos. Bogak Pumping Station Electrical pump 5.1 m ³ /sec/each ,4 nos. Gravity (Bukit Merah Reservoir)	Huge weed in the reservoir
- Kerian Laut Sub-Scheme		
- Kerian Darat Sub-Scheme		
6. Designed Intake Discharge		
- Bukit Merah Reservoir	35.3 m ³ /sec	
- Bogak Pump Station	5.1 m ³ /sec/each x 4 nos.	
7. Unit Field Water Requirement	2.3 lit/sec/ha at peak	
8. Irrigation Facilities		
Main canal	62.7 km	
Secondary canals	343.0 km	
Tertiary canals	320.1 km	lined with concrete
Related Structures	2,524 nos.	
9. Drainage Facilities		
Main & Secondary drains	570 km	
Tertiary drain	473 km	
10. Farm Road	700 km	

表 2.1.7 灌漑・排水施設の現況 (スンガイ・マニック地区)

Description	Features	Remarks
1. Number and Name of Sub-area	2 sub-schemes - Labu Kubong Sub-Scheme - Sg. Manik Sub-Scheme	
2. Number and Name of Irrigation Block	9 blocks - Labu Kubong Sub-Scheme 4 blocks (Block 4A, 4B, 5A, 5B) - Sg. Manik Sub-Scheme 5 blocks (Block 1A, 1B, 2, 3A, 3B)	
3. Net Irrigation Area	6,318 ha	
- Labu Kubong	2,716 ha	
Block 4A	756 ha	
Block 4B	855 ha	
Block 5A	631 ha	
Block 5B	474 ha	
- Sg. Manik	3,602 ha	
Block 1A	633 ha	
Block 1B	644 ha	
Block 2	1,000 ha	
Block 3A	707 ha	
Block 3B	618 ha	
4. Water Source	Sungai Batang Padan	
5. Intake Method		
- Block 4A, 4B, 5A, 5B, 1A, 1B, 2, 3A	Gravity (Sungai Manik Headworks)	
- Block 3B	Pumping (Chikus Pump Station)	
6. Designed Intake Discharge		
- Sg. Manik Headworks	16.99 m ³ /sec	
- Chikus Pump Station	0.85 m ³ /sec	
7. Unit Field Water Requirement	2.80 l/sec/ha at peak	
8. Irrigation Facilities		
Sungai Manik Headworks	Gated weir : Roller gate 6 nos.	Motor driving
	Intake gate : Roller gate 1.5 m x 2.5 m x 5 nos.	
Chikus Pump Station	0.43 m ³ /sec/each x 3 nos.	
Left main canal	1.5 km	
Right main canal	11.9 km	Sediment in canal
Secondary canal	51.2 km	Concrete lining 5.8 km
Tertiary canal	186.5 km	Concrete lining 51.4 km in Labu Kubong
Related structures	422 nos.	
9. Drainage Facilities		
Main & secondary drain	61 km	
Tertiary drain	181 km	
Drainage control gate (tidal gate)	3 nos.	
10. Farm Road	245.3 km	Laterite pavement, 3 m width along main & secondary, 1.8 m width along tertiary canal

表 2.1.8 灌漑・排水施設の現況 (セベラン・ペラ地区)

Description	Features	Remarks
1. Number and Name of Sub-Scheme	2 sub-schemes - Left Branch Canal Sub-Scheme - Right Branch Canal Sub-Scheme	
2. Number and Name of Irrigation Block - Left Branch Canal Sub-Scheme - Right Branch Canal Sub-Scheme	7 blocks 4 blocks (Block A, B, C, D) 3 blocks (Block E, F, G)	
3. Net Irrigation Area	8,768 ha	
- Left Branch Canal Sub-Scheme	4,365 ha	
Block-A	881 ha	
Block-B	634 ha	
Block-C	1,692 ha	
Block-D	1,158 ha	
- Right Branch Canal Sub-Scheme	4,343 ha	
Block-E	1,528 ha	
Block-F	1,384 ha	
Block-G	1,431 ha	
4. Water Source	Sungai Perak	
5. Intake Method	Gravity Free Intake Type (Telok Sena Intake)	
6. Designed Intake Discharge	17.3 m ³ /sec	
7. Unit Field Water Requirement	2.40 l/sec/ha at peak	
8. Irrigation Facilities		
Telok Sena Intake	Intake gate : 1.50 m x 2.00m x 6 nos.	Manual driving, Steel slide gate
Main canal	8.4 km	Sediment in canal
Left branch canal	22.3 km	
Right branch canal	29.6 km	
Secondary canal	65.9 km	Concrete lining 53.8 km
Tertiary canal	188.6 km	Concrete lining 119.5 km
Related structures	3,075 nos	
9. Drainage Facilities (including Block H)		
Main & secondary drains	63 km	
Tertiary drain	314 km	
Drainage control gate (tidal gate)	9 nos	
10. Farm Road	432 km	3.65 width with laterite surfacing

表 2.1.9 灌漑・排水施設の現況 (ケマシ/セマラク地区)

Description	Features	Remarks
1. Number and Name of Sub-Scheme	8 sub-schemes - Kemasin Hilir - Jelawat Rusa - Semerak Hilir - Semerak Hulu - Semerak Selatan - Semerak Barat - Sungai Yong-Gaal - Jeram-Rasau	under design review, no planting presently under design review, no planting presently under design review, no planting presently under design review, irrigated by movable pumps under design review, single cropping under design review, rainfed area
2. Number and Name of Irrigation Block	10 blocks - Kemasin Hilir - Jelawat Rusa	5 blocks (Block A, B, C, D & E) 5 blocks (Zone A0, B0, C0, B1 & C1)
3. Irrigation Area including sub-schemes under the design review		6,895 ha
- Kemasin Hilir		261 ha
- Jelawat Rusa		1,384 ha
- Semerak Hilir		1,000 ha
- Semerak Hulu		174 ha
- Semerak Selatan		1,100 ha
- Semerak Barat		115 ha
- Sungai Yong-Gaal		2,260 ha
- Jeram-Rasau		601 ha
4. Water Source		Supplemented from Kada
- Kemasin Hilir	Sungai Kemasin	
- Jelawat Rusa	Sungai Jelawat	
5. Intake Method		
- Kemasin Hilir	Pumping	5 main P/S
- Jelawat Rusa	Pumping	3 main P/S and 2 booster P/S
6. Capacity of Pump Station		
- Kemasin Hilir		
Block-A	137 l/sec/each x 3 nos.	
Block-B	25 l/sec/each x 1 no.	
Block-C	25 l/sec/each x 2 nos.	
Block-D	25 l/sec/each x 3 nos.	
Block-E	125 l/sec/each x 2 nos.	
- Jelawat Rusa		
Block-A	425 l/sec/each x 3 nos.	
Block-B	Main P/S 347 l/sec/each x 3 nos. Booster P/S 192 l/sec/each x 4 nos.	
Block-C	Main P/S 397 l/sec/each x 4 nos. Booster P/S 146 l/sec/each x 4 nos.	
7. Unit Field Water Requirement		
- Kemasin Hilir	2.06 l/sec/ha at peak	
- Jelawat Rusa	2.06 l/sec/ha at peak	
8. Irrigation Facilities		
- Kemasin Hilir		
Tertiary canal		8.7 km
Related structures		94 nos.
- Jelawat Rusa		
Main canal		17.9 km
Tertiary canal		27.4 km
Related structures		240 nos.
9. Drainage Facilities		
- Kemasin Hilir		
Tertiary drain		3 km
Related structures		13 nos.
- Jelawat Rusa		
Main drain		27 km
Secondary drain		20 km
Tertiary drain		8 km
Related structures		21 nos.
- Tidal Gate at Sg. Kemasin		
Type of gate	Electrical roller gate	
Size and number of gate	5.1 m x 4.5 m x 6 nos.	
Power source	Public electricity & Generator (100 kVA 1 no.)	
10. Farm Road		89 km 3 m width with gravel pavement

表 2.1.10 灌漑・排水施設の現況 (ブスット地区)

Description	Features	Remarks
1. Number and Name of Sub-Scheme	2 sub-schemes - Angga Sub-Scheme - Besut Sub-Scheme	
2. Number and Name of Irrigation Block	4 blocks 1 block (Compartment 2) 3 blocks (Compartment 1, 3 & 4)	
3. Net Irrigation Area	5,164 ha	
- Angga Sub-Scheme	1,148 ha	
Compartment 2	1,148 ha	
- Besut Sub-Scheme	4,016 ha	
Compartment 1	1,235 ha	
Compartment 3	1,306 ha	
Compartment 4	1,475 ha	
4. Water Source		
- Angga Sub-Scheme	Sungai Angga	
- Besut Sub-Scheme	Sungai Besut	
5. Intake Method		
- Angga Sub-Scheme	Gravity (Angga Barrage)	
- Besut Sub-Scheme	Gravity (Besut Barrage)	
6. Designed Intake Discharge		
- Angga Barrage	3.12 m ³ /sec	
- Besut Barrage	9.02 m ³ /sec	
7. Unit Field Water Requirement		
- Angga Sub-Scheme	2.33 l/sec/ha at peak	
- Besut Sub-Scheme	2.33 l/sec/ha at peak	
8. Irrigation Facilities		
- Angga Sub-Scheme		
Angga Barrage	Barrage : Radial gate (7.6 m x 1.2 m x 2 nos) Intake gate : Sluice gate (1.3 m x 1.0 m x 2 nos.)	no operation of intake gates due to their damages
Main canal	14.9 km	Sediment in Angga main canal
Secondary canal	20.3 km	Concrete lining 13 km
Tertiary canal	16.0 km	
Related structures	60 nos	
- Besut Sub-Scheme		
Besut Barrage	Barrage : Rotter gate (12.32m x 2.93 m x 4 nos.) Intake gate : Slide gate (1.93m x 2.49m x 3 nos.)	Water leakage
Main canal	32.1 km	Concrete lining 28 km
Secondary canal	65.7 km	Concrete lining 56 km
Tertiary canal	100.5 km	Concrete lining
Related structures	242 nos	
9. Drainage Facilities		
Main & secondary drains	177 km	
Tertiary drain	64 km	
10. Farm Road	241 km	

表 2.1.11 各地区における作物収支

	Pulau Pinang			Kerian			Sungai Manik			Seberang Perak			Keaman Semarak			Beut			Changkat Jong				
	Unit	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	
GROSS Income																							
I. Paddy production	kg	3,090	0.7442	2,299.6	2,990	0.7442	2,225	2,990	0.7442	2,225	3,520	0.7442	2,619.6	2,770	0.7442	2,061	3,460	0.7442	2,574.9	7,952	0.7442	5,918	
Production Cost																							
I. Material Cost																							
1) Seed	kg	80	1.0	80	100	1.0	100	100	1.0	100	100	1.0	100	60	1.0	60	50	1.0	50	100	1.0	100	
2-1) Fertilizer (Subsidised)																							
17:5:15:10	kg	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	
35:31:20	kg	0	0.48	0	80	0.48	38.4	0	0.48	0	0	0.48	0	0	0.48	0	125	0.48	60	0	0.48	0	
12:12:17	kg	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	
15:15:15	kg	0	0.48	0	125	0.48	60	0	0.48	0	0	0.48	0	0	0.48	0	75	0.54	40.5	100	0.54	54	
Urea	kg	100	0.54	54	40	0.54	21.6	100	0.54	54	100	0.54	54	120	0.54	64.8	75	0.54	40.5	100	0.54	54	
2-2) Fertilizer (Non-Subsidised)																							
16:16:16	kg	72	0.48	34.6	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	
15:15:15	kg	72	0.48	34.6	0	0.48	0	50	0.48	24	0	0.48	0	0	0.48	0	0	0.48	0	125	0.48	60	
12:9:22.3	kg	0	0.48	0	0	0.48	0	0	0.48	0	150	0.48	72	0	0.48	0	0	0.48	0	0	0.48	0	
Urea	kg	0	0.54	0	0	0.54	0	0	0.54	0	100	0.54	54	0	0.54	0	75	0.54	40.5	168	0.54	90.72	
Baja Makmur	kg	0	0.48	0	0	0.48	0	0	0.48	0	0	0.48	0	125	0.48	60	0	0.48	0	0	0.48	0	
3) Agro-chemical																							
Pesticide	lit	125		123.3			189.2			180			180			22.2				365			295.4
Weedicide	lit	41		92.1		103.1			90			90				183				175			110
		84		31.3		86.8			40			40				40				187			185.4
II. Labor Cost																							
Land preparation	md	2.5	20	50			144			144			0			264			322			168	
Sowing	md	0.1	20	2	0.6	20.0	12	0.6	20.0	12	0.6	20.0	12	3	12.0	36	3.3	12.0	39.6	0.6	20.0	12	
Replanting	md	2.5	20	50	3.7	20.0	74	0	20.0	0	0	20.0	0	5	12.0	60	2	12.0	24	0	20.0	0	
Fertilizer Application	md	3.7	20	74	1.6	20.0	32	1.9	20.0	38	1.9	20.0	38	5	12.0	60	8	12.0	96	3.55	20.0	71	
Chemical Application	md	2.4	20	48	2.8	20.0	55	2.5	20.0	50	2.5	20.0	50	14	12.0	168	7.5	12.0	90	4.25	20.0	85	
Irrigation	md	2.2	20	44	2.2	20.0	44	2.2	20.0	44	2.2	20.0	44		12.0	0		12.0	0		20.0	0	
III. Machinery																							
Tractor	times	2		199			700.43			761.21			150			589.2			648.04			1,638.8	
Sprayer	hrs	1		249			181.25			150			300			250			300			167	
Combine	times	1		56			445			53			924			774			244.24			1,184	
Transport	times	1		56	41	1.2	49.2	2.99	24.8	74.152	3.52	24.8	87.296	53	0.4	21.2	3.46	30.0	103.8	7.95	45.0	278.31	
IV. Miscellaneous																							
Net Return																							
With Subsidized Fertilizer																							
Without Subsidized Fertilizer																							

表 4.1.1 システム・インフラストラクチャーの主要改修計画

(1/2)

Name of Scheme	Rehabilitation/Improvement Plan
IADP Pulau Pinang	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Concrete lining including removal of sediment (main canal 35 km, secondary canal 79 km) - Construction of regulating structure (main canal 6 nos., secondary canal 12 nos.) - Repair of damaged structures (2 nos.) - Desilting of drains (tertiary drains 40 km) - Pavement of farm road (asphalt pavement 11 km) - Widening of farm road along tertiary canals (100 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at main pump stations, intake and major diversion point on main and secondary canals - Installation of rainfall stations (4 locations) - Provision of remote control facilities for major gates and pumps
IADP Kerian	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Construction of new drains (17 km) - Desilting of existing drains (570 km) - Construction of bunds (150 km) - Construction and repair of drainage gates (2 locations) - Construction of drainage control structures - Concrete lining including removal of sediment (main canal 62 km, secondary canal 40 km) - Construction of regulating structure (main canal 7 nos., secondary canal 8 nos.) - Repair of damaged structures (16 nos.) - Pavement of farm road (asphalt pavement 40 km) - Widening of farm road along tertiary canals (100 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at Bukit Merah reservoir intake, Bogak pump station and major diversion point on main and secondary canals - Installation of rainfall stations (4 locations) - Provision of remote control facilities for major gates and pumps
IADP Sungai Manik	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Construction of settling basin at downstream of intake structure - Concrete lining (secondary canal 51 km, tertiary canal 135 km) - Construction of regulating structure (secondary canal 2 nos.) - Construction of road crossing structures (4 nos.) - Repair of damaged structures (54 nos.) - Desilting of drains (main drain 12 km) - Pavement of farm road (asphalt pavement 13 km) - Widening of farm road along tertiary canals (42 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at intake and major diversion point on main and secondary canals - Installation of rainfall stations (2 locations) - Provision of remote control facilities for major gates
IADP Seberang Perak	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Removal of sediment in canal (46 km) - Concrete lining (secondary canal 12 km, tertiary canal 69 km) - Construction of regulating structure (5 nos.) - Construction of spillway on main canal - Repair of damaged structures (53 nos.) - Desilting of drains (main drain 13 km) - Construction of farm road (6 km) - Widening of farm road along tertiary canals (35 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at intake and major diversion point on main and secondary canals - Installation of rainfall stations (2 locations) - Provision of remote control facilities for major gates including motorization of intake and bifurcation gates

表 4.1.1 システム・インフラストラクチャーの主要改修計画

(2/2)

Name of Scheme	Rehabilitation/Improvement Plan
IADP Kemasin/Semerak	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Repair of damaged structures (9 nos.) - Desilting of drains (main drain 20 km) - Widening of farm road along tertiary canals (36 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at major pump stations - Installation of rainfall stations (2 locations)
IADP Besut	<p><i>I. Improvement of Irrigation and Drainage Facilities</i></p> <ul style="list-style-type: none"> - Replacement of Angga Barrage - Repair of Besut Barrage gates (4 nos.) - Concrete lining (main & secondary canals 26 km, tertiary canal 3 km) - Heightening of existing lining canal (12 km) - Construction of regulating structure (6 nos.) - Repair of damaged structures (74 nos.) - Desilting of drains (main drain 16 km) - Construction of farm road (6 km) - Construction of drainage control structures (15 nos.) - Pavement of farm road (asphalt pavement 8 km) - Widening of farm road along tertiary canals (27 km) <p><i>II Provision of Water Management Facilities</i></p> <ul style="list-style-type: none"> - Installation of water level stations at Angga & Besut Barrage and major diversion point on main and secondary canals - Installation of rainfall stations (3 locations) - Provision of remote control facilities for major gates

表4.1.2 作付け計画

IADP	Irr. area (ha)	PI/Seed		Main		PI/Seed		Off		PI/Seed		Total		
		Method	Area	Area	%	Method	Area	%	Method	Area	%	Method	Area	%
Pulau Pinang	9.601	WD	9.601	9.601	100.0%	WD	9.601	100.0%	WD	9.601	100.0%	WD	19.202	200.0%
		DD				DD			DD			DD	0	
		Sub-Total		9.601	9.601	100.0%	Sub-Total	9.601	100.0%	Sub-Total	9.601	100.0%	Sub-Total	19.202
Kerian	23.560	WD	19.555	19.555	83.0%	WD		0	0.0%	WD			19.555	83.0%
		DD	4.005	4.005	17.0%	DD	23.560	100.0%	DD	27.565	117.0%	DD	27.565	117.0%
		Sub-Total		23.560	23.560	100.0%	Sub-Total	23.560	100.0%	Sub-Total	47.120	200.0%	Sub-Total	47.120
Sungai Manik	6.318	WD	6.318	6.318	100.0%	WD	6.318	100.0%	WD	12.636	200.0%	WD	12.636	200.0%
		DD				DD			DD			DD		
		Sub-Total		6.318	6.318	100.0%	Sub-Total	6.318	100.0%	Sub-Total	12.636	200.0%	Sub-Total	12.636
Seberang Perak	8.708	WD	8.708	8.708	100.0%	WD	8.708	100.0%	WD	17.416	200.0%	WD	17.416	200.0%
		DD				DD			DD			DD		
		Sub-Total		8.708	8.708	100.0%	Sub-Total	8.708	100.0%	Sub-Total	17.416	200.0%	Sub-Total	17.416
Kemasin/ Semerak	6.895	WD	6.895	6.895	100.0%	WD	6.895	100.0%	WD	13.790	200.0%	WD	13.790	200.0%
		DD				DD			DD			DD		
		Sub-Total		6.895	6.895	100.0%	Sub-Total	6.895	100.0%	Sub-Total	13.790	200.0%	Sub-Total	13.790
Ketara (Besut)	5.164	WD	5.164	5.164	100.0%	WD	3.098	60.0%	WD	8.262	160.0%	WD	8.262	160.0%
		DD				DD	775	15.0%	DD	775	15.0%	DD	775	15.0%
		Sub-Total		5.164	5.164	100.0%	Sub-Total	3,098	75.0%	Sub-Total	8,262	175.0%	Sub-Total	8,262
5 Granaries (Study Area)	60.246	WD	56.241	56.241	93.4%	WD	34,620	57.5%	WD	90,861	150.8%	WD	90,861	150.8%
		DD	4,005	4,005	6.6%	DD	24,335	40.4%	DD	28,340	47.0%	DD	28,340	47.0%
		Sub-Total		60,246	60,246	100.0%	Sub-Total	58,955	97.9%	Sub-Total	119,201	197.9%	Sub-Total	119,201

WD: Wet Direct Seeding

DD: Dry Direct Seeding (germination depend on irrigation waer)

表4.1.3 計画耕種手法

Activities		Kind and Amount of Inputs		(Unit: ha)	
				Man-hr	
				Wet	Dry
I. Land preparation					
Wet direct seeding					
1	1st Rotavation	Tractor + Rotavator	1 round	2.0	
2	2nd Rotavation	Tractor + Rotavator	1 round	1.8	
3	Puddling	Tractor + Paddy Harrow	1 round	1.4	
Dry direct seeding					
1	1st Rotavation	Tractor + Rotavator	1 round		1.9
2	2nd Rotavation	Tractor + Rotavator	1 round		1.7
II. Seeding					
Wet	Seeding	Seed rate	60 - 80kg/ha		
		Tractor + Power Blower/Granule applicator or Broadcaster		1.0	
Dry	Seeding	Tractor + Power Blower/Granule applicator or Broadcaster			1.0
	Pressing	Tractor + Roter bucket/Land Roller			1.0
III. Fertilizing					
	Lime or MgO Application (if necessary)	Tractor + Lime sower		2.0	2.0
	Lime		2.5ton/ha		
	MgO		130kg/ha		
1	1st Top dressing	Tractor + Granule applicator/Power		1.2	1.2
2	2nd Top dressing	Brower or Broadcaster		1.2	1.2
3	3rd Top dressing			1.2	1.2
	Fertilizer	N:P2O5:K2O=100 - 120:30:50:30-40			
		Subsidy: Mixture 200kg, Urea 100kg			
		Additional: Mix: 100kg			
		Urea 40kg			
IV. Pest and Weed control					
1 Weed control					
Wet direct seeding		Tractor + Granule Applicator, Carpet Duster, Boom Sprayer			
	2 times			2.4	
	Dimepiperate/Bensulfuron-methyl (Yukamate/Push)		30-40kg/ha		
	2,4PA (2,4-D amine)		30-45kg/ha		
Dry direct seeding		Tractor + Granule Applicator, Carpet Duster, Boom Sprayer			
	3 times				3.1
	Thiobencarb (Saturn)		6000-12000ml/ha		
	Thiobencarb (Saturn)		30-40kg/ha		
	2,4PA (2,4-D amine)		30-45kg/ha		
	2 Pest Control	Tractor + Granule Applicator, Carpet Duster, Boom Sprayer			
	2 times				
	BPMC (fenobucarb)		30kg/ha	1.9	1.9
	Buprofezin		600cc/ha		
	3 Rat control	Tractor			
	2 times	Drat	250ml/ha	1.3	1.3
V. Harvesting					
1	Harvesting	Combinharvester with chopper		1.0	1.0
2	Transportation	Lorry			
VI. Preparatory Work					
				2.0	2.0
VII. Others					
				10.0	10.0
Total				30.4	30.3

表 4.2.1 国際灌漑排水議会 (ICID) の環境チェックリスト

Category	Check Items	Positive Impact very likely	Positive Impact possible	No Impact likely	Negative Impact possible	Negative Impact likely	No Judgment possible at present	Comments
		A	B	C	D	E	F	
Hydrology	Level of impacts							
	1-1 Low flow regime						X	
	1-2 Flood regime			X				
	1-3 Operation of dams			X				
	1-4 Fall of water table						X	
	1-5 Rise of water table			X				
Pollution	2-1 Solute dispersion			X				
	2-2 Toxic substances						X	
	2-3 Organic pollution			X				
	2-4 Anaerobic effects			X				
	2-5 Gas emissions			X				
Soils	3-1 Soil salinity			X				
	3-2 Soil properties			X				
	3-3 Saline groundwater			X				
	3-4 Saline drainage			X				
	3-5 Saline intrusion			X				
Sediments	4-1 Local erosion			X				
	4-2 Hinterland effect			X				
	4-3 River morphology			X				
	4-4 Channel regime			X				
	4-5 Sedimentation			X				
	4-6 Estuary erosion			X				
Ecology	5-1 Project lands			X				
	5-2 Water bodies						X	
	5-3 Surrounding areas						X	
	5-4 Valleys & shores			X				
	5-5 Wetlands & plains			X				
	5-6 Rare species			X				
	5-7 Animal migration			X				
	5-8 Natural industry			X				
Socio-economic	6-1 Population change			X				
	6-2 Income & amenity		X					
	6-3 Human migration						X	
	6-4 Resettlement			X				
	6-5 Women's role						X	
	6-6 Minority groups			X				
	6-7 Sites of value		X					
	6-8 Regional effects		X					
	6-9 User involvement		X					
	6-10 Recreation			X				
Health	7-1 Water & sanitation						X	
	7-2 Habitation			X				
	7-3 Health services			X				
	7-4 Nutrition			X				
	7-5 Relocation effect			X				
	7-6 Disease ecology			X				
	7-7 Disease hosts			X				
	7-8 Disease control			X				
	7-9 Other hazards			X				
Imbalance	8-1 Pests & weeds						X	
	8-2 Animal diseases			X				
	8-3 Aquatic weeds			X				
	8-4 Structural damage			X				
	8-5 Animal imbalances			X				
Total Number		0	4	40	0	0	9	

表 4.3.1 初期投資費用 (マスタープラン)

Unit : RM

Scheme	Civil Works			Water Management / Monitoring System			Grand Total
	System Infrastructure	Infield Facilities	Total	Telemetry / Telecontrol System	Feedback System	Total	
Kenan	78,379,000	21,881,000	100,260,000	14,630,000	869,300	15,499,300	115,759,300
Besut	26,796,000	2,435,000	29,231,000	3,524,000	922,800	4,446,800	33,677,800
Pulau Pinang	32,060,000	4,316,000	36,376,000	9,387,000	920,000	10,307,000	46,683,000
Sungai Manik	28,198,000	2,911,000	31,109,000	5,775,000	609,700	6,384,700	37,493,700
Seberang Perak	20,288,000	1,814,000	22,102,000	8,121,000	863,700	8,984,700	31,086,700
Kemasin/Semerak	1,700,000	861,000	2,561,000	830,000	821,300	1,651,300	4,212,300

表 4.3.2 システム・インフラストラクチャー改修工事費 (1/2)
(マスタープラン)

Kerian Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	42,972,000
Improvement of Drainage Facilities	13,089,000
Improvement of Farm Roads	3,759,000
Improvement of Related Structures	471,000
Total	60,291,000
2. Physical Contingency	9,044,000
3. Engineering Cost	6,029,000
4. Administration Cost	3,015,000
Grand Total	78,379,000

Besut Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Replacement of Besut Barrage Gates	8,000,000
Construction of New Angga Barrage	1,800,000
Concrete Lining of Canals	7,659,000
Improvement of Drainage Facilities	534,000
Improvement of Farm Roads	1,440,000
Improvement of Related Structures	1,179,000
Total	20,612,000
2. Physical Contingency	3,092,000
3. Engineering Cost	2,061,000
4. Administration Cost	1,031,000
Grand Total	26,796,000

Pulau Pinang Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	22,473,000
Improvement of Drainage Facilities	99,000
Improvement of Farm Roads	1,860,000
Improvement of Related Structures	230,000
Total	24,662,000
2. Physical Contingency	3,699,000
3. Engineering Cost	2,466,000
4. Administration Cost	1,233,000
Grand Total	32,060,000

表 4.3.2 システム・インフラストラクチャー改修工事費 (2/2)
(マスタープラン)

Sungai Manik Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Construction of Settling Basin	113,000
Concrete Lining of Canals	18,600,000
Improvement of Drainage Facilities	74,000
Improvement of Farm Roads	2,095,000
Improvement of Related Structures	808,000
Total	21,690,000
2. Physical Contingency	3,254,000
3. Engineering Cost	2,169,000
4. Administration Cost	1,085,000
Grand Total	28,198,000

Seberang Perak Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	10,253,000
Desilting of Irrigation Canals	202,000
Improvement of Drainage Facilities	32,000
Improvement of Farm Roads	331,000
Replacement of Intake Gates	3,888,000
Improvement of Related Structures	900,000
Total	15,606,000
2. Physical Contingency	2,341,000
3. Engineering Cost	1,561,000
4. Administration Cost	780,000
Grand Total	20,288,000

Kemasin/Semerak Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	38,000
Improvement of Drainage Facilities	153,000
Improvement of Farm Roads	964,000
Improvement of Related Structures	153,000
Total	1,308,000
2. Physical Contingency	196,000
3. Engineering Cost	131,000
4. Administration Cost	65,000
Grand Total	1,700,000

表 4.3.3 圃場インフラストラクチャー改修工事費 (1/2)
(マスタープラン)

Kerian Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	5,700,000
Infield Channel	964,000
Control Box	508,000
Tramline	9,659,000
Total	16,831,000
2. Physical Contingency	2,525,000
3. Engineering Cost	1,683,000
4. Administration Cost	842,000
Grand Total	21,881,000

Besut Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	1,443,000
Infield Channel	244,000
Control Box	186,000
Total	1,873,000
2. Physical Contingency	281,000
3. Engineering Cost	187,000
4. Administration Cost	94,000
Grand Total	2,435,000

Pulau Pinang Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	2,665,000
Infield Channel	451,000
Control Box	204,000
Total	3,320,000
2. Physical Contingency	498,000
3. Engineering Cost	332,000
4. Administration Cost	166,000
Grand Total	4,316,000

表 4.3.3 圃場インフラストラクチャー改修工事費 (2/2)
(マスタープラン)

Sungai Manik Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	1,793,000
Infield Channel	307,000
Control Box	139,000
Total	2,239,000
2. Physical Contingency	336,000
3. Engineering Cost	224,000
4. Administration Cost	112,000
Grand Total	2,911,000

Seberang Perak Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	1,118,000
Infield Channel	190,000
Control Box	87,000
Total	1,395,000
2. Physical Contingency	209,000
3. Engineering Cost	140,000
4. Administration Cost	70,000
Grand Total	1,814,000

Kemasin/Semerak Scheme

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	510,000
Infield Channel	87,000
Control Box	66,000
Total	663,000
2. Physical Contingency	99,000
3. Engineering Cost	66,000
4. Administration Cost	33,000
Grand Total	861,000

表 4.3.4 テレメトリ・テレコントロールシステム施設設置費
(マスタープラン)

Name of Scheme	Central Station	Repeater Station	Water Level Gauge inc. RTU	Rainfall Gauge inc. RTU	Remote Gate/ Pump	Total		Physical Contingency	Engineering Cost	Administration Cost	Grand Total
						Direct Cost	Cost				
Kerian	266,000	39,000	1,212,000	43,000	9,694,000	11,254,000	1,688,000	1,123,000	563,000	14,630,000	
Besut			974,000	24,000	1,712,000	2,710,000	407,000	271,000	136,000	3,524,000	
Pulau Pinang	266,000		1,344,000	29,000	5,582,000	7,221,000	1,083,000	722,000	361,000	9,387,000	
Sg. Manik	266,000		532,000	49,000	3,596,000	4,443,000	666,000	444,000	222,000	5,775,000	
Sb. Perak	266,000		1,150,000	5,000	4,826,000	6,247,000	937,000	625,000	312,000	8,121,000	
Kemasin/Semerak	266,000		345,000	27,000		638,000	96,000	64,000	32,000	830,000	

表 4.3.5 モニタリング・フィードバックシステム設置費
(マスタープラン)

Name of Scheme	Direct Cost	Physical Contingency	Engineering Cost	Administration Cost	Total
Besut	709,800	106,500	71,000	35,500	922,800
Pulau Pinang	707,600	106,200	70,800	35,400	920,000
Sg. Manik	468,900	70,400	46,900	23,500	609,700
Sb. Perak	664,200	99,700	66,500	33,300	863,700
Kemasin/Semerak	631,700	94,800	63,200	31,600	821,300

表 4.5.1 優先事業選定に係る 5 大穀倉地区の比較表

Item	Name of Scheme					
	Pulau Pinang	Kerian / Sungai Manik		Seberang Perak	Kemasin Semerak	Ketara (Besut)
		Kerian	Sg. Manik			
(1) Location	West Coast / Pulau Pinang State	West Coast / Perak State	West Coast / Perak State	West Coast / Perak State	East Coast / Kelantan State	East Coast / Terengganu State
(2) Scale (Irrigation Area : ha)	9,832	23,560	6,318	8,708	6,895	5,164
(3) Water Availability	Relatively severe	Not so severe	No problem	No problem	Severe	Severe
(4) Irrigation & Drainage Facilities	Completed / necessity of improvement	Completed / necessity of improvement	Completed / necessity of improvement	Completed / necessity of improvement	Not yet completed	Completed / necessity of improvement
(5) Water Management System	No telemetry system	Telemetry system exists but not completed.	No telemetry system	No telemetry system	No telemetry system	No telemetry system
(6) Cropping Intensity (Average in 1990 - 1994 : %)	189	164	191	191	57	163
(7) Unit Yield of Paddy (Average in 1990 - 1994 : ton/ha)	2.80	2.94	3.05	3.53	2.82	3.18
(8) Farm Income (RM/Year)	6,407	1,693	3,479	3,713	1,409	2,784
(9) Farm-based Organization						
- Under DOA	108	50	11	6	6	30
- Under PPK	33	31	8	1	13	-
- Estate/Mini estate	2	-	-	1	-	-
(10) Competition with Industrialization	Very severe	Severe	Not so severe	Not so severe	Not so severe	Not so severe

表 4.5.2 事業費支出計画 (マスタープラン)

Unit : x 1000 RM

Scheme	Year	1999	2000	2001	2002	2003	2004	2005	2006	Total
I. Kerian Scheme										
1. Improvement of System Infrastructures		22,388	22,388	19,638	13,966					78,379
2. Improvement of In-field Infrastructures		2,735	2,735	2,735	2,735	2,735	2,735	2,735	2,735	21,831
3. Water Management / Monitoring System		5,126	5,087	5,031	53					15,499
4. Training of Water Users Group		77	77	128	27	28				337
Total		30,526	30,287	27,535	16,781	2,763	2,735	2,735	2,735	116,096
II. Besut Scheme										
1. Improvement of System Infrastructures		11,696	11,002	4,099						26,796
2. Improvement of In-field Infrastructures		304	304	304	304	304	304	304	304	2,435
3. Water Management / Monitoring System		2,153	2,085	209						4,447
4. Training of Water Users Group		42	6	42	6	6				102
Total		14,195	13,397	4,654	310	310	304	304	304	33,780
III. Pulau Pinang Scheme										
1. Improvement of System Infrastructures		8,941	8,513	7,304	7,304					32,060
2. Improvement of In-field Infrastructures		540	540	540	540	540	540	540	540	4,316
3. Water Management / Monitoring System		3,630	3,339	3,233	105					10,307
4. Training of Water Users Group		100	100	143	15	15				373
Total		13,210	12,491	11,219	7,963	555	540	540	540	47,056
IV. Sungai Manik Scheme										
1. Improvement of System Infrastructures		8,628	7,481	6,045	6,045					28,198
2. Improvement of In-field Infrastructures		364	364	364	364	364	364	364	364	2,911
3. Water Management / Monitoring System		2,888	3,192	305						6,385
4. Training of Water Users Group		8	52	51	8	8				127
Total		11,887	11,089	6,765	6,417	372	364	364	364	37,621
V. Seberang Perak Scheme										
1. Improvement of System Infrastructures		8,159	7,687	4,443						20,288
2. Improvement of In-field Infrastructures		227	227	227	227	227	227	227	227	1,814
3. Water Management / Monitoring System		4,061	4,348	288	288					8,985
4. Training of Water Users Group		5	52	5	5	5				72
Total		12,451	12,314	4,963	520	232	227	227	227	31,159
VI. Kemasin/Semerak Scheme										
1. Improvement of System Infrastructures		1,074	627							1,700
2. Improvement of In-field Infrastructures		287	287	287						864
3. Water Management / Monitoring System		415	415	0	0	506	158	157		1,651
4. Training of Water Users Group		24	71	71	24	23				213
Total		1,800	1,400	358	24	529	158	157	0	4,425
VII. Whole Schemes										
1. Improvement of System Infrastructures		60,883	57,695	41,528	27,314	0	0	0	0	187,421
2. Improvement of In-field Infrastructures		4,457	4,457	4,457	4,170	4,170	4,170	4,170	4,170	34,218
3. Water Management / Monitoring System		18,472	18,466	9,068	446	506	158	157	0	47,273
4. Training of Water Users Group		256	358	440	85	85	0	0	0	1,224
Grand Total		84,068	80,976	55,493	32,015	4,761	4,328	4,327	4,170	270,136

Note : Costs for improvement of system infrastructures and in-field infrastructures show for Jelawat Rusa and Kemasin Hilir sub-schemes.

表 5.1.1 地域別現況 (クリアン地区)

Items	Kerian Laut Sub-scheme			Kerian Darat Sub-scheme						Total/ Average
	Compartment A	Compartment B	Compartment C	Compartment D	Compartment E	Compartment F	Compartment G	Compartment H		
Parcel Area (ha)	2,403.0	4,001.0	3,960.0	3,362.0	2,344.0	2,697.0	2,143.0	2,650.0	23,560.0	
Planted Area (ha)*1	4,243.7	7,258.3	7,069.0	4,726.3	4,313.7	4,659.3	4,106.0	5,061.5	41,437.9	
Cropping Intensity (%)	176.6	181.4	178.5	140.6	184.0	172.8	191.6	191.0	175.9	
Yield (t/ha)*2	3.7	3.5	4.2	2.7	2.8	2.8	3.2	3.7	3.4	
Production (ton)	15,701.7	25,404.2	29,689.8	12,761.1	12,078.3	13,046.1	13,139.2	18,727.6	140,547.9	
Irrigation Schedule	from late Nov. to late Nov. from late Nov. from early Mar. from early Mar. from early Mar. from early Mar. from early Mar.									
- Main season	to early Apr.	to early Apr.	to early Apr.	to late Jul.	to late Jun.	to late Jun.	to mid Aug.	to late Jul.		
- Off season	from late Jul.	from late Jul.	from early Sep.	from early Sep.	from early Sep.	from early Sep.	from early Oct.	from early Oct.		
Planting Method*1	to early Dec.	to early Dec.	to early Dec.	to late Jan.	to early Jan.	to mid Dec.	to mid Feb.	to late Jan.		
Land Preparation*1	DS: 33%	DS: 9%	DS: 13%	DS: 46%	DS: 58%	DS: 84%	DS: 67%	DS: 54%	DS: 46%	
Varieties Used*1	Mech: 44%	Mech: 40%	Mech: 52%	Mech: 58%	Mech: 78%	Mech: 86%	Mech: 90%	Mech: 88%	Mech: 85%	
Fertilizer Application	MPM, Semarak, Lain2, 101, Saari									
Harvesting*1	The majority of farmers applies subsidy fertilizer only.									
Machinery	Comb: 45%	Comb: 48%	Comb: 55%	Comb: 55%	Comb: 76%	Comb: 82%	Comb: 71%	Comb: 82%	Comb: 62%	
- 4 W tractors	1	4	13	9	14	60	80	8	189	
- 2 W tractors	5	5	1	1	5	47	3	11	67	
- Combin harvester	1	4	3	2	3	3	3	4	67	
Irrigation System	Canal density: 31 m/ha, earth canal									
Drainage System	Drain density: 44 m/ha in average									
Drainage Condition	Water shortage in off-season									
Farm Road	Poor drainage due to insufficient facilities									
Tertiary System	Laterite and non-paved, Road density: approx. 29 m/ha									
Lots (nos.)	1,955	2,939	2,265	2,624	1,538	1,773	1,385	2,142	16,641	
Land Levelling (ha) "done"	0	179	385	1,259	644	647	1,155	902	5,171	
"to be done"	2,402	3,822	3,575	2,103	1,700	2,050	675	2,062	18,349	
Crop Budget (RM/ha)	Gross Return: RM2,225/ha, Production Cost: RM1,219/ha, Net Return: 1,006/ha									
Farm Income (RM/year)*3	Farm Income RM2,989, Non-Farm Income: RM4,627, Total: RM7,616									
Farmers' Organization*4	4	7	10	6	6	5	6	6	50	

*1: Source IADP Kerian, 6 seasons average (94 off season + 9697 main season) except A (4 season average, 94 Off - 95/96 main)

*2: Source IADP Kerian, 11 seasons average (91/92 main - 96/97 main)

*3: Farm Income includes non-paddy income and farm wage. (Paddy Income RM1,693, Non-paddy and wage RM1,246)

*4: under DOA

表5.1.2 クリアン地区既存テレメトリ施設

1. Central Station : Bagan Serai

2. Repeater Station : Bakit Larut

3. Remote Station

Code	Name	Rainfall Gauge	Water Level Gauge
01	Bukit Bertim	1	
02	Jemerang Setar	1	
03	Pondok Tanjung	1	1
04	Bukit Merah Intake	1	1
05	Padang Lalang	1	1
06	Selama	1	1
07	Samagahah	1	1
08	Ampang Jajar	1	1
09	FDC Alor Pongsu		2
10	Alor Pancor	1	
11	Jalan Banjar	1	2
12	Jalan Baru	1	3
13	FDC Kuala Kurau	1	
14	FDC Tg Piandang	1	
15	Sungai Acheh	1	
16	FDC Kubu Gajah	1	
17	FDC Simpang Empat	1	
18	Terusan Selinsing	1	1
19	FDC Kampung Selinsing	1	
20	Sungai Kata		2
21	Kelian Gunung	1	
22	Ibu Bekalan Ijok		1
23	Sungai Merah	1	1
24	(Not used)		
25	Bukit Merah (2)		2

表 5.1.3 灌漑・排水施設の改修/改良計画 (クリアン地区)

Work Plan		Remarks
1. Irrigation Canal	Main canal Terusan Besar	10 km from diversion point of main canal Terusan Alor Pongus to downstream
Concrete lining		
	Main canal other than above	52 km
	Secondary canals	
	TA 564 KN1	3.7 km
	Panchor 2	3.6 km
	Kolam 1167 AB	2.2 km
	TA 74	8.7 km
	TA 178	6.7 km
	TA 136	2.0 km
	TA 206	3.6 km
	218 K1	5.9 km
	Air Hitam	3.5 km
2. Drainage Facilities		
	Provision of additional drainage control gate at mouse of Sg. Bharu	
	Repair of drainage control gate at mouse of Sg. Burong	
	Desilting of drains	110 km
	Compartment D - F	472 km
	Compartment A - C	
	Construction of additional outlet pipe	800 m
	Construction of control structure	120 nos.
	Construction of bund : 153 km	153 km
	Construction of new drain	17 km
	Provision of drainage pump	10 nos.
3. Farm road		
	Asphalt pavement	along Terusan Besar, Serinsing, Alor Pongus, Tg. Pampang, T. Serong
		40 km
	Widening of tertiary roads	100 km
4. Related structures		
	Provision of check structures	7 nos. Key monitoring point
		8 nos. Second monitoring point
	Replacement of CHO & offtake gate	14 nos.
	Change gate spindle	2 nos.

表 5.1.4 農業用水管理施設 (クリアン地区)

Point	Location	Remote Control		Required Works		Remarks
		Number of Pump	Remote Control Gate Size / Water Level Gauge	no.	no.	
Key Control point						
KC1	Inake at Bukit Merah Reservoir	1.83 m x 2.13 m x 6 nos.	2	15		
KC2	Offtake point to Terusan Alor Pongau	1.50m x 2.00m x 8 nos. 4 nos.	2	15		CHO, proposed lining portion
KC3	Bogak Pump Station	3.40 m x 3.20 m x 2 nos.	2	30		
KC4	Offtake point to Terusan Tik Pindang	1.65 m x 2.60 m x 6 nos.	2	30		CHO
KC5	Offtake point to TA 218					
Secondary Control Point						
SC1	Offtake point to TA Kolum 1167	1.20 m x 2.00 m x 3 nos.	2	30		CHO
SC2	Offtake point to TA 74	1.65 m x 2.60 m x 6 nos.	2	30		CHO
SC3	Offtake point to TA 196	1.65 m x 2.60 m x 6 nos.	2	30		CHO
Key Monitoring Point						
KM1	Lower reach of offtake for TA Haji Ali on Terusan Besar		1			proposed lining portion
KM2	Lower reach of offtake for TA 804 KJ KS on Terusan Besar		1			proposed lining portion
KM3	Lower reach of offtake for TA. Sg. Dungan 1068 on Terusan Besar		1			
KM4	Lower reach of offtake for TA 303 on Terusan I. Secong		1			
KM5	Lower reach of offtake for TA 195 on Terusan Secong		1			
KM6	Upper reach of offtake for TA 1B on Terusan Secong		1			
KM7	Lower reach of offtake for TA Alor Pongau 3 on Terusan Alor Pongau		1			
Secondary Monitoring Point						
SM1	Beginning of TA 315		1			30
SM2	Beginning of TA 1B		1			30
SM3	Beginning of TA 579 K1		1			30
SM4	Beginning of TA Alor Pongau 3		1			30
SM5	Beginning of TA Pancheh 2/1		1			30
SM6	Beginning of TA 310 A		1			30
SM7	Beginning of TA 303		1			30
SM8	Beginning of TA Air Hitam		1			30
Tertiary Monitoring Point						
TM1	Beginning of TA Tebok Pancheh-A		1			30
TM2	Beginning of TA Ali Kaling 2		1			30
TM3	Beginning of TA Hj. Aman 2/1		1			30
TM4	Beginning of TA Haji Ali		1			30
TM5	Lower reach of offtake for TA Jambol 2/1		1			30
TM6	Lower reach of offtake for TA 1088 KN-B		1			30
TM7	Beginning of TA 16		1			30
TM8	Beginning of TA 206		1			30
TM9	Beginning of TA Sg. Tongkan		1			30
TM10	Beginning of Sg. Uluang		1			30
TM11	Beginning of TA 375		1			30
TM12	Beginning of TA 559		1			30
TM13	Beginning of TA 561 K5		1			30

表5.1.5 クリアン地区の土壌と水稻栽培に対する適性

Soil Type and Series	Suitability for Paddy	Area (ha)	Rate (%)
I. Marine Alluvial Soils			
Soil Series			
1 Serong	suitable	9,754.0	27.72%
2 Bakau	suitable	6,170.1	17.54%
3 Sabrang	suitable	1,093.5	3.11%
4 Piandang	marginal	749.3	2.13%
5 Sedaka	-	245.8	0.70%
6 Chenan	-	123.1	0.35%
7 Keranji	unsuitable	11.7	0.03%
Sub-total		18,147.5	51.58%
II. Brackish Water Deposits			
Soil Series			
1 Beriah	suitable	9,225.9	26.22%
2 Brown Clay	suitable	1,705.0	4.85%
3 Sedu	-	180.2	0.51%
4 Jawa	-	64.8	0.18%
5 Udang	-	13.4	0.04%
Sub-total		11,189.3	31.80%
III. High Organic Matter Soils			
Soil Series			
1 Linau	marginal	4,390.0	12.48%
2 Organic Clay	marginal	1,452.0	4.13%
Sub-total		5,842.0	16.60%
IV. Others			
1 Residential	-	7.3	0.02%
		35,186.1	100.00%

Source: Semi-detailed Soil Survey of the Padi Growing Areas in the Krian District Perak, DOA

	Area (ha)	Rate (%)
Suitable	27,948.5	79.43
Marginal	6,591.3	18.73
Unsuitable	11.7	0.03
ND	634.6	1.80

表5.1.6 クリアン地区の計画耕種法

Dry Direct Seeding		Wet Direct Seeding	
Days after Seeding	Activities	Input	Remark
-40	Harvesting for Last Season Paddy	Harvester/manual	
-23	Lime Application Fused magnesium phosphate	GML Lime (2.5ton/ha)	depend on the soil condition (Organic Soil and low pH soil)
-18	1st Land Preparation	4W Tractor + Rotavator	15 - 16cm
-7	Rodent/Rat Control	Check or Drai 125 ml	depend on location, either there are rat attack happen or not.
-5	2nd Land Preparation and Land Levelling	4W Tractor + Rotavator	
-1	Selecting Seeds		
0	Seed Sowing and pressing (seed mix with soil)	4W Tractor + Drill/seeder + Roller/bucket	
0 - 4	Herbicide application before sprouting (1)		(0 - 4 HLT)
5	Water supply		(5 - 8 cm)
25 - 30	Herbicide application after sprouting (2) Water Control		(5 - 15 HLT) (5 - 10 cm, 5 - 15 HLT)
15-21	1st Fertilizer Application	N:P:O ₅ :K ₂ O = 40:30:20 kg/ha	(15 - 20 HLT)
	Pest control	as required Tractor + Blower or sprayer	4 boxes fertilizer application for low fertility area
45-50	2nd Fertilizer Application	N: 40kg/ha	2nd N:40kg/ha 35 HLT
	3rd Fertilizer Application	N: 20kg/ha	3rd N:20kg/ha 55 HLT
	4th Fertilizer Application	N: 20kg/ha	4th N:20kg/ha 75 HLT
75 (PIS)	Pest control	as required Tractor + Blower or sprayer	
110	Drainage		
125	Harvesting	Harvester + Lorry	

Dry Direct Seeding		Wet Direct Seeding	
Days after Seeding	Activities	Input	Remark
-40	Harvesting for Last Season Paddy	Harvester/manual	
-23	Lime Application Fused magnesium phosphate	GML Lime (2.5ton/ha)	depend on the soil condition (Organic Soil and low pH soil)
-18	1st Land Preparation	4W Tractor + Rotavator	15 - 16cm
-15	Water Supply		5 - 8cm
-7	Rodent/Rat Control	Check or Drai 125 ml	depend on location, either there are rat attack happen or not. (7 - 21 HLT)
-4	Puddling and levelling	4W Tractor + Rotavator Paddy Harrow	(5 - 0 HBT) (2 - 1 HBT)
0	Sowing Sprouting Seeds	Tractor + MGA or Turn Table Wide Blower	
0 - 4	Herbicide application before sprouting (1)		(0 - 4 HLT)
25 - 30	Herbicide application after sprouting (2) Water Control		(5 - 15 HLT) (5 - 10 cm, 5 - 15 HLT)
15	1st Fertilizer Application	N:P:O ₅ :K ₂ O = 40:30:20 kg/ha	(15 - 20 HLT)
	Pest control	as required Tractor + Blower or sprayer	
45	2nd Fertilizer Application	N: 40kg/ha	4 boxes fertilizer application for low fertility area
	3rd Fertilizer Application	N: 20kg/ha	2nd N:40kg/ha 35 HLT
	4th Fertilizer Application	N: 20kg/ha	3rd N:20kg/ha 55 HLT
	4th Fertilizer Application	N: 20kg/ha	4th N:20kg/ha 75 HLT
75 (PIS)	Pest control	as required Tractor + Blower or sprayer	
110	Drainage		
125	Harvesting	Harvester + Lorry	

Source: IADP Kenan, MARDI and DOA Recommendation

表 5.1.7 システム・インフラストラクチャー改修工事費
(クリアン地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Concrete Lining of Canals	45,233,400
Improvement of Drainage Facilities	14,542,400
Improvement of Farm Roads	4,176,000
Improvement of Related Structures	470,200
Total	64,422,000
2. Physical Contingency	9,663,300
3. Engineering Cost	6,442,200
4. Administration Cost	3,221,100
Grand Total	83,748,600

表 5.1.8 圃場インフラストラクチャー改修工事費
(クリアン地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	5,700,600
Infield Channel	965,000
Control Box	509,000
Tramline	12,074,500
Total	19,249,100
2. Physical Contingency	2,887,400
3. Engineering Cost	1,924,900
4. Administration Cost	962,500
Grand Total	25,023,900

表 5.1.9 テレメトリ/テレコントロール施設設置費
(クリアン地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Central Station	266,300
Repeater Station	38,700
Water Level Gauge inc. RTU	1,213,000
Rainfall Gauge inc. RTU	43,400
Remote Gate/ Pump	9,694,100
Total	11,255,500
2. Physical Contingency	1,688,400
3. Engineering Cost	1,125,600
4. Administration Cost	562,800
Grand Total	14,632,300

表 5.1.10 モニタリング・フィードバックシステム設置費
(クリアン地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Master Station	227,000
Player & TV	355,000
Additional TV	6,000
Wiring	58,800
MOA, DID & DOA HQ	21,800
Total	668,600
2. Physical Contingency	100,300
3. Engineering Cost	66,900
4. Administration Cost	33,500
Grand Total	869,300

表 5.1.11 水利・営農グループの研修費用
(クリアン地区)

Off-Site Training

Compartment	WUGs (Nos)	Total WUG Leaders	Training day per Leader	Unit RM/day/person	Total Cost (RM)
Compartment A&B	20	40	3	400	48,000
Compartment C	4	8	3	400	9,600
Compartment D	17	34	3	400	40,800
Compartment E&F	22	44	3	400	52,800
Compartment G&H	21	42	3	400	50,400
Total	84	168			201,600

On-Site Training

Compartment	Farmers (Nos)	WUGs (Nos)	Training day per farmer	Unit RM/day/person	Total Cost (RM)
Compartment A&B		20	2	5	
Compartment C		4	2	5	
Compartment D		17	2	5	
Compartment E&F		22	2	5	
Compartment G&H		21	2	5	
Total	13,485	84			134,850

表 5.1.12 事業費支出計画 (クリアン地区)

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		14,701	14,701	14,701	14,701					58,803
2. Improvement of drainage facilities		6,302	6,302	6,302						18,905
3. Improvement of farm road		2,714	2,714							5,429
4. Improvement of related structures		306	306							611
Sub-total		24,023	24,023	21,003	14,701					83,749
II. Improvement of In-field Infrastructures										
1. Land leveling/tramline		2,888	2,888	2,888	2,888	2,888	2,888	2,888	2,888	23,108
2. In-field structures		240	240	240	240	240	240	240	240	1,916
Sub-total		3,128	3,128	3,128	3,128	3,128	3,128	3,128	3,128	25,024
III. Water Management / Monitoring System										
1. Telemetry and telecontrol system		4,877	4,877	4,877						14,632
2. Feedback system		449	210	157	53					869
Sub-total		5,326	5,087	5,034	53					15,501
IV. Training of Water Users Group										
		77	77	128	27	28				337
Total		32,554	32,315	29,293	17,909	3,156	3,128	3,128	3,128	124,611

表5.1.13 経済便益・費用フロー (クリアン地区)

Year	Benefit						Incr. Benefit	Cost						Total Cost	B-C
	Without			With				System	Infield	Training	Telemetry	O&M	Replace		
	Main	Off	Total	Main	Off	Total		Infra.	Infra.	Cost	Feedback	Cost	ment		
1	20,555	17,321	37,876	19,645	16,807	36,452	-1,424	22,974	2,952	72	5,227	2,309	33,535	-34,959	
2	20,555	17,321	37,876	20,207	17,761	37,968	92	22,974	2,952	72	4,992	4,599	35,590	-35,498	
3	20,555	17,321	37,876	22,221	20,166	42,387	4,511	20,086	2,952	120	4,940	6,649	31,747	-30,236	
4	20,555	17,321	37,876	25,686	24,023	49,709	11,832	14,059	2,952	25	52	7,804	24,893	-13,061	
5	20,555	17,321	37,876	30,602	29,331	59,933	22,056	0	2,952	26	0	7,804	10,783	11,273	
6	20,555	17,321	37,876	35,518	34,639	70,157	32,280	0	2,952	0	0	7,804	10,757	21,524	
7	20,555	17,321	37,876	40,434	39,947	80,381	42,504	0	2,952	0	0	7,804	10,757	31,748	
8	20,555	17,321	37,876	45,350	45,255	90,604	52,728	0	2,952	0	0	7,804	10,757	41,972	
9	20,555	17,321	37,876	51,155	51,060	102,215	64,339					7,804	7,804	56,534	
10	20,555	17,321	37,876	55,509	55,414	110,923	73,046					7,804	14,664	22,468	50,578
11	20,555	17,321	37,876	58,412	58,316	116,728	78,852					7,804	7,804	71,047	
12	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
13	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
14	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
15	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
16	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
17	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
18	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
19	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
20	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	32,444	40,248	41,506
21	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
22	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
23	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
24	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
25	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
26	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
27	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
28	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
29	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
30	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	14,664	22,468	59,286
31	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
32	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
33	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
34	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
35	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
36	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
37	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
38	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
39	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
40	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	32,444	40,248	41,506
41	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
42	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
43	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
44	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
45	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
46	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
47	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
48	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
49	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	7,804	73,950	
50	20,555	17,321	37,876	59,863	59,768	119,630	81,754					7,804	14,664	22,468	59,286
							3,569,227	80,093	23,620	316	15,211	350,355	108,880	608,476	24.1%

Benefit	Cost		
	0%	10%	20%
0%	24.1%	22.9%	21.8%
-10%	22.3%	21.1%	20.1%
-20%	20.3%	19.2%	18.3%

IRR	24.1%
B/C	2.59
NPV	277,028

表 5.2.1 地域別現況 (ブスット地区)

Items	Besut Sub-scheme			Angga S-S		Total / Average
	Compartment 1	Compartment 3	Compartment 4	Compartment 2		
Parcel Area (ha)	1,234.8	1,306.4	1,474.6	1,147.5		5,163.3
Planted Area (ha)*1	2,265.2	2,122.8	2,610.6	2,091.2		9,089.8
Cropping Intensity (%)	183.4	162.5	177.0	182.2		176.0
Yield (t/ha)*2	4.1	4.3	4.2	4.2		4.2
Production (ton)	9,287.3	9,128.0	10,964.5	8,783.0		38,177.2
Irrigation Schedule				up stream PS	down stream PS	
-Main season	from mid. Nov. to late Mar.	from early Dec. to mid. Apr.	from mid. Nov. to late Mar.	from mid Nov. to late Mar.	from early Dec. to mid. Apr.	
-Off season	from early May to late Sep.	from mid. May to early Oct.	from early May to late Sep.	from early May to late Sep.	from mid. May to early Oct.	
Planting Method	Wet Direct Seeding					
Land Preparation	Mechanized, 1st: by 4W tractor, 2nd by 2W tractor					
Varieties Used	MR84					
Fertilizer Application	The majority of farmers apply subsidy fertilizer only.					
Harvesting	Mechanized (combine harvester)					
Machinery						
-4 W tractors			44			44
-2 W tractors			642			642
-Combin harvester			6			6
Irrigation System	48 m/ha	42 m/ha	58 m/ha	45 m/ha		48 m/ha
Irrigation Condition	Water shortage in drought season					
Drainage System	51 m/ha	52 m/ha	47 m/ha	35 m/ha		46 m/ha
Drainage Condition	Sedimentation in drains					
Farm Road	Road density : 46 m/ha					
Tertiary System	Canal density : 25 m/ha in average, lined with concrete					
Lot (nos.)						
Land Levelling (ha) "done"						
"to be done"*3	0	0	60	20		80
Crop Budget (RM/ha)	Gross Return: RM2,575/ha, Production Cost: RM1,525/ha, Net Return RM1,051/ha					
Farm Income (RM/year)	Farm Income: RM2,784, Non-Farm Income: MR3,336 Total RM6,120					
Farmers' Organization*4	8	8	9	5		30

*1: 4 seasons average ('95 off - '96/'97 main)

*2: Estimated figure based on 5 seasons average ('94/'95 main - '96/'97 main), net paddy factor: 0.90 is applied.

*3: off-season '98

*4: KP (Kumpulan Petani)

表 5.2.2 灌溉・排水施設の改修/改良計画 (プスット地区)

(1/2)

Work Plan	Remarks
1. Replacement of Angga Barrage and Intake structure including construction of control house	
2. Replacement of Besut Barrage gates	4 nos.
3. Irrigation Canal	
Concrete lining	2.6 km
Besut main canal Point B - E	1.8 km from BP
TA. Telaga Nibong	
Besut secondary canals	
TA. Lubok Kawah	3.8 km from BP
TA. Pulau Panjang	3.1 km from BP
TA. Tok Bugis	2.5 km from BP
Besut tertiary canals	2.5 km
Angga secondary canals	
TA. Padang Baloh	4.0 km from BP
TA. Awek	3.5 km from BP
Angga tertiary canals	0.5 km
Heightening of lining	
Besut main canal Point E - H	4.8 km
Besut main canal Point G-M-N-O	4.0 km
Besut secondary canals	
TA. Pulau Ribu	2.8 km from BP
Heightening of existing bank and placing of lining newly	
Angga main canal (Point 3.7 km to Point R)	4.6 km
4. Drainage facilities	
Desilting of drains	16 km
Provision of drainage control	15 nos.

表 5.2.2 灌漑・排水施設の改修/改良計画 (ブスット地区)

(2/2)

Work Plan	Remarks
5. Farm road	
Asphalt pavement	
along Besut main canal	5.5 km
along Angga main canal	2.5 km
Widening and laterite pavement	
along Besut tertiary canals	14 km
along Angga tertiary canals	13 km
6. Related structures	
Provision of check structures	
on Besut main canal	3 nos.
on Angga main canal	2 nos.
on Besut secondary canals	1 no.
Monitoring points & downstream of point C	
Monitoring points	
Monitoring points	
Replacement of CHO & offtake gate	
on Besut main canal	34 nos.
on Besut secondary canals	18 nos.
on Angga main canal	2 nos.
on Angga secondary canals	5 nos.
Replacement of check gate and control drop gate	
on Besut main canal	10 nos.
on Besut secondary canals	4 nos.
on Angga main canal	1 no.

表 5.2.3 農業用水管理施設 (ブスット地区)

Point	Location	Required Works	Lining		Remarks
			Primary canal	m	
		Remote Control Gate Size / Number of Pump	Water Level Gauge nos.		
Key Control point					
KC1	Intake at Besut Barrage	1.93 m x 2.49 m x 3 nos.	2		proposed lining portion
KC2	Offtake point G on Besut Main Canal	1.60 m x 2.00 m x 1 no.	2		installed
KC3	Intake at Angga Barrage	1.52 m x 1.52 m x 2 nos.	2		including control room
Secondary Control Point					
SC1	Offtake point F on Besut Main Canal	1.60 m x 2.00 m x 1 no.	2		proposed lining portion
SC2	Offtake point M on Besut Main Canal	1.20 m x 1.70 m x 1 no.	2		"
Key Monitoring Point					
KM1	Lower reach of offtake point E on Besut Main canal		1		proposed lining portion
KM2	Lower reach of offtake point M on Besut Main canal		1		"
KM3	Lower reach of offtake point O on Besut Main canal		1		"
KM4	Upper reach of offtake point R on Angga Main Canal		1		"
Secondary Monitoring Point					
SM1	Beginning of TA, Lubok Lawah (point R on Besut Main Canal)		1		proposed lining portion
SM2	Upper reach of offtake point F on Besut Main Canal		1		"
SM3	Lower reach of offtake point N on Besut Main Canal		1		"
SM4	Lower reach of offtake point H on Besut Main Canal		1		"
SM5	Lower reach of offtake point R on Angga Main Canal		1		"
Tertiary Monitoring Point					
TM1	Beginning of TA, Lubok Agu		1		proposed lining portion
TM2	Beginning of TA, Gong Kulim		1		"
TM3	Beginning of TA, Kubong Depu		1		"
TM4	Beginning of TA, Lubau Ribu		1		"
TM5	Beginning of TA, TG, Celal		1		"
TM6	Beginning of TA, ECI/SC		1		"
TM7	Beginning of TA, BH1		1		"
TM8	Beginning of TA, J		1		"
TM9	Beginning of TA, M1a		1		"
TM10	Beginning of TA, M1b		1		"
TM11	Beginning of TA, NN1		1		"
TM12	Beginning of TA, PP1		1		"
TM13	Beginning of TA, QQ1		1		"
TM14	Beginning of TA, Q2a		1		"
TM15	Beginning of TA, Q2b		1		"
TM16	Beginning of TA, Padang Beloh		1		"
TM17	Beginning of TA, Awet		1		"
TM18	Beginning of TA, RR1		1		"
TM19	Beginning of TA, SS1		1		"

表 5.2.4 ブスット地区のリサイクル・ポンプ

LOCATION	COMMAND AREA (ha)	NUMBER OF PUMP (nos.)	TOTAL CAPACITY (m ³ /sec)	REMARKS
Kuala Kenak	48	1	0.28	
Gong Jelutong	30	2	0.14	
Pangkal Q2C	12	1	0.06	
Alor Bakong	30	2	0.31	
Gerong	61	2	0.28	
Alor Belusu	30	1	0.14	

表5.2.5 ブスット地区の土壤と水稻栽培に対する適性

Soil Type and Series		Suitability for Paddy	Area (ha)	Rate (%)
I. Riverine Alluvium				
Soil Series				
1	Tok Yong	2 marginal	3,998.2	33.75%
2	Kg. Chempaka	2 marginal	2,143.2	18.09%
3	Holyrood	3 unsuitable	294.6	2.49%
4	Kg. Lating	2 marginal	661.7	5.59%
5	Sg. Jabil	2 marginal	349.2	2.95%
6	Batu Hitam	2 marginal	36.4	0.31%
7	Kg. Tepus	2 marginal	635.3	5.36%
8	Pasir Puteh	3 unsuitable	1,136.7	9.60%
9	Local Alluvium	3 unsuitable	28.7	0.24%
10	Kg. Binjai	3 unsuitable	437.9	3.70%
Sub-total			9,722.0	82.07%
II. Organic Soils				
Soil Series				
1	Brown Clay	3 unsuitable	76.5	0.65%
2	Peat	3 unsuitable	217.7	1.84%
Sub-total			294.2	2.48%
III. Mixed Riverline and Marine Alluvium				
1	Lubok Itac	3 unsuitable	63.5	0.22%
IV. Marine Alluvium				
Soil Series				
1	Rusifa	3 unsuitable	44.5	0.38%
2	Rudua	3 unsuitable	230.7	1.95%
Sub-total			275.2	2.32%
V. Shale				
1	Malacca Munchong Ass.	3 unsuitable	407.5	3.44%
2	Durian-Malacca Ass.	3 unsuitable	157.8	1.33%
Sub-total			565.3	4.77%
VI. Granite and Granodiorite				
1	Jerangau	3 unsuitable	29.1	0.25%
2	Jerangau-Rangam Ass.	3 unsuitable	768.9	6.49%
Sub-total			798.0	6.74%
VII. Miscellaneous				
1	Steepland	3 unsuitable	128.3	1.08%
			11,846.6	100.00%

Source: Semi-detailed Soil Survey of the Padi Growing Areas in the Krian District Perak, DOA

	Area (ha)	Rate (%)
suitable	0	0.00
marginal	7,824.1	66.04
unsuitable	4,022.5	33.96

表5.2.6 ブスット地区の計画耕種法

Dry Direct Seeding		Wet Direct Seeding	
Days after Seeding	Activities	Input	Remark
-23-21	Lime Application (or Magnesium)	GML Lime (2.5ton/ha) (MgO: 180kg/ha)	depend on the soil condition (Organic Soil and low pH soil)
-19-18	1st Land Preparation	4W Tractor + Rotavator	15 - 10cm
-7	Rodent/Rat Control	Check of Dra: 125 ml	depend on location, either there are rat attack happen or not.
-5	2nd Land Preparation and Land Levelling	4W Tractor + Rotavator	(10 - 15 HBT)
-1	Selecting and Soaking Seeds	Seed selecting but until it	
0	Sowing and pressing (seed mix with soil)	4W Tractor + Drillseed + Rotabucket	
0 - 4	Herbicide application before sprouting (1)		(0 - 4 HLT)
5	Water supply		(5 - 8 cm)
25 - 30	Herbicide application after sprouting (2)		(5 - 15 HLT) (5 - 10 cm, 5 - 15 HLT)
15-21	1st Fertilizer Application	N:P2O5:K2O= 40:40:30 kg/ha	(15 - 20 HLT)
45-50	2nd Fertilizer Application	as required Tractor + Blower or sprayer N: 40kg/ha	4 times fertilizer application for low fertility area 2nd N: 40kg/ha 35 HLT 3rd N: 20kg/ha 55 HLT 4th N: 20kg/ha 75 HLT
75 (PIS)	3rd Fertilizer Application	N: 20kg/ha	
110-115	Drainage	as required Tractor + Blower or sprayer	
125-130	Harvesting	Harvester + Lorry	
Seeding	Activities	Input	Remark
-23-21	Lime Application (or Magnesium)	GML Lime (2.5ton/ha) (or MgO 180kg/ha)	depend on the soil condition (Organic Soil and low pH soil)
-19-18	1st Land Preparation	4W Tractor + Rotavator	15 - 10cm
-15	Water Supply		5 - 8cm
-7	Rodent/Rat Control	Check of Dra: 125 ml	depend on location, either there are rat attack happen or not.
-4-2	Puddling and levelling	4W Tractor + Rotavator Paddy Harrow	
-3 - 2	Selecting and Soaking Seeds		
0	Sowing Sprouting Seeds	Tractor + MGA or Turn Table Wide Blower)	
0 - 4	Herbicide application before sprouting		(0 - 4 HLT)
25 - 30	Herbicide application after sprouting Water Control		(5 - 15 HLT) (5 - 10 cm, 5 - 15 HLT)
15	1st Fertilizer Application	N:P2O5:K2O= 40:30:20 kg/ha	(15 - 20 HLT)
	Pest and control	as required Tractor + Blower or sprayer	
45	2nd Fertilizer Application	N: 40kg/ha	4 times fertilizer application for low fertility area 2nd N: 40kg/ha 35 HLT 3rd N: 20kg/ha 55 HLT 4th N: 20kg/ha 75 HLT
75	3rd Fertilizer Application	N: 20kg/ha	
	Pest control	as required Tractor + Blower or sprayer	
110-115	Drainage		
125-130	Harvesting	Harvester + Lorry	

Source: IADP Kctara (Besut), MAKDI and DOA Recommendation

表 5.2.7 システム・インフラストラクチャー改修工事費
(ブスット地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Replacement of Besut Barrage Gates	8,000,000
Construction of New Angga Barrage	1,800,000
Concrete Lining of Canals	8,509,200
Improvement of Drainage Facilities	533,300
Improvement of Farm Roads	1,439,500
Improvement of Related Structures	1,178,600
Total	21,460,600
2. Physical Contingency	3,219,100
3. Engineering Cost	2,146,100
4. Administration Cost	1,073,000
Grand Total	27,898,800

表 5.2.8 圃場インフラストラクチャー改修工事費
(ブスット地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Land Leveling	1,443,300
Infield Channel	244,700
Control Box	186,300
Total	1,874,300
2. Physical Contingency	281,100
3. Engineering Cost	187,400
4. Administration Cost	93,700
Grand Total	2,436,500

表 5.2.9 テレメトリ/テレコントロール施設設置費
(ブスット地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Central Station	Installed in Pilot Project
Repeater Station	0
Water Level Gauge inc. RTU	974,900
Rainfall Gauge inc. RTU	24,200
Remote Gate/ Pump	1,712,100
Total	2,711,200
2. Physical Contingency	406,700
3. Engineering Cost	271,200
4. Administration Cost	135,600
Grand Total	3,524,700

表 5.2.10 モニタリング・フィードバックシステム設置費
(ブスット地区)

Work Item	Construction Cost (RM)
1. Direct Cost	
Master Station	227,000
Player & TV	390,500
Additional TV	8,000
Wiring	62,500
MOA, DID & DOA HQ	21,800
Total	709,800
2. Physical Contingency	106,500
3. Engineering Cost	71,000
4. Administration Cost	35,500
Grand Total	922,800

表 5.2.11 水利・営農グループの研修費用
(ブスット地区)

Off-Site Training

Compartment	WUGs (Nos)	Total WUG Leaders	Training day per Leader	Unit RM/day/person	Total Cost (RM)
Compartment 1	8	16	3	400	19,200
Compartment 2	5	10	3	400	12,000
Compartment 3	8	16	3	400	19,200
Compartment 4	9	18	3	400	21,600
Total	30	60			72,000

On-Site Training

Compartment	Farmers (Nos)	WUGs (Nos)	Training day per farmer	Unit RM/day/person	Total Cost (RM)
Compartment 1	659	8	2	5	6,590
Compartment 2	509	5	2	5	5,090
Compartment 3	858	8	2	5	8,580
Compartment 4	1,028	9	2	5	10,280
Total	3,054	30			30,540

表 5.2.12 事業費支出計画 (ブスット地区)

Unit : x 1000 RM

Scheme	Year	1999	2000	2001	2002	2003	2004	2005	2006	Total
I. Improvement of System Infrastructures										
1. Replacement of Besut Barrage Improvement		5,200	5,200							10,400
2. Construction of New Angga Barrage		780	780	780						2,340
3. Concrete lining of canals		3,687	3,687	3,687						
4. Improvement of drainage facilities		693								1,871
5. Improvement of farm road		936	936							1,532
6. Improvement of related structures		766	766							27,899
Sub-total		12,062	11,369	4,467						
II. Improvement of In-field Infrastructures										
1. Land leveling/tramline		235	235	235	235	235	235	235	235	1,876
2. In-field structures		70	70	70	70	70	70	70	70	560
Sub-total		305	305	305	305	305	305	305	305	2,437
III. Water Management / Monitoring System										
1. Telemetry and telecontrol system		1,762	1,762							3,525
2. Feedback system		391	323	209						923
Sub-total		2,153	2,085	209						4,448
IV. Training of Water Users Group										
		42	6	42	6	6				102
Total		14,562	13,765	5,023	311	311	305	305	305	34,885

表5.2.13 経済便益・費用フロー（ブスト地区）

Year	Benefit							Cost						Total Cost	B-C
	Without			With			Incr. Benefit	System Infra.	Infield Infra.	Training Cost	Telemetry Feedback	O&M Cost	Replace- ment		
	Main	Off	Total	Main	Off	Total									
1	5,852	5,179	11,031	5,504	4,818	10,322	-709	11,536	287	39	2,113	684	14,660	-15,359	
2	5,852	5,179	11,031	5,449	4,678	10,127	-905	10,873	287	6	2,046	1,332	14,544	-15,449	
3	5,852	5,179	11,031	5,682	4,754	10,435	-596	4,272	287	39	205	1,557	6,361	-6,957	
4	5,852	5,179	11,031	6,203	5,045	11,249	217	0	287	6	0	1,557	1,850	-1,632	
5	5,852	5,179	11,031	7,013	5,554	12,567	1,535	0	287	6	0	1,557	1,850	-314	
6	5,852	5,179	11,031	7,823	6,062	13,884	2,853	0	287	0	0	1,557	1,844	1,009	
7	5,852	5,179	11,031	8,632	6,570	15,202	4,171	0	287	0	0	1,557	1,844	2,327	
8	5,852	5,179	11,031	9,442	7,078	16,520	5,489	0	287	0	0	1,557	1,844	3,645	
9	5,852	5,179	11,031	10,595	7,943	18,538	7,507					1,557	1,557	5,950	
10	5,852	5,179	11,031	11,460	8,591	20,051	9,020					1,557	3,357	4,914	4,106
11	5,852	5,179	11,031	12,037	9,024	21,060	10,029					1,557	1,557	1,557	8,473
12	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
13	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
14	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
15	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
16	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
17	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
18	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
19	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
20	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	9,153	10,710	-176
21	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
22	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
23	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
24	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
25	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
26	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
27	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
28	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
29	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
30	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	3,357	4,914	5,620
31	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
32	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
33	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
34	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
35	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
36	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
37	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
38	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
39	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
40	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	9,153	10,710	-176
41	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
42	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
43	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
44	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
45	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
46	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
47	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
48	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
49	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	1,557	1,557	8,977
50	5,852	5,179	11,031	12,325	9,240	21,565	10,534					1,557	3,357	4,914	5,620
							449,424	26,681	2,300	96	4,365	76,735	28,379	138,555	11.2%

Sensitivity

Benefit	Cost		
	0%	10%	20%
0%	11.2%	10.6%	10.1%
-10%	10.2%	9.6%	9.1%
-20%	9.1%	8.6%	8.1%

IRR	11.2%
B/C	1.14
NPV	6.178

表 5.3.1 地域別現況 (ブラウ・ピナン地区)

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.

表 5.3.2 灌溉・排水施設の改修/改良計画 (ブラウ・ピナン地区)

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	along Sg. Muda main canal along upper reach of P. Tunggal main canal
Widening of tertiary farm road	8 km 100 km
4. Related structures	Key & secondary monitoring points
Provision of check structures	on Sg. Muda main canal on P. Tunggal main canal on Sg. Kulim main canal on Sg. Muda secondary canals on Sg. Jarak main & secondary
Replacement of CHO gate	2 nos. 2 nos. 1 no. 1 no. 8 nos. 6 nos. 2 nos.
	Key monitoring point Key monitoring point Key monitoring point Second monitoring point

表 5.3.3 農業用水管理施設 (プラウ・ピナン地区)

Point	Location	Required Works			Remarks
		Remote Control Gate Size / Number of Pump	Water Level Gauge nos.	Lining m	
				Primary canal	Branched canal
<i>Sg. Muda Sub-Scheme</i>					
Key Control point					
KC1	Rumohing Lima Pump Station	8 nos.	2		proposed lining portion
KC2	Offtake point to TA. B	2.00 m x 2.00 m x 4 nos.	2		CHO, proposed lining portion
KC3	Offtake point to TA. C	2.00 m x 2.00 m x 4 nos.	2		CHO, proposed lining portion
KC4	Offtake point to TA. G	1.25 m x 1.70 m x 2 nos.	2		proposed lining portion
KC5	Offtake point to TA. H	1.00 m x 0.60 m x 2 nos.	2		CHO, proposed lining portion
<i>Secondary Control Point</i>					
SC1	Offtake point to TA. CA	1.70 m x 1.70 m x 4 nos.	2		CHO, proposed lining portion
SC2	Offtake point to TA. D	1.70 m x 1.70 m x 4 nos.	2		CHO, proposed lining portion
SC3	Offtake point to TA. E	2.00 m x 2.00 m x 4 nos.	2		CHO, proposed lining portion
<i>Key Monitoring Point</i>					
KM1	Lower reach of offtake point TA. A on Main canal		1		
KM2	Lower reach of offtake point TA. F on Main canal		1		proposed lining portion
<i>Secondary Monitoring Point</i>					
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. C 7L 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	
<i>Tertiary Monitoring Point</i>					
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. C4		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. F1A		1	30	
TM10	Beginning of TA. H1		1	30	
TM11	Beginning of TA. H2		1	30	

表 5.3.3 農業用水管理施設 (プラウ・ピナン地区)

Point	Location	Required Works			Remarks
		Remote Control Gate Size / Number of Pump	Water Level Gauge nos.	Lining m	
<i>Pinang Tunjung Sub-Scheme</i>					
Key Control Point					
KC1	Pinang Tunjung 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		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 Cempejak Pump Station		2	15	
KM3	Sg. Kreh Headworks		2	15	
KM4	Kreh Pump Station		2	15	

表5.3.4 プラウ・ピナン地区の土壌と水稲栽培に対する適性

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-Permatang Association	6,480.0	2.53%
5 Sintek 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

表5.3.5 プラウ・ピナン地区の計画耕種法

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 Drai 125 ml	depend on location, either there are rat attack happen or not.
-4	Puddling and levelling	4W Tractor + Rotavator Paddy Harrow	(5 - 0 HBT)
-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 Water Control		(5 - 15 HLT) (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

表 5.3.6 システム・インフラストラクチャー改修工事費
(ブラウ・ピナン地区)

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

表 5.3.7 圃場インフラストラクチャー改修工事費
(ブラウ・ピナン地区)

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

表 5.3.8 テレメトリ/テレコントロール施設設置費
(ブラウ・ピナン地区)

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

表 5.3.9 モニタリング・フィードバックシステム設置費
(ブラウ・ピナン地区)

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

表 5.3.10 水利・営農グループの研修費用
(プラウ・ピナン地区)

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 Tunggal	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 Tunggal		7	2	5	
Padang Menora & Pokok Tampang		3	2	5	
Total	7,301	125			73,010

表 5.3.11 事業費支出計画 (プラウ・ピナン地区)

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

表5.3.12 経済便益・費用フロー（ブラウ・ピナン地区）

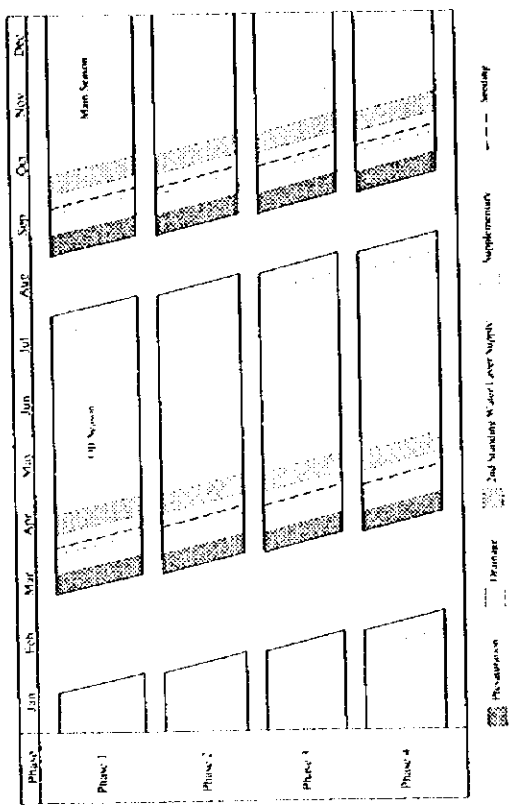
(RM1000)

Year	Benefit						Increm. Benefit	Cost						B/C	
	Without			With				System	Infield	Training	Telemetry	O&M	Replace		Total
	Main	Off	Total	Main	Off	Total		Infra.	Infra.	Cost	Feedback	Cost	ment		Cost
1	10,031	9,926	19,957	9,379	9,287	18,665	-1,292	9,041	509	91	3,562	1,019		14,255	-15,347
2	10,031	9,926	19,957	9,359	9,280	18,638	-1,319	8,632	509	91	3,277	2,041		14,533	-15,872
3	10,031	9,926	19,957	9,962	9,896	19,858	-.99	7,348	509	134	3,173	2,917		14,050	-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	11	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	52,295	271,957	19,5%

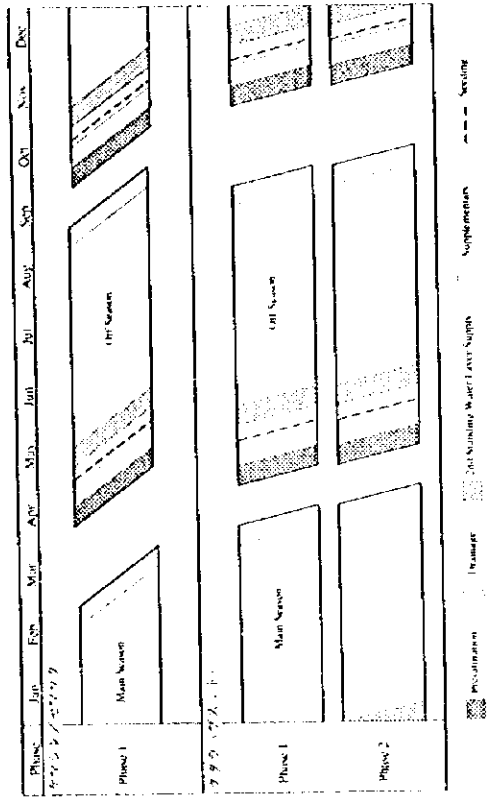
Sensitivity

		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%

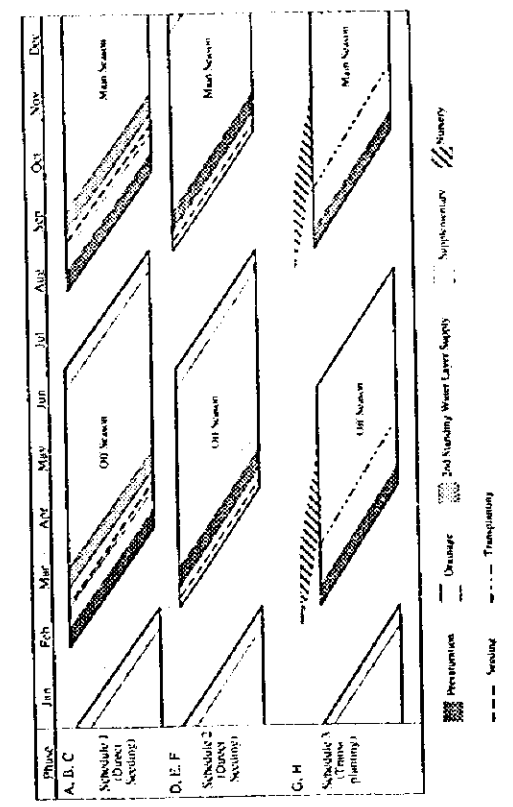
付 図



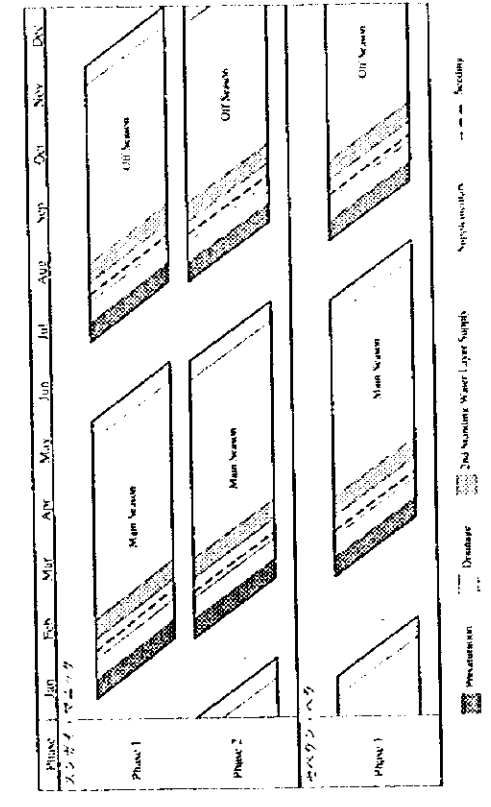
いわくら・比叡地区



（カマシン/セマルク、クダラ（アスルト）地区）



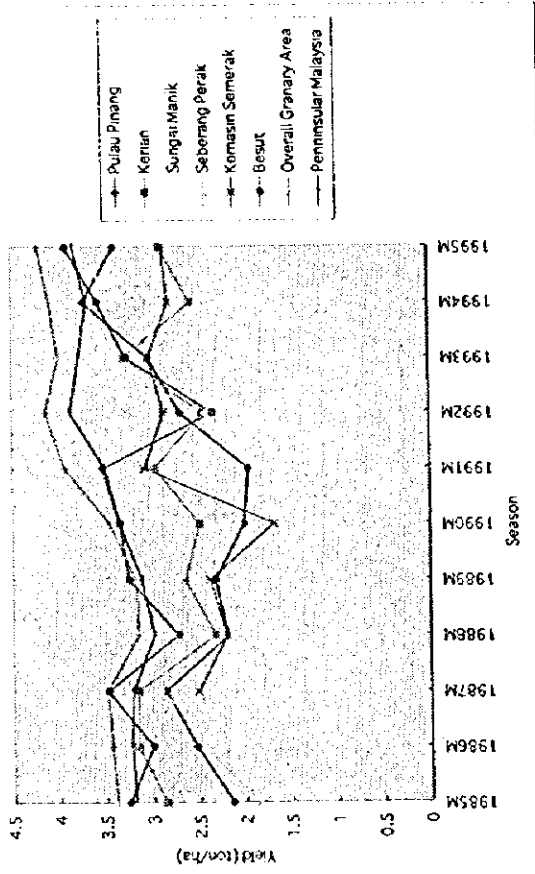
（クリハラ地区）



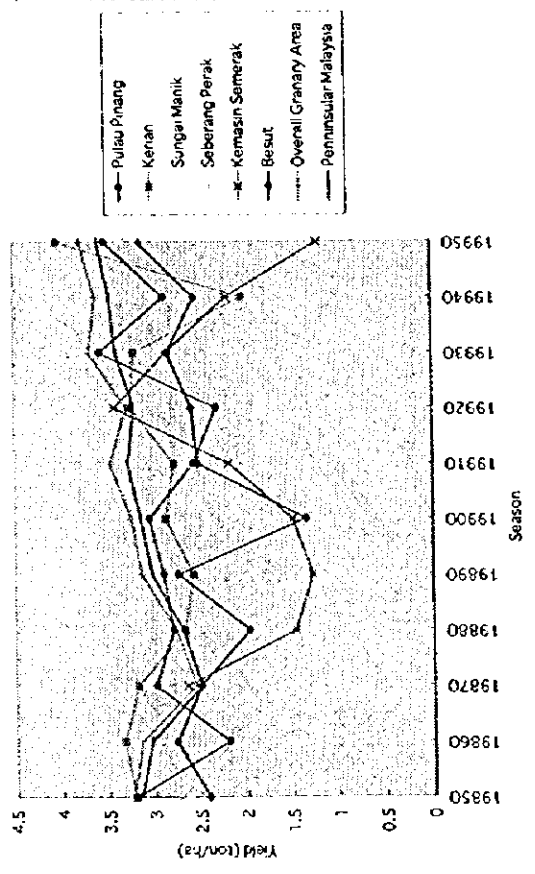
（スンガイ・マニッカ並びにセベラン・ベラ地区）

図2.1.1 調査対象地区の現況作付けスケジュール

Average Paddy Yield (Main Season)



Average Paddy Yield (Off Season)



Average Paddy Yield (Annual)

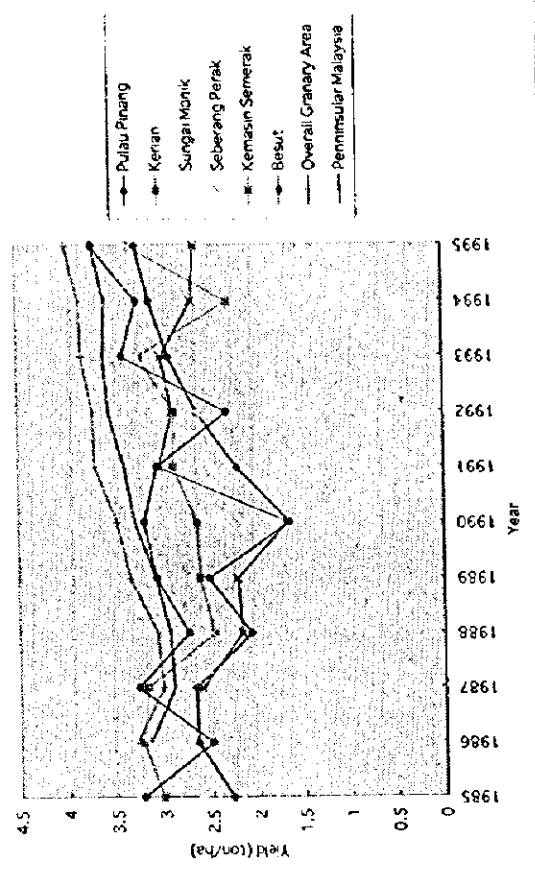


図2.1.2 調査対象地区の水稻単位収量の推移

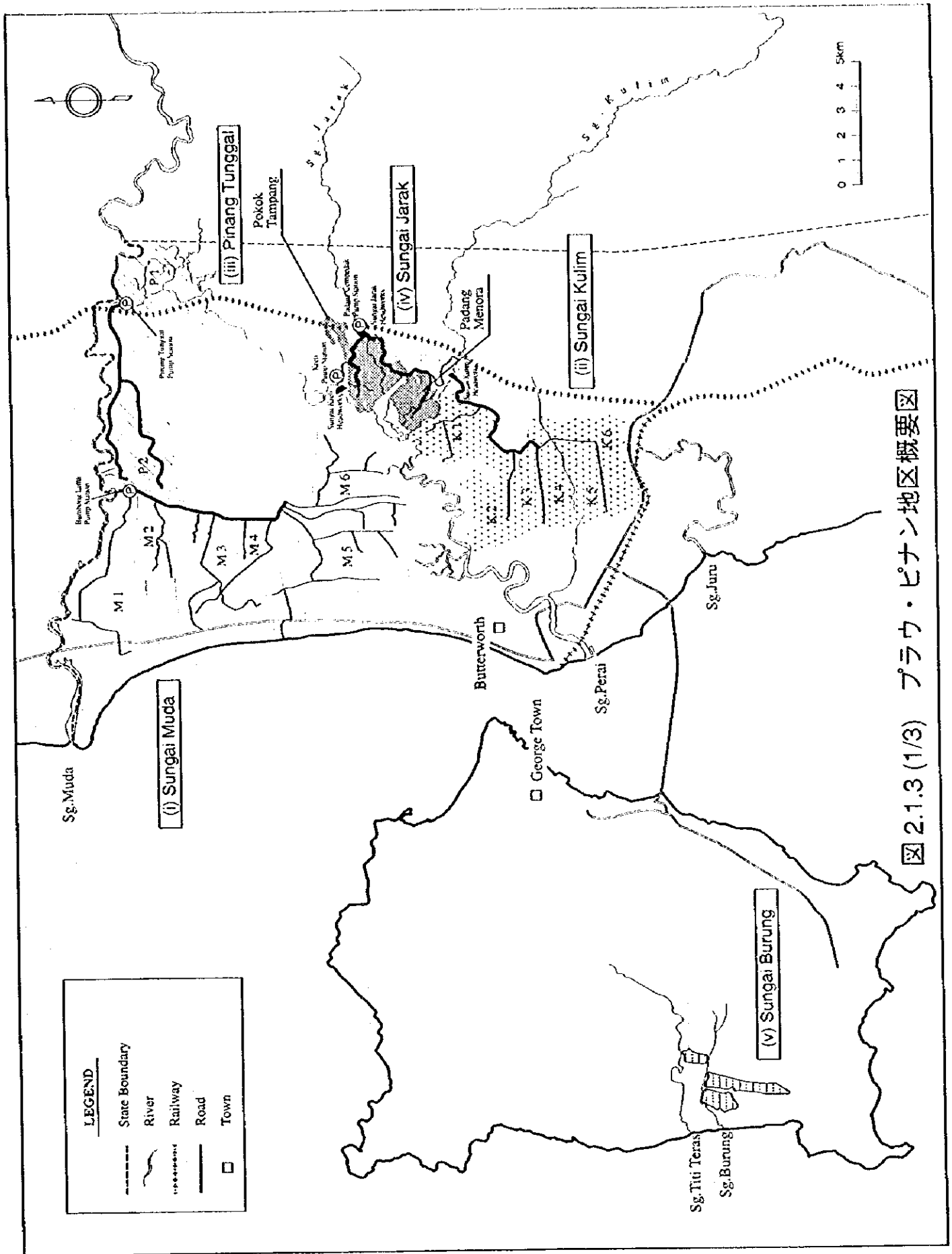


図 2.1.3 (1/3) プラウ・ピナン地区概要図

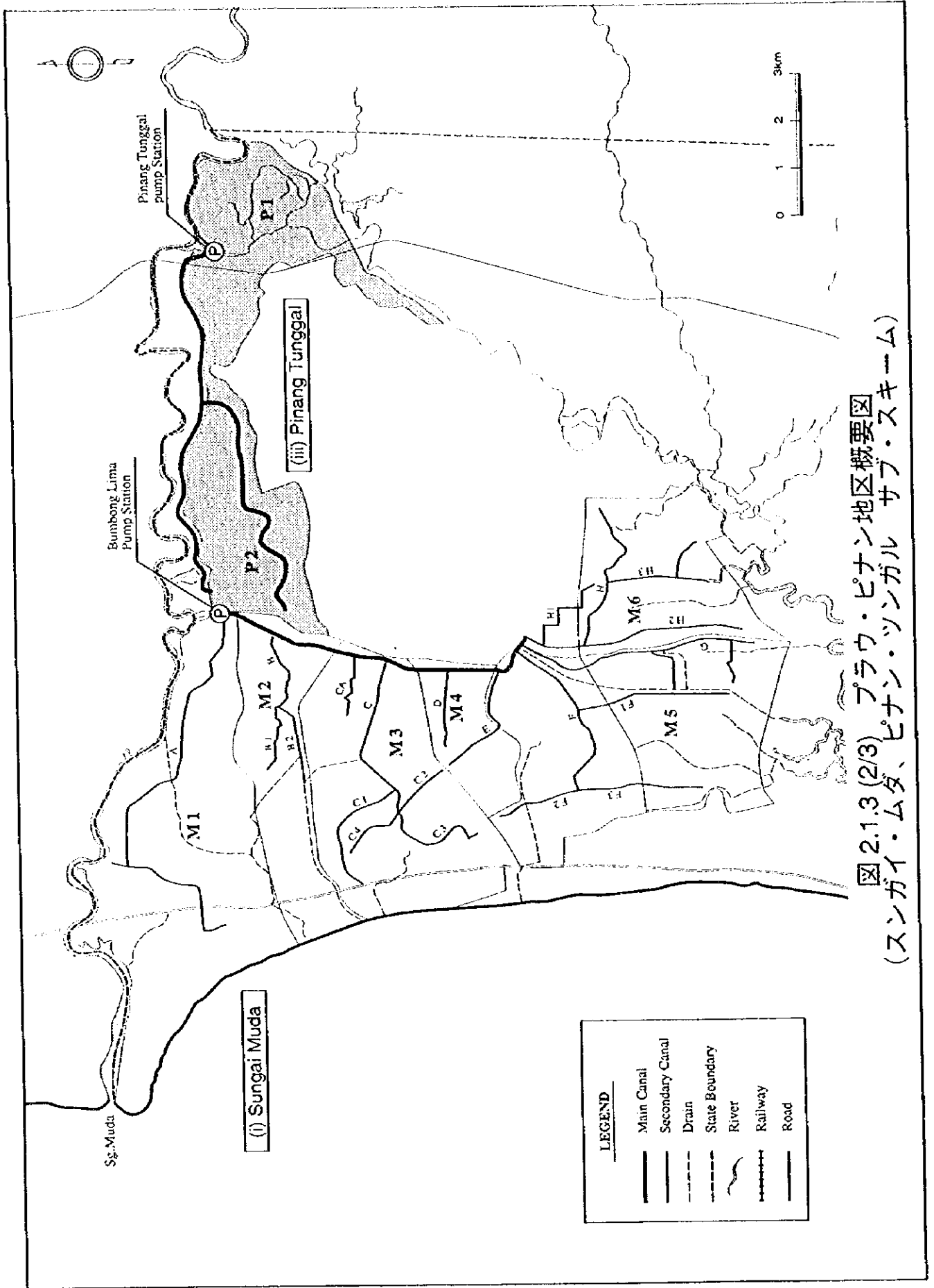


図 2.1.3 (2/3) プラウ・ピナン地区概要図
 (スンガイ・ムダ、ピナン・ツンガル サブ・スキーム)

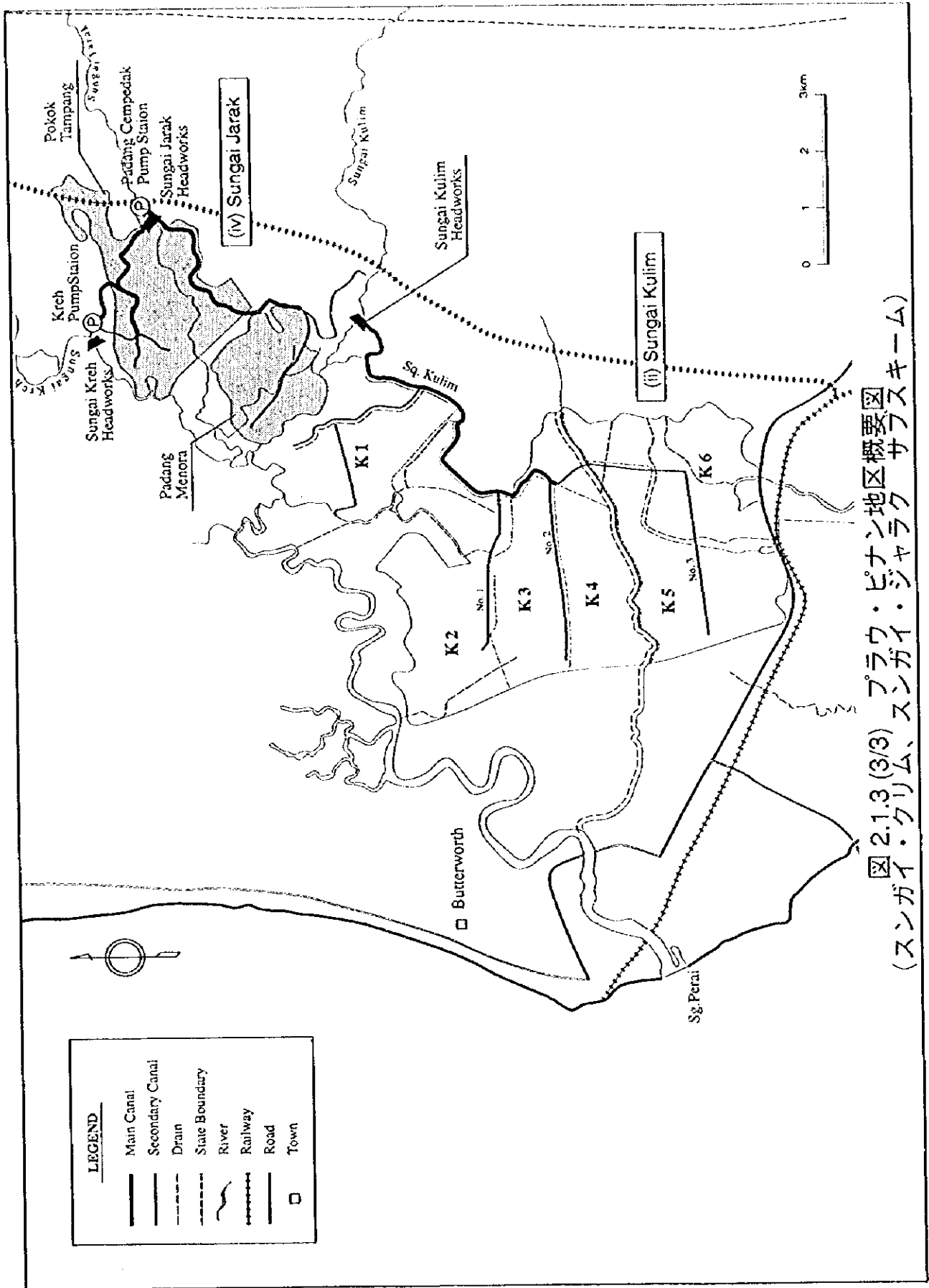


図 2.1.3 (3/3) プラウ・ピナン地区概要図
 (スンガイ・クリム、スンガイ・ジャラク、サラスキーム)

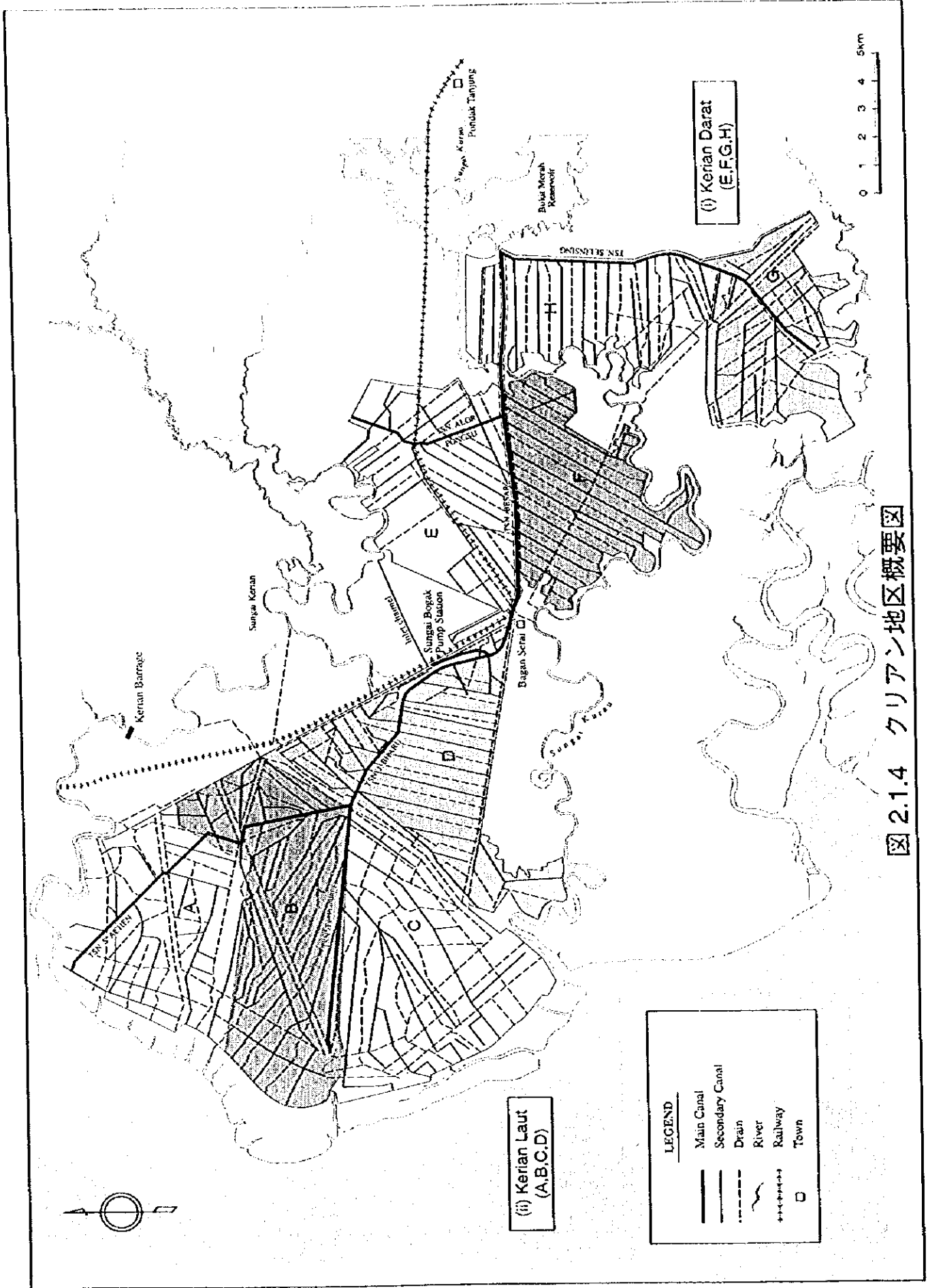


図 2.1.4 クリアン地区概要図

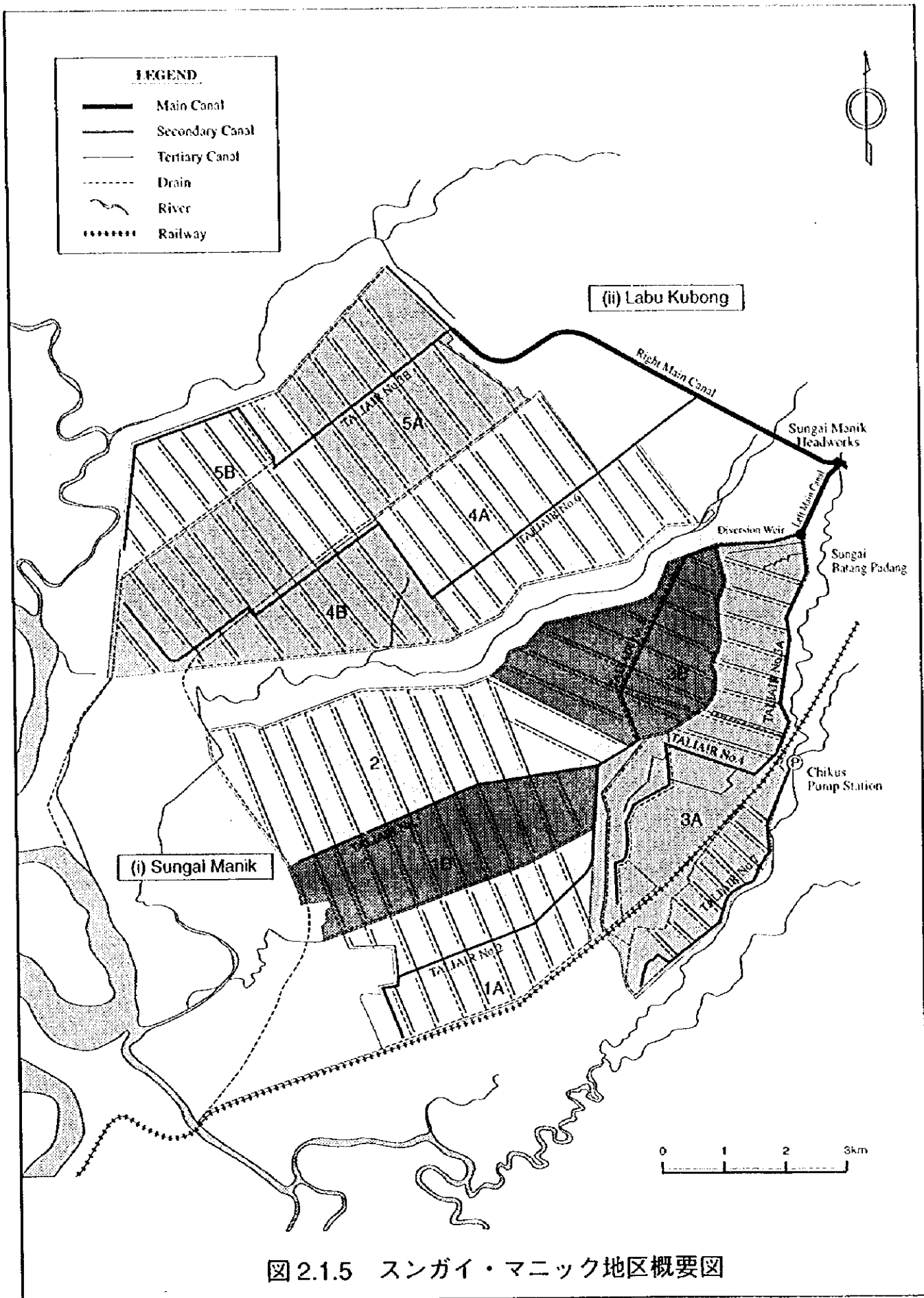


図 2.15 スンガイ・マニック地区概要図

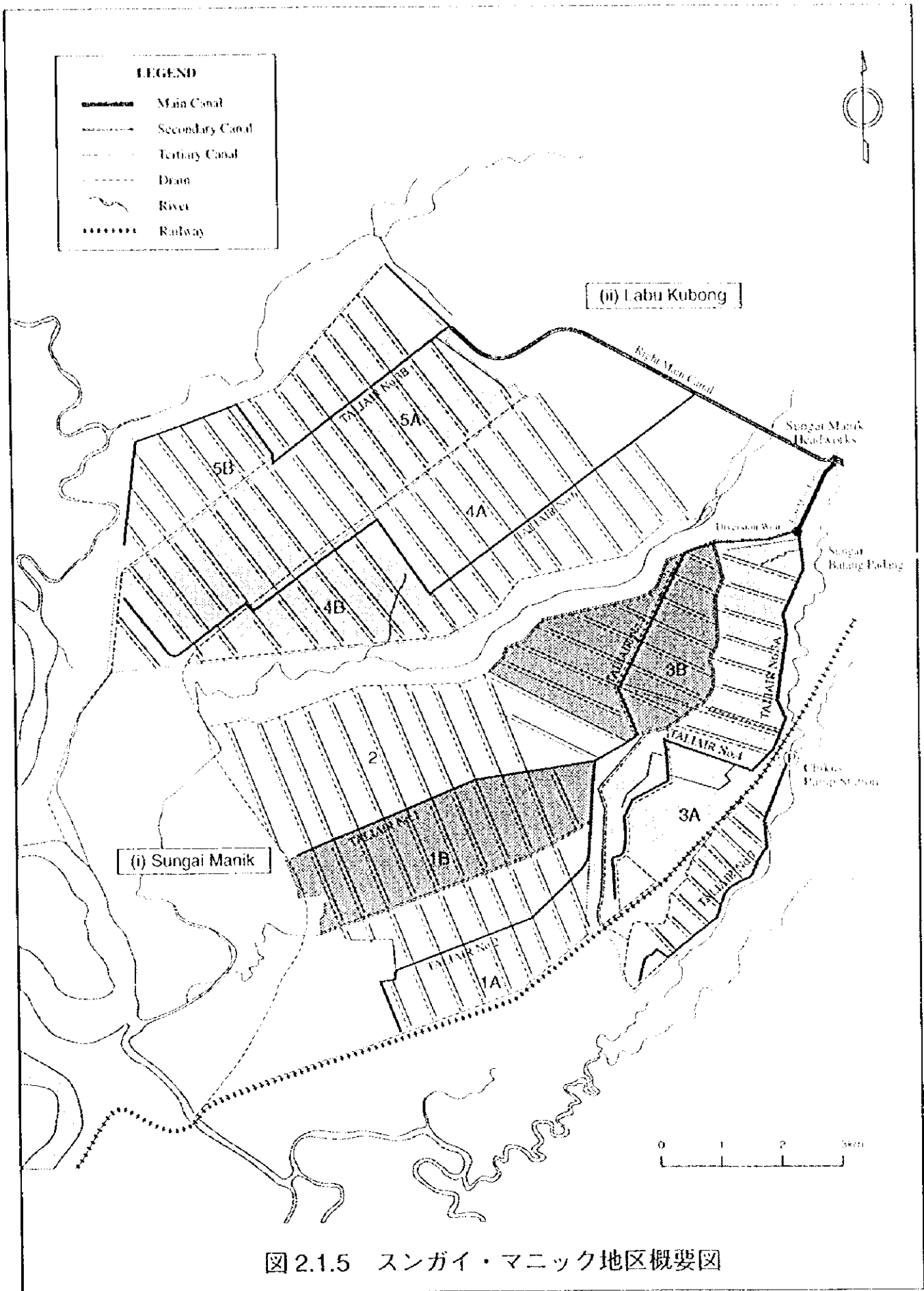


図 2.1.5 スンガイ・マニック地区概要図

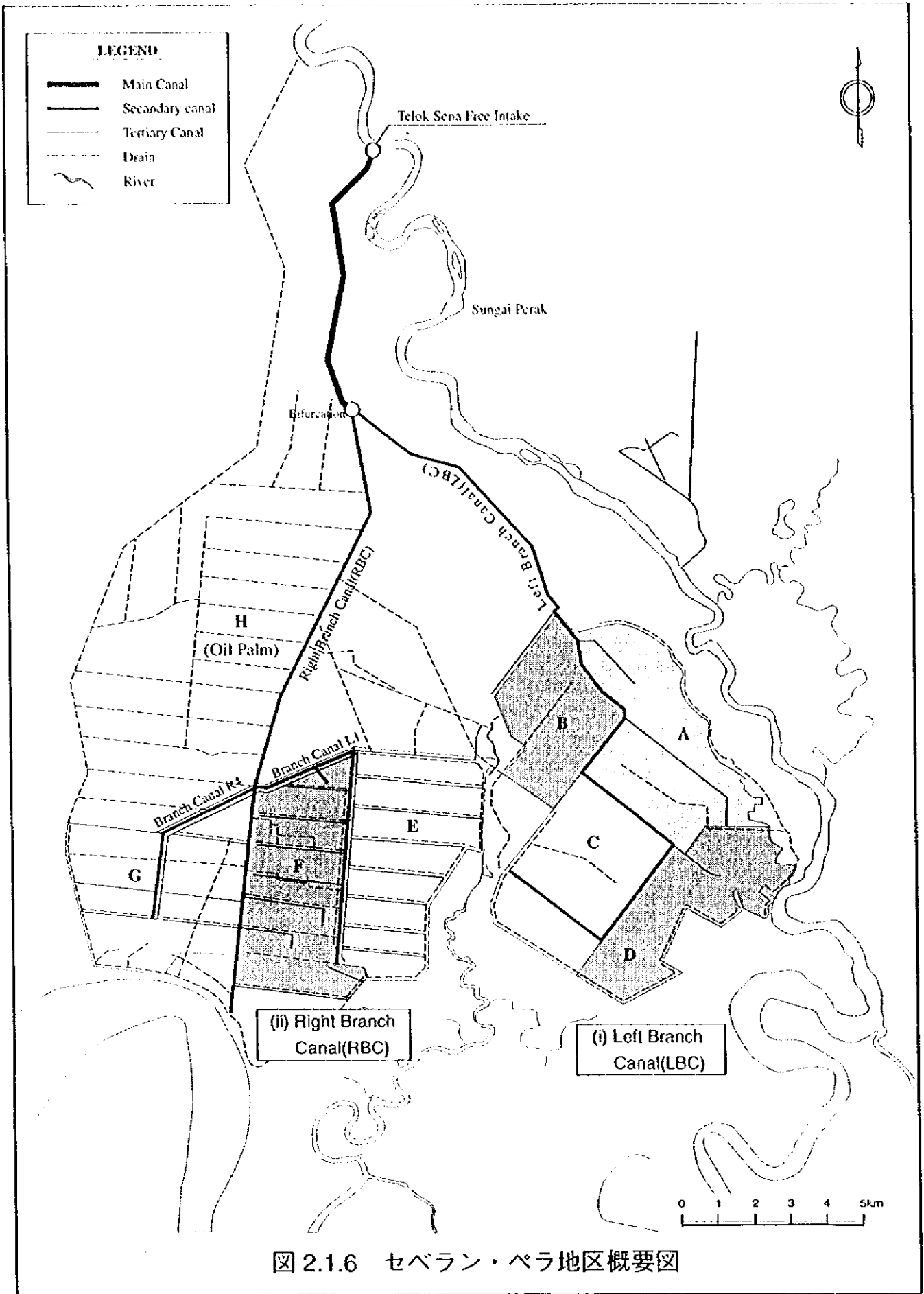


図 2.1.6 セベラン・ペラ地区概要図

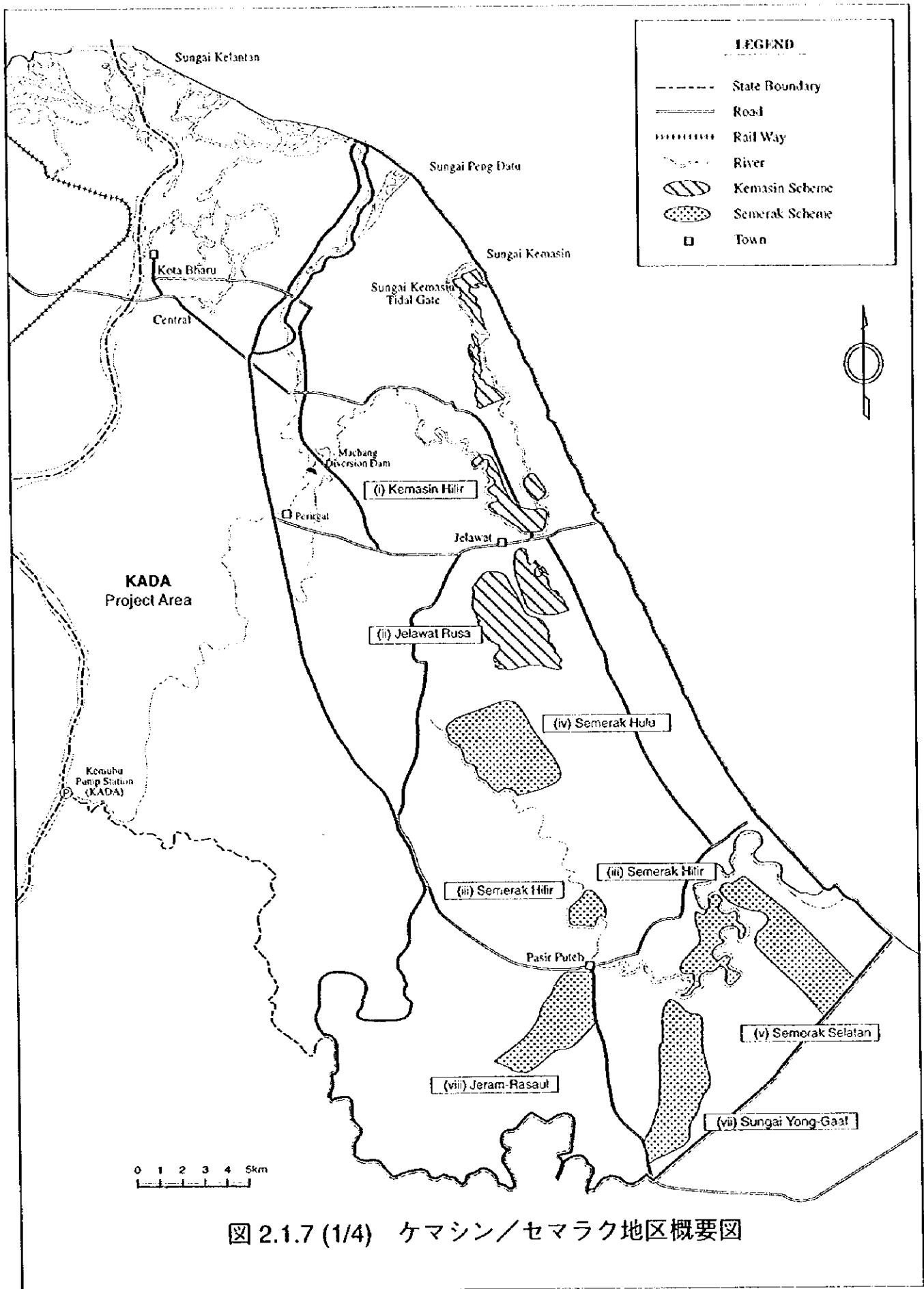


図 2.1.7 (1/4) ケマシシ/セマラク地区概要図

LEGEND

— Canal

Ⓟ Pump Station

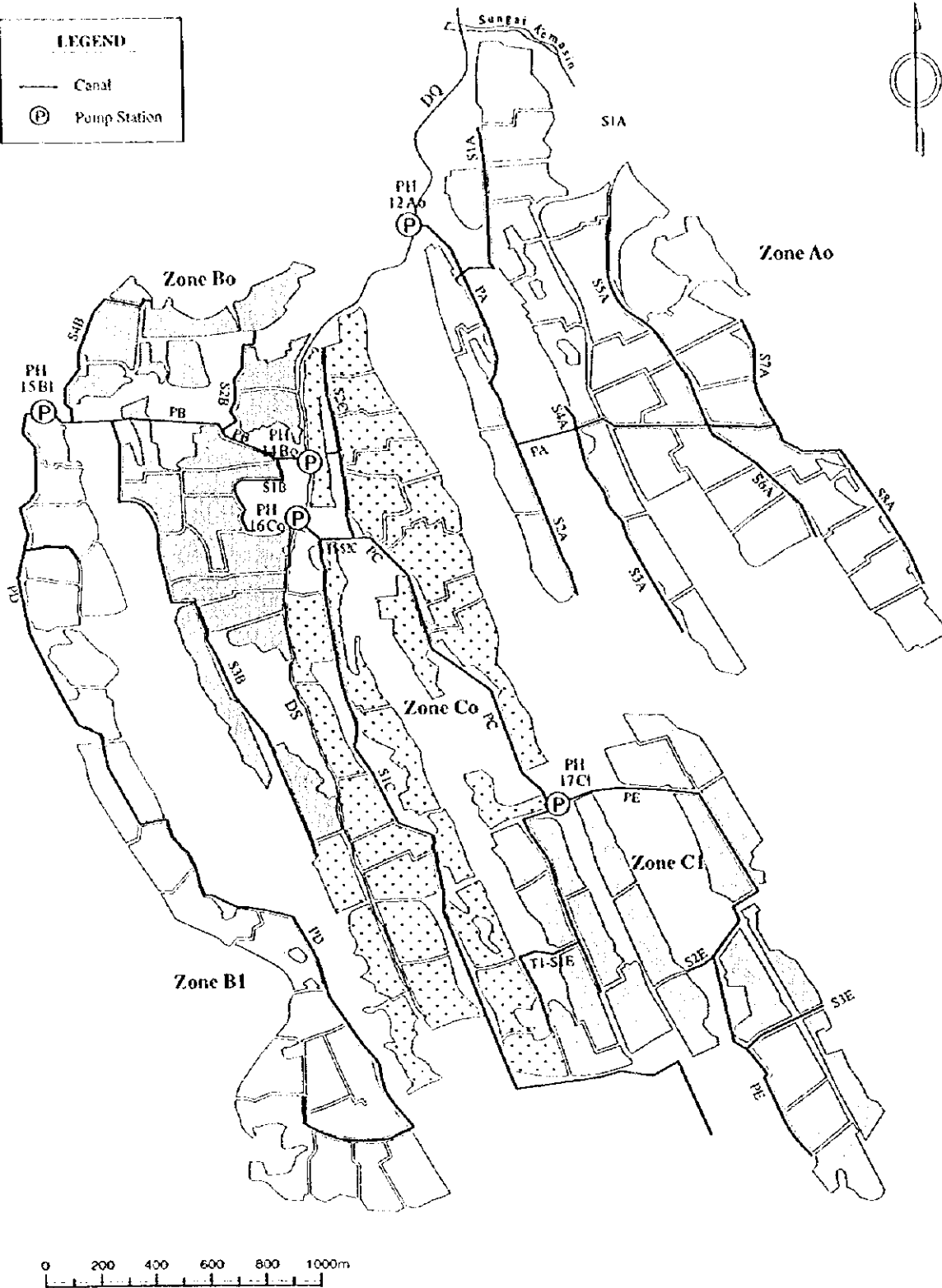
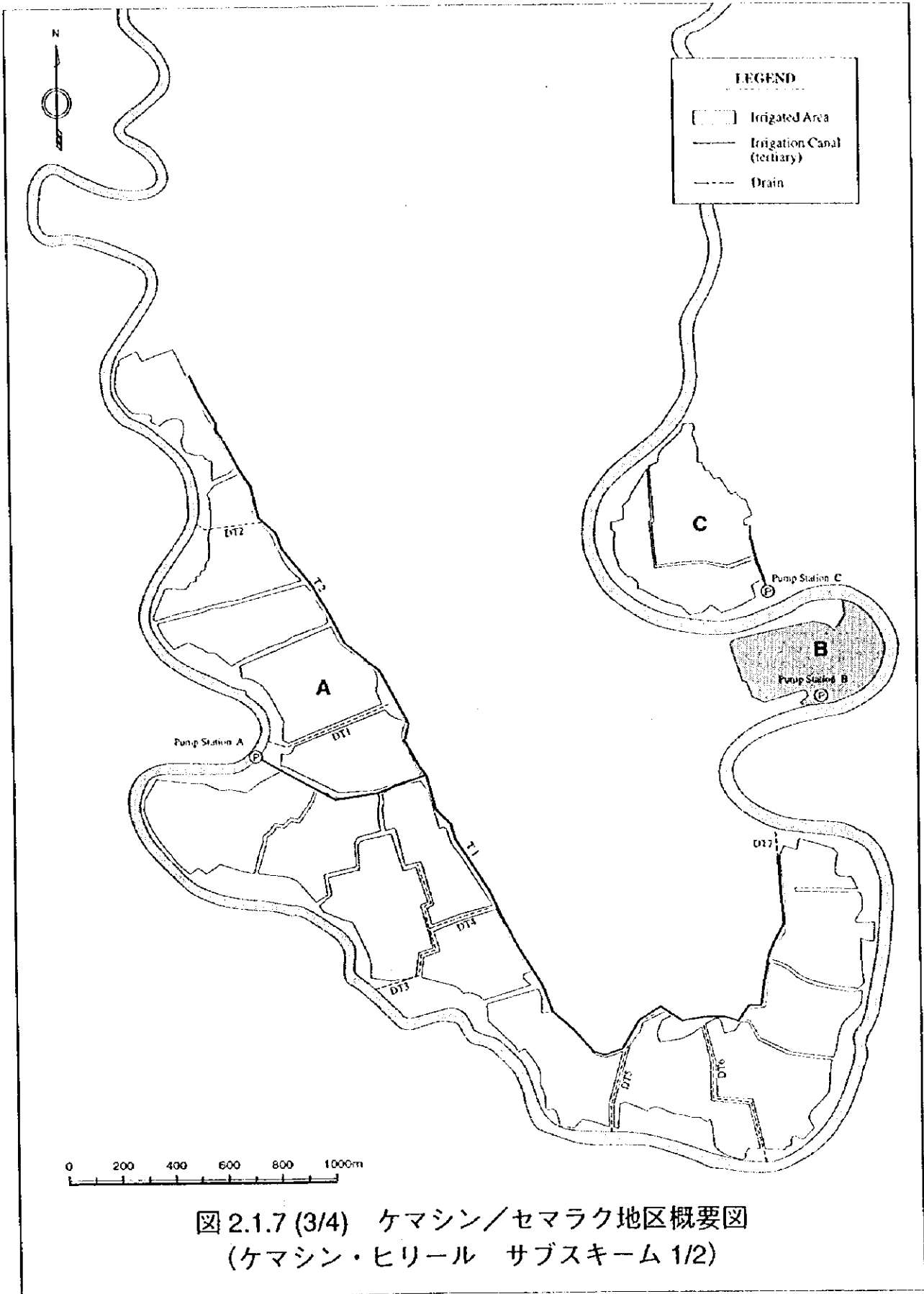
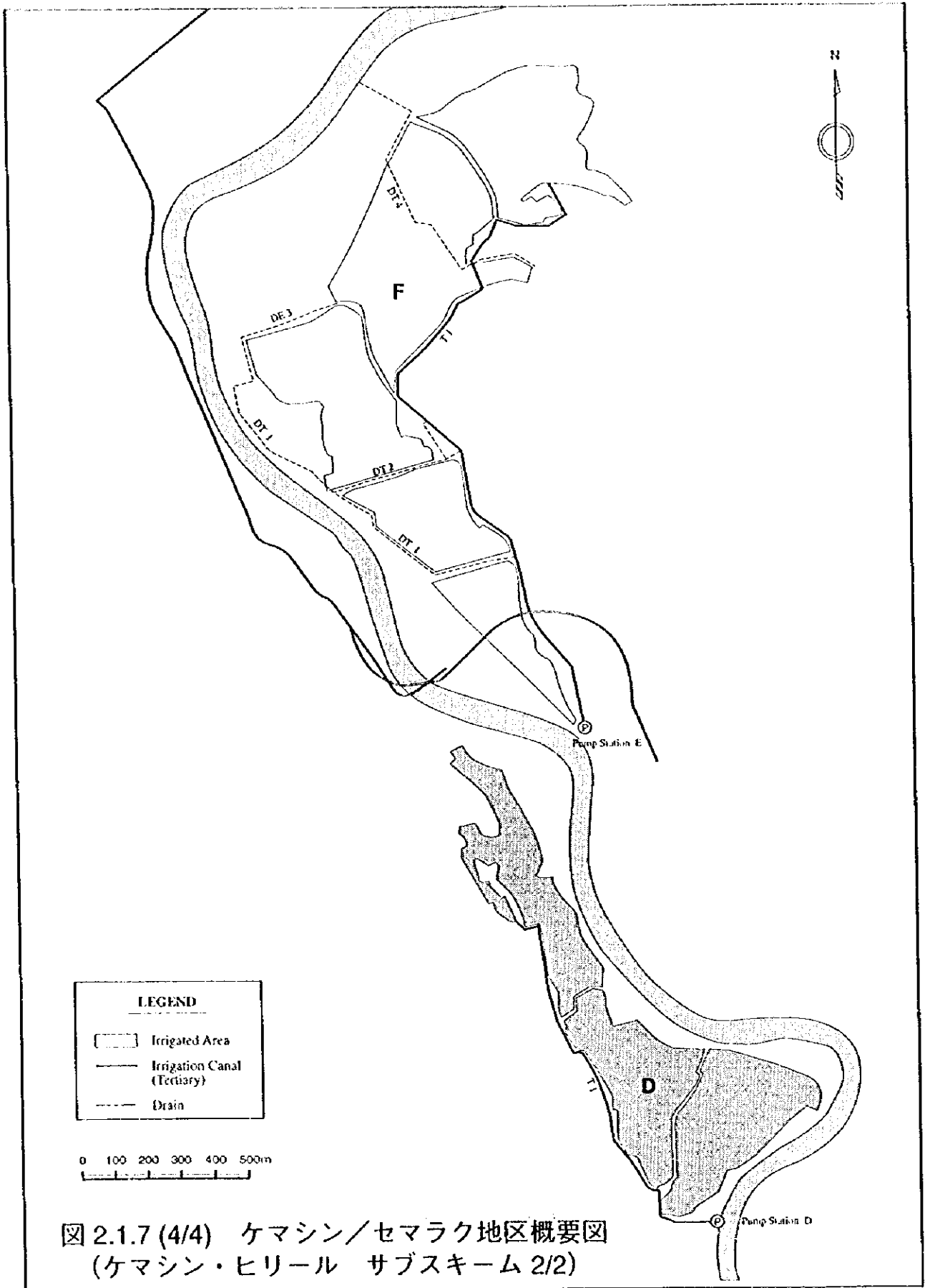


図 2.1.7 (2/4) ケマシン/セマラク地区概要図
(ジェラワット・ルサ サブスキーム)





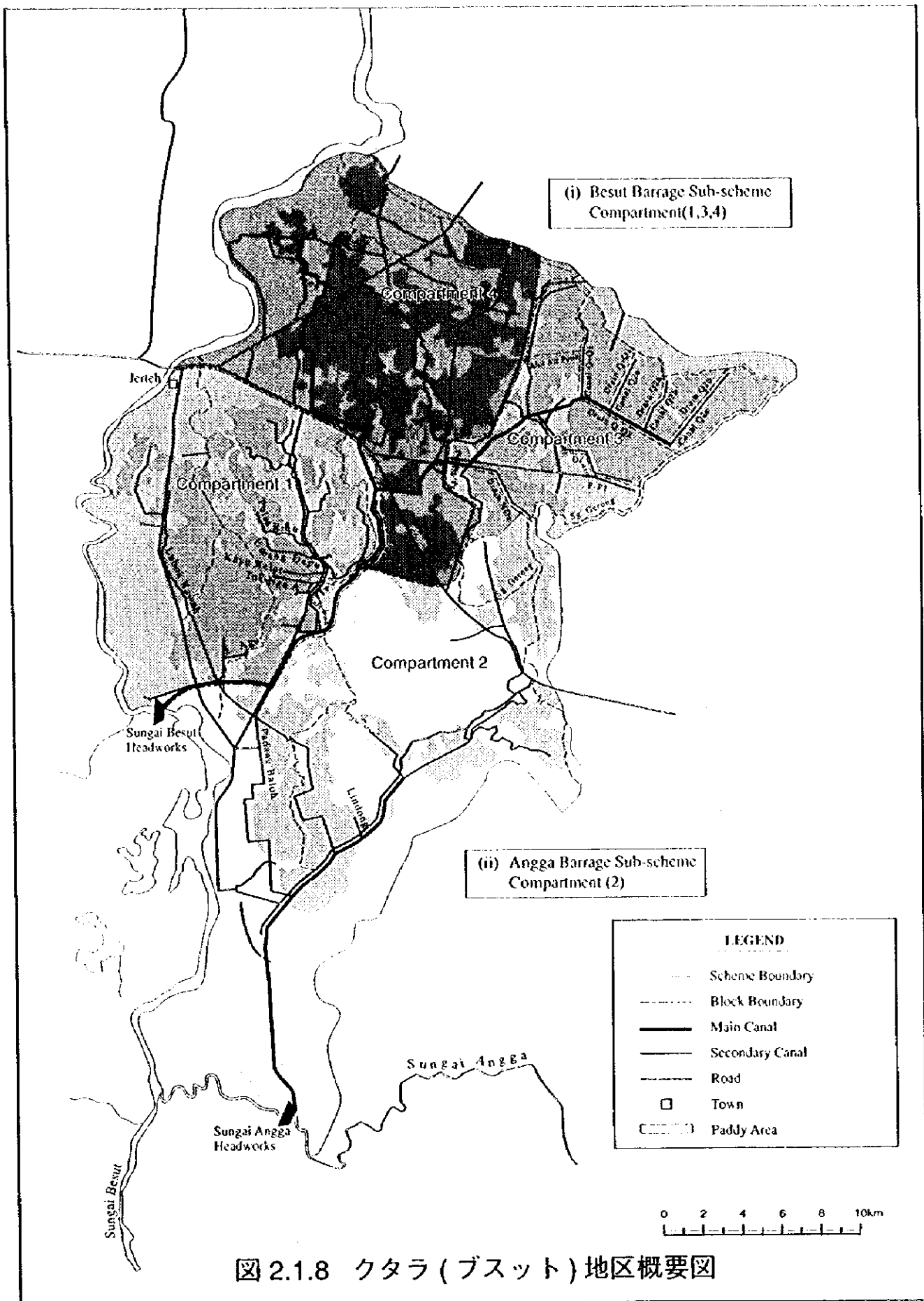
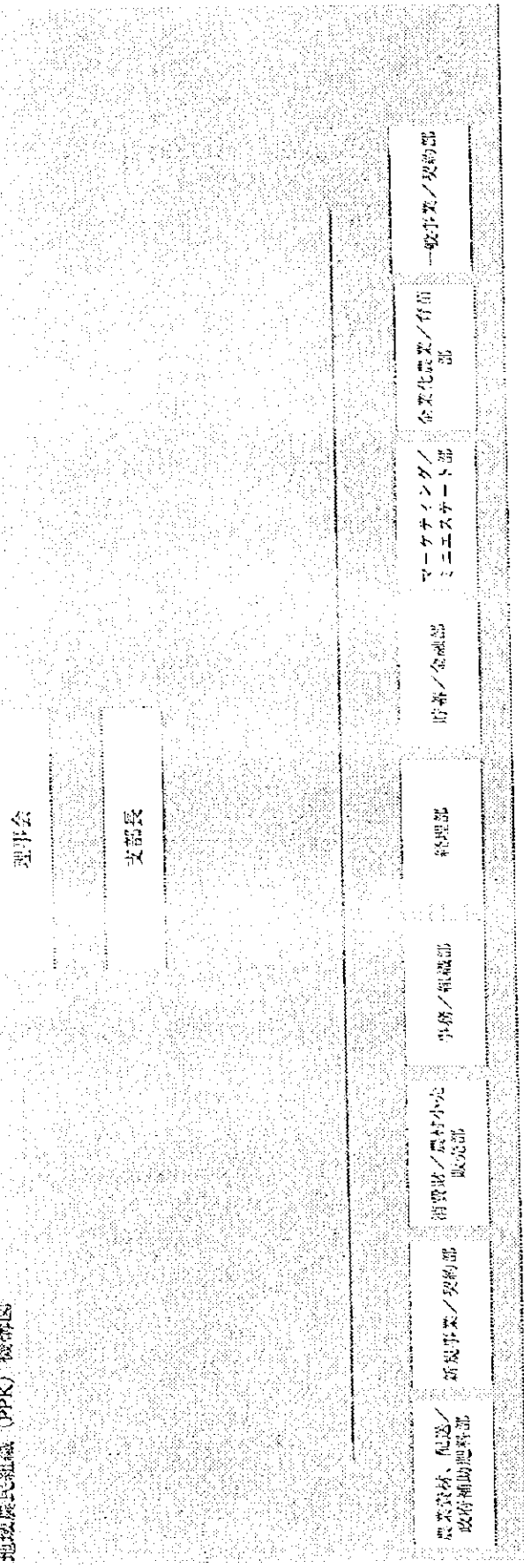
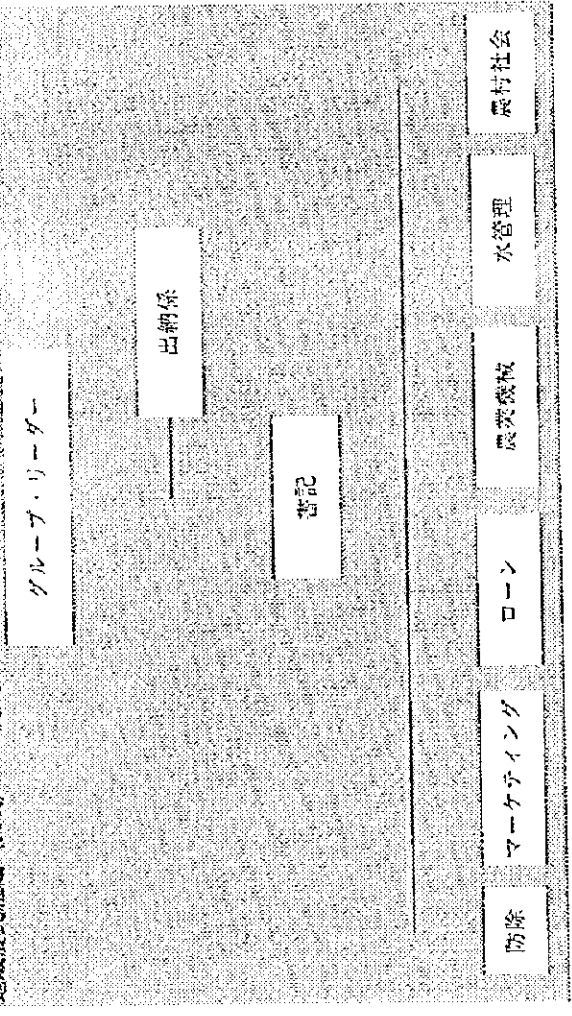


図 2.1.8 クタラ(ブスット)地区概要図

地域農民組織 (PPK) 機構図



地域農民組織 (PPK) 下の農民グループ機構図



DOA下の農民グループ機構図

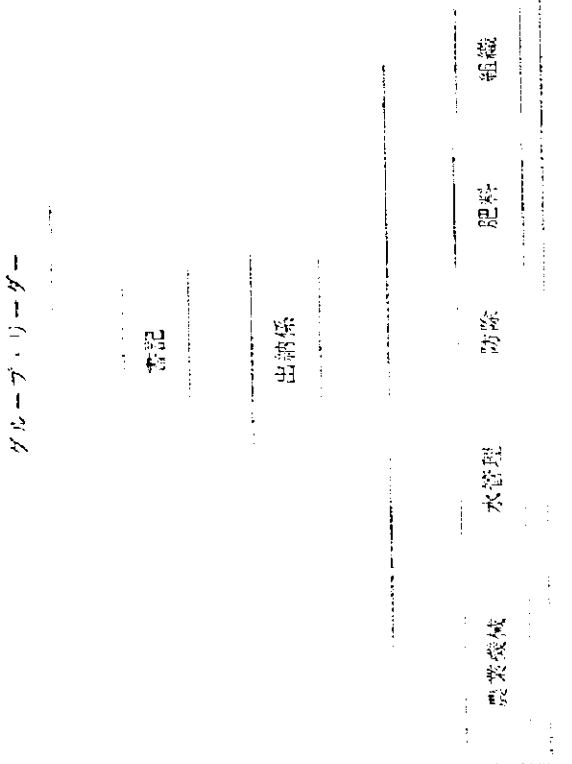


図2.1.9 地域農民組織 (PPK) 機構図

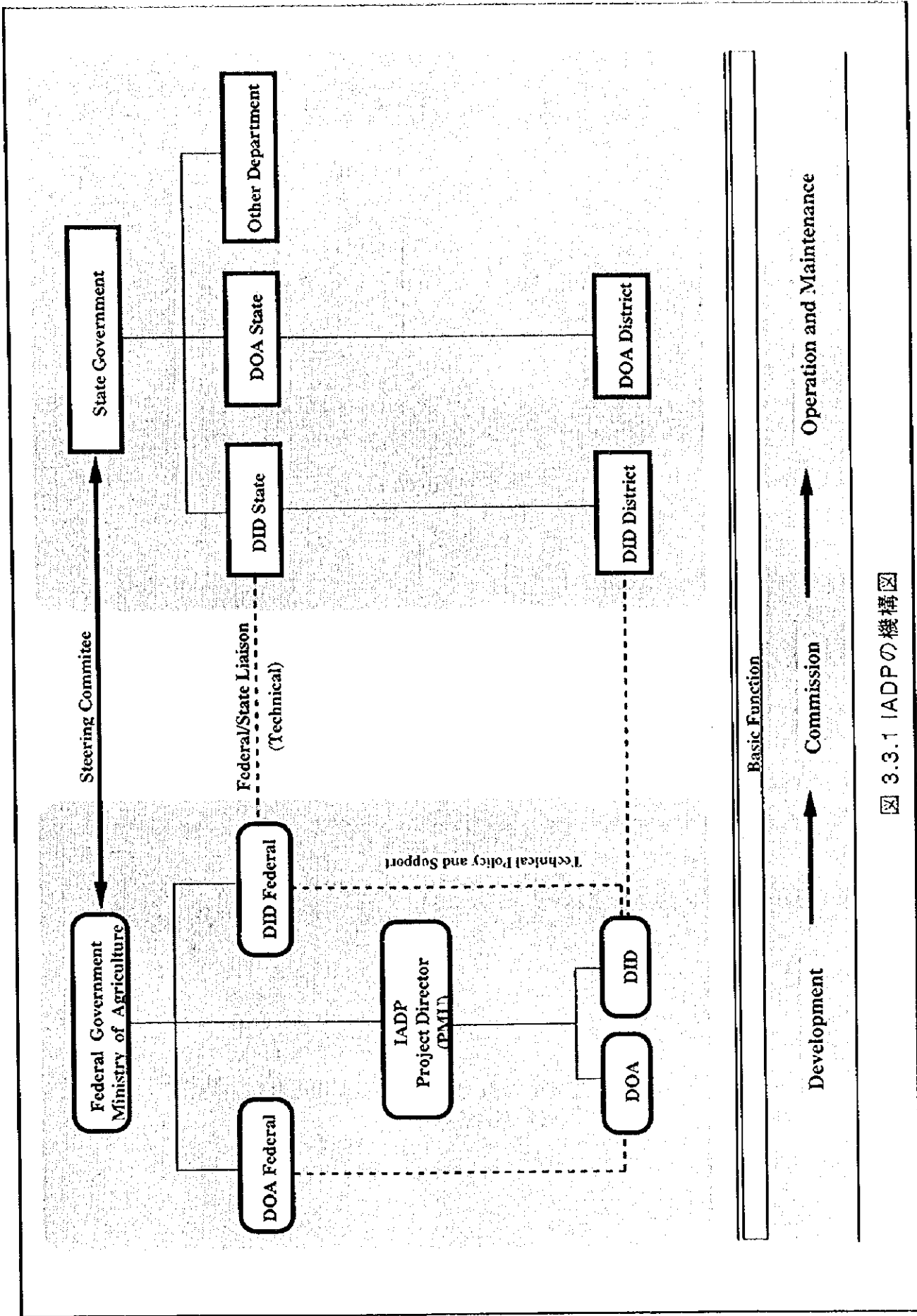


図 3.3.1 IADP の機構図