

D.3 INSTITUTION AND OPERATION & MAINTENANCE

CENTRAL STAFF OF THE GENERAL DIRECTORATE OF IRRIGATION METEOROLOGY AND HYDROLOGY

Table D.3.1

24/4/96	MASTER			ENGINEER			TECHNICIAN			VOCATIONAL			STAFF QUALIFIED			NON QUALIFIED			EFFECTIVE			
	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	M	W	TOTAL	
OFFICE																						
ADMINISTRATION			0	4		4						2	2		1	1	17	11	28	21	14	35
ORGANISATION			0	2		2		2	1	1	2					0	4	1	5	7	4	11
PLANNING			0	4	2	6	4	2	6	1	1	2				0	8	3	11	17	8	25
ACCOUNTING			0		1	1	5	2	7	1	1	1				0	18	9	27	24	12	36
DESIGN	1		1	64	1	65	55	21	76	2	2				1	1	29	7	36	151	30	181
CONSTRUCTION			0	39		39	50	17	67	5	4	9	8	5	13	168	4	172	270	30		300
WATER MANAGMT.			0	31	1	32	44	1	45	2	2	4	4		4	67	0	67	148	4		152
HYDRO-METEO			0	6	5	11	28	7	35	5	1	6	1		1	19	9	28	59	22		81
TOTAL	1	0	1	150	10	160	186	52	238	17	11	28	13	7	20	330	44	374	697	124		821
%	0.1	0.0	0.1	18.3	1.2	19.5	22.7	6.3	29.0	2.1	1.3	3.4	1.6	0.9	2.4	40.2	5.4	45.6	84.9	15.1		100.0

Source : Central Office in GDMH

Table D.3.2 Equipment List at Construction Office ,GDIMH

Item No.	Equipment Name	Type	Quantity	Remarks
1	Trailer Kraz plate forme	Russian made	3	
2	Truck 7ton KAMAZ Benne HINO FUSO MITSUBISHI KAMAZ Transport NISSAN	Russian made KB402 FP318FD FP418F Russian made CPC 14E	9 3 3 7 2 6	-one is breakdown -one is breakdown -one is breakdown
3	TRUCK CRANE NISSAN FUSO ISUZU	CPC14K & 14H FK115F 1275717	2 1 1	
4	OTHER TRUCK		11	
	SUB TOTAL		48	
5	BULLDOZER Komatsu Caterpillar RUSSLAN SUB TOTAL	D53P-16 D5HLGP T170-40, Etc.	7 2 10 19	-four are breakdown
6	EXCAVATOR MITSUBISHI Komatsu Catepillar MASSEYFERGUSON RUSSLAN Scrapeur automateure SUB TOTAL	- - 2d100774 - - -	5 1 2 3 4 2 17	-all breakdown
7	FRONT LOADER Komatsu Caterpillar RUSSLAN SUB TOTAL	- - - -	3 1 2 6	
8	Grader	-	3	
9	TIRE ROLLER Sakai Komatsu SUB TOTAL		3 1 4	
10	VIBRATER ROLLER	BOMAG	3	
11	METAL ROLLAR	RUSSLAN	2	-one is breakdown
12	CONCRET MIXER JAPAN RUSSAN SUB TOTAL	1.0 CU.M 0.5 CU.M	2 4 6	
	TOTAL		108	-10 are breakdown

Source ; Obtained from the Construction Office in GDIMH

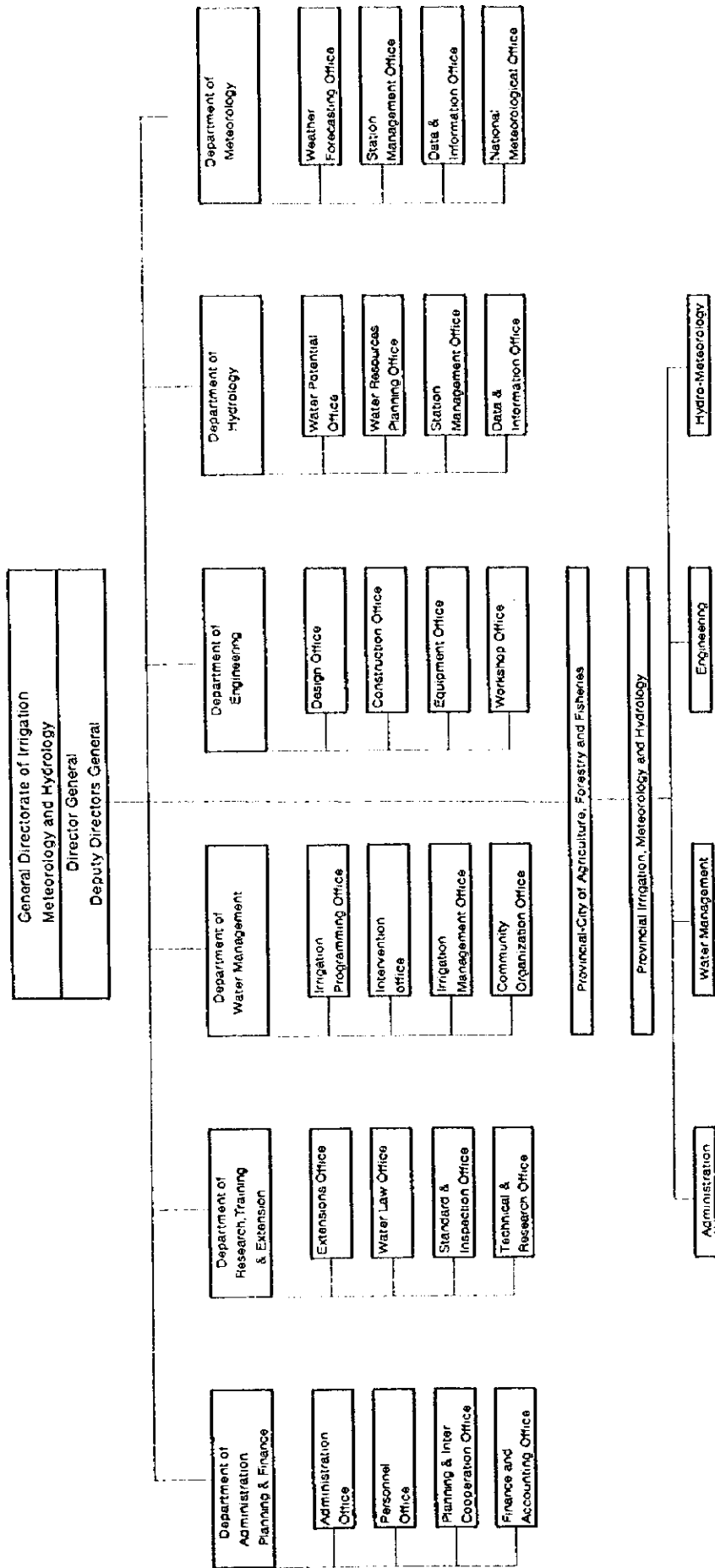


Figure D.3.1 Organization Chart of the General Directorate of Irrigation, Meteorology and Hydrology

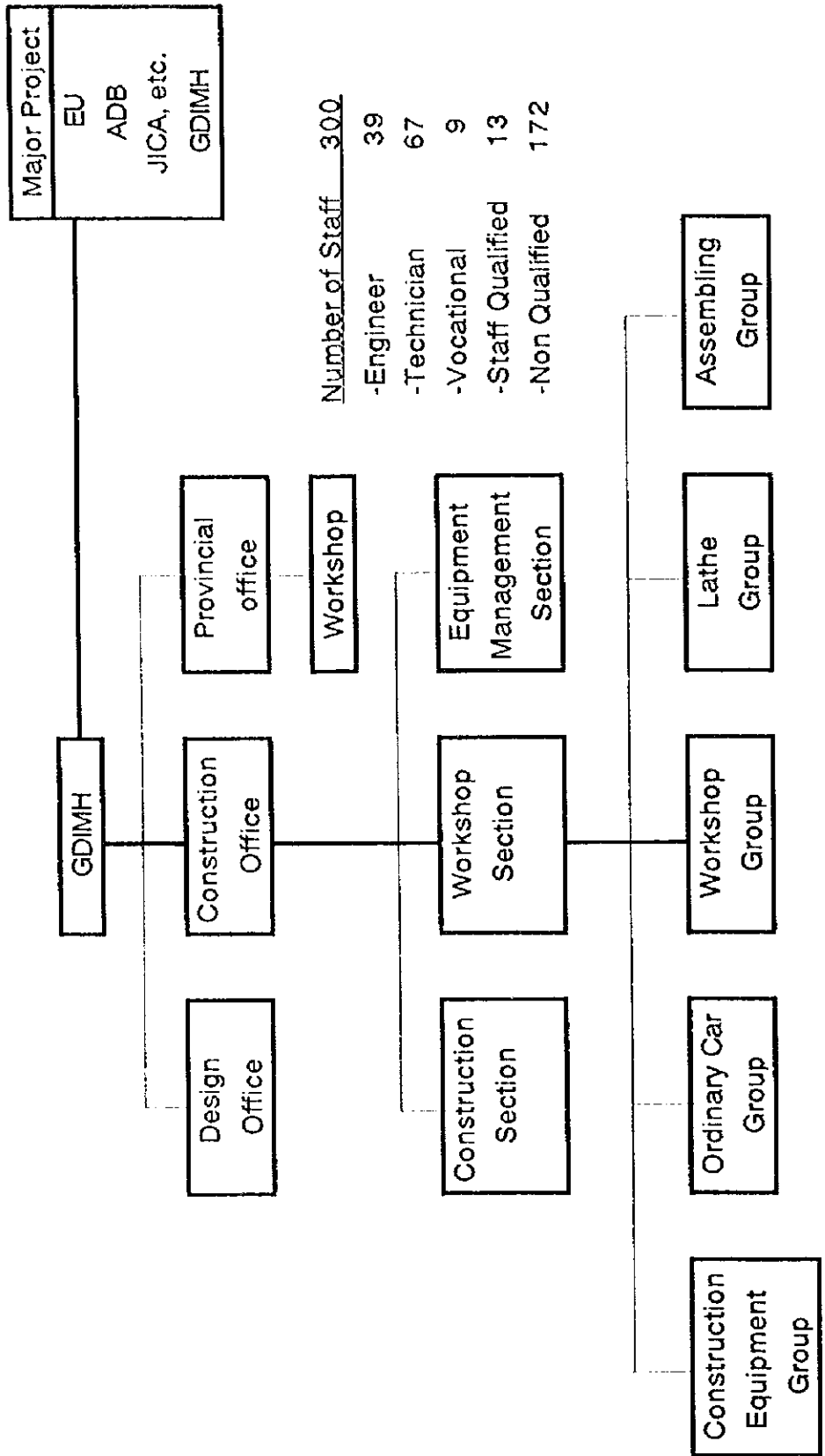
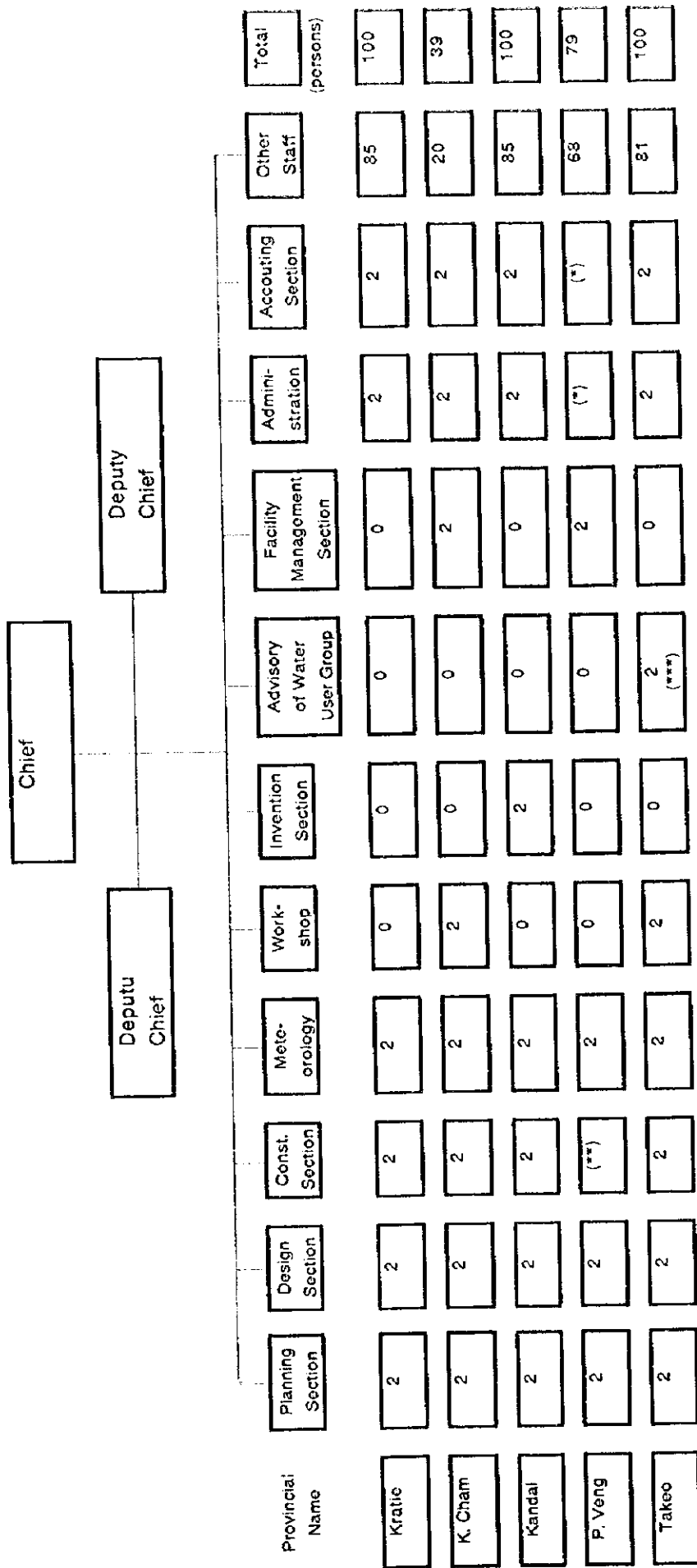


Figure D.3.2 Organization Chart of Construction Office of GDIMH



Note ; Chief of planning section is in charge of section (*)

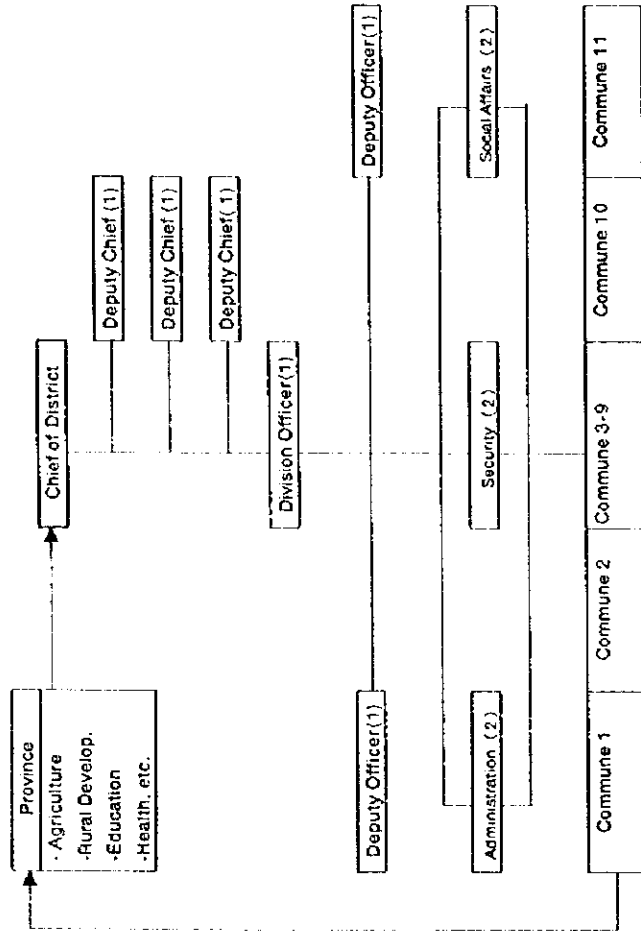
Chief of design section is in charge of section (**)

*** ; Water user groups are organized at Thnot Te reservoir rehabilitation project and Agricultural Development and Research Center by Agronomy Department

Source : Department of GDMH at each Provincial Governor office

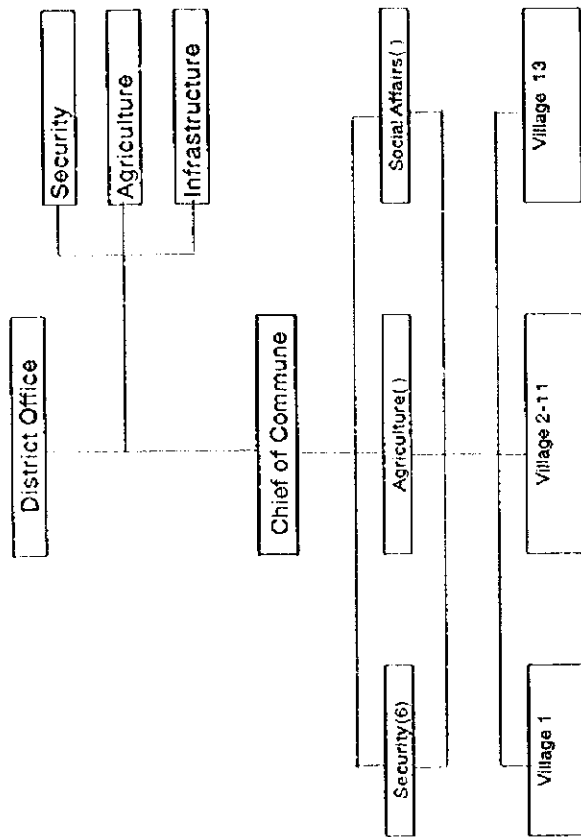
Organization of Provincial GDMH Office

Figure D.3.3



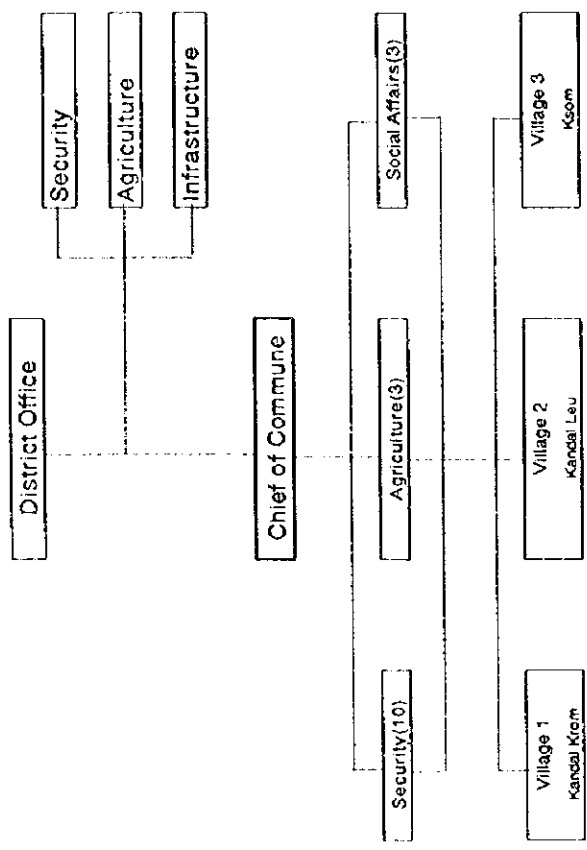
- Note :
- (1) Staff of District Office is 12 persons and control 11 communes.
 - (2) Monthly salary of all staff amounts to 600,000Riels.
 - (3) Chief of commune request a construction/rehabilitation of rural infrastructure to provincial office directly.

Figure D.3.4 Organization of the Kho Thom District, Kandal Province



- Note:
- Security(6) : Number of staff
 - Chief of Commune is appointed by Kandal Province ,the Ministry of Interior
 - Salary : Chief of Commune(30,000Riels/mon. ≈\$12.0), Others (27,000/mon. ≈\$10.0)
 - District has a responsibility of gate operation.
 - Due to inadequate structure of gate, villagers make a dike behind the gate until middle of Aug. to protect the paddy and plantation land from flood water after that to introduce the flood to the field, the dike is demolished in middle of Aug. every year.
 - To construct the dike, chief of commune collect 1,300Riels from each farmer.
 - Due to lack of budget, no infrastructure facility construct and no NGO activity.

Figure D.3.5 Organization of the Prek Thmei Commune, Koh Thom District, Kandal



- Note:
- Security(10) : Number of staff
 - Chief of Commune is appointed by Kandal Province ,the Ministry of Interior
 - Salary : Chief of Commune(30,000Riels/mon. ≈u\$12.0), Agriculture(25,000/mon. ≈u\$10.0)
 - District has a responsibility of gate operation.
 - Due to inadequate structure of gate, villagers make a dike behind the gate until middle of Aug. to protect the paddy and plantation land from flood water after that to introduce the flood to the field, the dike is demolished in middle of Aug.
 - The cost of the dike construction is estimated at 350,000riels and beneficiaries pay.
 - Construction cost for rural infrastructure such as road, public facilities are donated by NGO(CWS, Rural Credit Organization, WB)

FigureD.3.6 Organization of the Bontey Dek Commune(Prek Poi), Kean Svay District, Kandal

D.4 PRIORITY PROJECT

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D.4.1 Summary of the Priority Project

Summary of the priority project is described as below

1. Boeng Veam Area Agricultural Development Project

(1) Location

Boeng Veam area is situated in Koh Sotin and Srey Santhel district, Kampong Cham province, in the left bank of the Mekong river and about 40km east of Kampong Cham PC.

(2) Summary

At present there are 5 colmatage canals and the intake structures, constructed during Pol Pot regime, are too old for use. The area is usually inundated in the wet season because some portions of the dike crest is lower than the flood water level. According to the LANDSAT image in December 1994, about 30 % of the area is inundated to a depth of 0-30cm and 50 % to a depth of 1-2m. The lakes in the center, with depth of more than 3m, occupy about 20 % of the area. There is no existing irrigation system of more than 10 ha. The farmers start to cultivate the recession crops and upland crops from mid November. With the purpose to improve cropping to ensure food security and to lift the level of rural life, the central GDMH has given the first priority to develop agriculture, in harmonious with fishery development in the area. The water source is the Mekong river and Tonle Toch river.

(3) Project component

- a. Construction of the flood protection dike along the Mekong river, L= 27 km
- b. Rehabilitation of the colmatage canals and intake facilities
- c. Plan for new canal systems
- d. Plan for reservoirs use.
- e. Plan for intake facilities in the dry season
- f. Land use and water availability study

2. Prek Pour Canal Irrigation System Rehabilitation Project

(1) Location

Prek Pour canal is located in Prek Pour commune, Srey Sonthor district, Kampong Cham. The

area is located in the left bank of the Mekong river close to the Boeng Veam Area Agricultural Development and northwest of Kompong Cham PC.

(2) Summary

The canal was constructed during Pol Pot regime. After Pol Pot regime 3 sets of pump, with capacity of 700 l/hour and diameter of pipe 250 mm, were donated by the Australian Government. But they are now seriously damaged and out of function due to the lack of O&M fee. The canal is 7km long with 6 check gates. At present the bottom elevation at entrance of the canal is lower than that at end of the canal and the bottom elevation of the canal is higher than the water level of the Mekong river in dry season. The water source is mainly from Mekong river and some parts of the area take water from Tonle Toch. At present, the access to the site is difficult because the surface and slope of the road have been damaged by rain or flood water. Kampong Cham provincial GDJMH has given the first priority to rehabilitate the area because the farmers are more active in cultivation than other areas in Kampong Cham. With rehabilitation, the irrigable area can be extended up to 3,000 ha in the wet season and 1,500 ha in the dry season. 200 ha of the area has already been developed by water users group with assistance from the NGOs.

(3) Project components

- a. Canal rehabilitation, L=7km, and plan for secondary canal system
- b. Pumping station installation
- c. Check gate structures construction
- d. Land use and water availability study

3. Pday Chum Flood Dam Irrigation Project

(1) Location

Cheung Prey district, Kampong Cham Province, The area is located along the National Road No.7 and about 70 km. north of Phnom Penh.

(2) Summary

Phdauv Chum dike was initially constructed during French regime. Additional dike was constructed during Pol Pot regime which protected about 3,000 ha of the wet season paddy fields from the flood. Due to old facilities and poor compaction of the embankment, the crest of dam and slope of the embankment were eroded at many places by flood water in 1994. In order to enhance the irrigation area, a new flood protection dike has been planed. After

construction of the dike, about 4,000 ha of area could be irrigated in the wet season. The provincial GDIMH gives the first priority to develop this area.

(3) Project Component

- a. Construction of new dike, L=13.5 km
- b. Construction of new reservoir dike, L=11.0 km
- c. Intake gates, 3 sets and outlet gates, 10 sets
- d. Irrigation & Drainage Plan
- e. Main canals, L=28 km

4. O Chrey Flood Dam Irrigation Project

(1) Location

The Project area is located in Batheay district, Kampong Cham province along the National Road No.6 and about 70km northeast of Kampong Cham PC.

(2) Summary

The area is always inundated during flood period from September to the end of October, with depth varying from 1.6 to 2.0m. The main water source is Mekong river through National Road No.6 bridge. The farmers usually plant paddy from May to September and some areas are planted to the recession crops from November to April. All of the facilities were constructed during Pol Pot regime and are too old for use. The irrigation area at present is 800 ha and after development, it can irrigated up to 1,500 ha. There is an existing protection dike, L=4 km, which is damaged and it is necessarily to build a new one.

(3) Project component

- a. Construction of protection dike, L= 8.5 km
- b. Construction of reservoir dike, L=2.5 km
- c. Intake gates construction, 6 sets
- d. Canal construction, L=19 km

5. Tamouk Reservoir Area Agricultural Development Project

(1) Location

Ponhea Leu District, Kandal Province, the area is located 12 km north of Phnom Penh along the National Road No.5

(2) Summary

The area is about 10,000 ha and farming consists of flood recession rice, dry season and wet season cropping. There is a fishing lot (No. 14) upstream of the Samrong reservoir. The main source of water for the project area is Tamouk reservoir which is filled during the wet season by the Tonle Sap flood water. Water from the Tonle Sap flows into Tamouk reservoir through its eastern gate, Prek Phnou Regulator. The gates consists of 11 bay structures with wooden lifting gates. The gates are in bad conditions and the wings are in dangerous situations, all needing urgent repair. The irrigated land extending to the north is served by a number of outlets and main canals from the reservoirs. The main canals are silted and the slopes are eroded heavily by rain. There is no secondary or tertiary canal. GDIMH has given the first priority to develop agriculture as well as fishery.

From the flooding in October, 1996, the following facts became clear.

- The waves overtopping at the west side of the Pol Pot dike are caused by the heavy northeast wind. Protection of the outer slope of dike as well as increasing the height of dike are urgently required.
- The dike located in eastern side of the Tamouk reservoir protects Phnom Penh urban area from flood but water level in the reservoir almost reached to the crest of dike. It is therefore necessary to increase the height of dike by more than 1 meter urgently.

(3) Project Component

A feasibility study for the proposed area is necessary and the main components of the study area are shown as below.

- a. Topographical survey, about 20,000 ha
- b. Repair of the Prek Phnou regulator, etc. 3 sets
- c. Rehabilitation of flood protection dike, L=6 km
- d. Rehabilitation of Pol Pot Dike, L=7 km, and construction of slope protection, L=3 km
- e. Water availability study in Tamouk and Samrong reservoirs
- f. Agriculture and fishery development study
- g. Plan for rehabilitation and construction of canal systems, L=8 km
- h. Construction of a new dike for demarcation between agriculture and fishery, L=18 km
- i. Rural infrastructure development plan

j. Cost estimation and implementation schedule

6. Boeng Thom Area Agricultural Development Project

(1) Location

Boeng Thom area is located in Kean Svay district Kandal province, between the Mekong and Bassac rivers. This area is about 15 km from Phnom Penh by National Road No. 1.

(2) Summary

All of the irrigation facilities were constructed during Pol Pot regime. Except for the existing dike between the Bassac and Mekong rivers, all of the facilities, the road from the National Road No.1 to the Bassac river only was rehabilitated by Hun Sen fund in 1994. The purpose of the project is to enhance wet and dry season agricultural production. In order to achieve the purpose, rehabilitation of the Done Saor dike in the Boeng Thom reservoir and the existing irrigation systems are indispensable. At present farmers in and around the reservoir area practice recession cropping from December and they wish to drain water through the colmatage canal to the Mekong river. On the other hand, the farmers in the downstream of the Boeng Thom reservoir wish to cultivate the dry season crops from February using water in the reservoir. The conflicts between them arise mainly from the differences in water utilization. To resolve the conflicts and to increase agricultural production, the necessity of a feasibility study for the area is strongly felt by GDMH.

(3) Project components

- a. Topographic survey, about 20,000 ha
- b. Repairing existing dike (Done Sar dike), L=4 km
- c. Reconstruction of intake gates along the Hun Sen dike, 4 sets
- d. Reconstruction of 4 canal systems
- e. Rehabilitation of 7 colmatage, including 7 gate structures along the Bassac river
- f. Land use study
- g. Water availability study in the reservoir
- h. Cost estimation and the implementation plan

7. Chhey Thom Area Agriculture Development Project

(1) Location

Chhey Thom Irrigation Project is located in Roca Chun Loeng commune, Ksach Kandal

district, Kandal Province. The Project area is in the left bank of the Mekong river and about 40 km northeast of the Phnom Penh.

(2) Summary

The Project area had a pumping station and other canal systems, including two main canals which were constructed during Pol Pot regime, but they were destroyed in 1978. Each of the main canal is 7km long. In 1976, the pumping station had a capacity to irrigate over 4,000 ha of the paddy in wet season. Due to the recent flood in 1991, almost all of the canals and structures were damaged. With rehabilitation and extension of the existing irrigation facilities, the potentiality of the irrigation is estimated at around 5,000 ha. The water source is the Tonle Toch. Because fishing lot No.18 is in the area, harmony between agricultural and fishery development plan should be taken into consideration. The provincial GDIMH has given the first priority to rehabilitate and extend the project.

(3) Project components

- a. Topographic survey, 20,000 ha
- b. Plan for flood protection dike at upstream of the area, L=13 km
- c. To study the adequate intake method such as pump or gravity by headwork from the Tonle Toch
- d. Land use plan
- e. Rehabilitation and extension of the main and secondary canals and ancillary structures, main canals L=14 km, secondary canals L=50 km
- f. Cost estimation and implementation plan

8. Maleach Krobeykon Area Agricultural Development Project

(1) Location

The project area is located at Chroy Takeo and Chheu Khmao communes in Kho Thom district, Kandal province, in the right bank of the Bassac river.

(2) Summary

The irrigation system covers over 4,000 ha of cultivable area and consist of about 25km reservoir dike and several water gate structures constructed during Pol Pot regime and colmatage canals. Due to the flood disaster in 1993, the dike and almost all of the structures were seriously destroyed. In the area is found 10 colmatage canals, all of which need to be dredged and the side slopes of canal repaired. At present, 844 ha of recession rice is cultivated.

With rehabilitation of the existing facilities, about 4,000 ha of dry season cropping can be irrigated. Since fishing lot No.10 is in the area, agricultural and fishery development plan should be considered together. The provincial GDIMH office has requested to rehabilitate and extend this irrigation systems.

(3) Project Components

- a. Topographic survey
- b. Rehabilitation of dike, L=25 km, gate structures 8 places
- c. Re-excavation of main canal systems, L=27 km
- d. Study of the water availability in the reservoir
- e. Irrigation and drainage plan
- f. Rehabilitation of 10 colmatage canals
- g. Cost estimation and implementation plan

9. Boeng Phtea Area Small Pump Irrigation Project

(1) Location

The project area is located in Ksach Kandal district, Kandal province along the Mekong river and about 25km northeast from Phnom Penh.

(2) Summary

There are two reservoirs, Boeng Veal Sannap and Boeng Phtea, in the area. In the dry season, water flows from Boeng Veal Sannap to Boeng Phtea through the existing river which is shallow, and water is not enough to supply for the dry season crops at Boeng Phtea area. According to the LANDSAT image in December 1994, water depth at both of the reservoirs is more than 3.0 m. As for the Boeng Phtea, 12 MCM of stored water is available for the domestic water and irrigation. At present there are 12 irrigation systems, all of which were constructed during Pol Pot regime or earlier. Small scale and recession cropping is practiced. Farmers mainly use a combination of the gravity canal, traditional lifting and mobile pump for irrigation. Due to the damaged systems such as reservoir dike and canals, agricultural production is very low.

In order to develop agricultural production for the area in the dry season, repairing the reservoir dike and canals, dredging of the rivers and small pumps are necessary. Since fishing lots No. 17 and No.18 are in the area harmony between agricultural and fishery development plan should be considered.

(3) Project Components

- a. Topographic survey
- b. Repair of the Boeng Phtea reservoir dike
- c. Plan for river dredging
- d. Irrigation and drainage plan
- e. Land use plan
- f. Establishing a public bank for mobile pumps

10. Tasen Area Flood Dam Irrigation Project

(1) Location

Tasen Area is located in the Muk Kompol district Kandal province, along the national road No.6A. It is about 20 km from Phnom Penh.

(2) Summary

Tasen Area is fully inundated during mid August to the end of October. From early of November the farmers start to plant upland crops such as soy bean, chili, maize, bananas, etc. There is a swamp behind the area and the recession cropping is practicing from early January. Taben prek colmatage canal, having no water control facilities, extends from southeast to northwest in the project area. There are three reservoirs and two fishing lots (No. 12 and No.13) in the study area. The crests of dike are too low and the dikes are too old to protect from flood water. In order to develop the agriculture production in the area, rehabilitation or extension of the facilities are necessary and also cooperation with fishery development cannot be omitted.

(3) Project components

- a. Topographic survey, 2,000 ha
- b. Polder dike, L=13 km
- c. Construction of intake structures and canal systems, 3 sets and L=4 km
- d. Rehabilitation of colmatage system
- e. Water availability study of the reservoirs
- f. Land use plan
- g. Cost estimation and implementation plan

11. Sras Bram Beay Irrigation System Rehabilitation Project

(1) Location

Sras Bram Beay area is located in Poban commune, the Koh Thom district, Kandal province. It is about 35 km. from Phnom Penh and in the east bank of the Bassac river.

(2) Summary

Of the 1,900 families living in the area, almost all of them are farmers. They cultivate both upland crops and recession rice from the beginning of dry season. Irrigation facilities such as flood protection dike, main canals and ancillary facilities were constructed during Pol Pot regime. 14 colmatage canals from the Bassac river are connected to the area. At present almost all of the damaged facilities are out of function due to long neglect in the civil war. Comparing with the other districts in Kandal province, infrastructures are poorer and incomes are lower. The provincial GDIMH has a plan to rehabilitate and extend these facilities to develop agricultural production and raise the level of living standard. Fishing lot No.3 is in the area so harmony between agriculture and fishery development should be considered.

(3) Project components

- a. Rehabilitation and construction of Polder dike, L=10 km
- b. Construction of the intake structures and canal rehabilitation of 14 colmatage systems
- c. Construction of the intake structures along the reservoir dike, 14 in total
- d. Rehabilitation of existing canal systems, L=18 km
- e. Plan for new irrigation canals and ancillary facilities, L=7 km
- f. Land use study
- g. Fishery development plan
- h. Cost estimation and implementation plan

12. Boeng Pring Area Small Pump Irrigation Project

(1) Location

The project area is located at Baphnom district, Prey Veng province. It is about 20km northeast of Prey Veng PC and connected to the dike of Kampong Sne ADB project at the south of Boeng Pring.

(2) Summary

The area of Boeng Pring (Pring Reservoir) is about 6,000 ha and the depth at the end of the wet season is 1.0-1.5 m. According to the inventory report by Mekong Secretariat in 1994, water

source is limited and there are 10 small scale existing irrigation systems (PV 1,3,5, PM 12 and PRO 4,5,7,8,etc.) around the Boeng Pring, irrigating less than 100 ha both in wet and dry season cropping. In order to develop agriculture in this area stable water for the dry season cropping is indispensable. The dike and ancillary facilities between the Boeng Pring and Boeng Khsachsar, constructed by Kampong Sne Irrigation Project with the assistance of ADB, should be utilized to supply the water in Boeng Khsachsar to Boeng Pring. Because of the limitation of water source, combination use of gravity canal and small mobile pump for double cropping small scale irrigation scheme in the area is the most effective way to enhance agriculture production.

(3) Project components

- a. Study of water use potential in the Boeng Pring through the Boeng Khsachsar
- b. Plan for irrigation and drainage system
- c. Plan for land use
- d. Establishing a public bank for mobile pumps

13. Oakambok Area Canal System Rehabilitation Project

(1) Location

Oakambok canal is situated in Kompong Trabek Commune, Kompong Trabek District, about 6km. southeast of Prey Veng town.

(2) Summary

The canal (11 km) was excavated by man power during Pol Pot regime in 1976-77 and is now silted up due to the lack of maintenance. The intake gate at the head of the colmatage had completely collapsed and water cannot be controlled from the Tonle Kompong Trabek for the dry season and recession cropping. In the dry season, the water level of the river is lower than the bottom of the colmatage and the farmers often use small pumps for supplementary irrigation water. With rehabilitation of the colmatage canal and ancillary facilities, over 3,000ha of recession crops can be irrigated.

(3) Project Components

- a. Reconstruction of intake gate
- b. Rehabilitation of existing canal systems
- c. Topo-survey for the area
- d. Rural infrastructure development plan

- c. Water available study for Tonle Kompong Trabek
- f. Land use plan

14 Khsachsar Reservoir Area Pump Irrigation Rehabilitation Project

(1) Location

Khsach Sar Pumping Station is located in Khsach village, Ruck Chey commune, Baphnom district, Prey Veng province and about 20 km southeast of the Prey Veng town.

(2) Summary

The pumping station was constructed during Pol Pot regime in 1976-77 with assistance from North Korea. The system was comprised of pump house (48m long and 25m wide), 6 sets of the pumps (500mm diameter), main and secondary canals. All of the systems were destroyed during the civil war and out of function at present. The water source is Tonle Toch. There is a colmatage canal, 7km long, connecting the Tonle Toch to Khsachsar reservoir which is silted and shallow. The irrigated area can be increased to 6,000 ha of paddy field in wet and dry season with rehabilitation of the facilities.

(3) Project Components

- a. Topographic survey, about 10,000 ha
- b. Water availability study for Khsachsar reservoir, including colmatage canal between Tonle Toch and the reservoir.
- c. Plan for pumping system
- d. Plan for land use and irrigation & drainage systems including rehabilitation of about 20km of Pol Pot canals
- e. Rural infrastructure development plan

15. Tourt Rolok Reservoir Irrigation System Rehabilitation Project

(1) Location

The Tourt Rolok irrigation project is located in three districts, Bati, Samrong, and Prey Kabass and is about 32km northwest of Takeo town.

(2) Summary

The Tourt Rolok reservoir irrigation system has two reservoirs, Toul Lolok and Sen Percam, with a storage capacity estimated at 9MCM. The water sources of the reservoirs are the Tonle

Bati Lake and several streams along the National Road No 2. The Tourt Rolok reservoir is capable of irrigating more than 1,200 ha in dry season and 500 ha in rainy season cropping respectively. The systems were established during King Sihakhouk's regime. The water control structure was reconstructed, from 60m to 14m, in 1978. Due to reduction of flow capacity, flood water cannot be drained and the structures were damaged.

(3) Project components

- a. Reservoir dike rehabilitation
- b. Intake structures of the reservoir dike
- c. Canal systems rehabilitation
- d. Land use study and water availability in the reservoir
- e. F/S completed by GDMH

16. Thnot Konchhrung Irrigation System Rehabilitation Project

(1) Location

Thnot Konchrong Dike, located in Koh Angdet district, Takeo province, is about 45 km south of Takeo town. It is in front of Koh Angdet district office.

(2) Summary

Thnot Konchrong Dike was constructed during 1960-66. In 1976, the dike was repaired by man power in order to retain water for the cultivation. Due to poor technology, insufficient compaction of dike, and shortage of maintenance, the dike was heavily damaged again and the embankment of the dike were nearly eroded by the flood water. The water source is the Takco river. About 2,500 ha is irrigated by gravity and 250 ha by pumping. The length of the dike length is approximately 9 km. There are 9 culvert structures for irrigation, but all of the gates were lost or broken. The farmers at present cultivate the wet season crops, depending only on rainfall. The yield of rice is about 3.5 ton/ha in the wet season.

(3) Project components

- a. Study area (? Need to elaborate)
- b. Repair of existing Pol Pot dike
- c. Repair of facilities
- d. Water availability study
- e. Land use study

17. Svay khom Reservoir Irrigation Development Area

(1) Location

Svay Khom dike, located in Cham Pey commune, Bati district, Takeo province, is about 45 km from Takeo province.

(2) Summary

Svay Khom dike was constructed during Pol Pot regime. But due to the flood in 1994, the dike was heavily damaged. At present water cannot be stored in the reservoir. Water sources are Chhcung Loung lake and Bassac tributary.

(3) Project components

- a. Dike construction, L=867m
- b. Dike embankment repair, L=3km
- c. Intake structure construction (6)
- d. Canal system rehabilitation, L= 22km
- e. F/S completed by GDI MH
- f. Land use study and water availability
- g. Cost estimation and project implementation schedule

18. Stung Takeo Irrigation System Rehabilitation Project

(1) Location

Stung Takeo river project is located in Koh Angdet and Treang district, Takeo province. The river extends from Takeo town to the border with Viet Nam. The Takeo river is in the right bank of the Bassac river.

(2) Summary

Stung Takeo (Takeo river) has played an important role in agricultural production in Cambodia. Takeo river had not been rehabilitated for long time, except for the diversion weir at Kompong Ampil which was constructed to store the flood water for irrigation in the wet and dry season paddy. The structure was seriously damaged because of inadequate design or heavy siltation in the river. The width of the river varies from 35m to 90m.

The length of river to be rehabilitated is 17.99km (from canal 87 to Kampong Ampil) and the depth to be excavated is 3.5m and the slope of the embankment is 1 to 1.5. The water sources come from the Slakou catchment and other tributaries. The recession cropping is adopted. The

irrigation area at present is 4,000 ha in dry season. About 6,000 ha can be irrigated in the dry season with rehabilitation of the rivers, canals and related irrigation facilities. The provincial GDIMH gives the first priority project to rehabilitate the river.

(3) Project Components

- a. River rehabilitation
- b. Repair of all facility structures
- c. Topo-survey for the study area
- d. Land use plan
- e. Water availability study
- f. To establish the Farmers organization

19. Samaki Irrigation System Rehabilitation Project

(1) Location

The project area is located in Borey Chularsar district, Takeo province, about 25km southeast from Takeo PC .

(2) Summary

The area is usually inundated by flood water from the Takeo river through a small stream. According to the LANDSAT image in December 1994, inundation depth was about 1.5-2m. The reservoir dike and check structures, constructed during Pol Pot regime, were damaged and out of function. Provincial GDIMH in Takeo wishes to rehabilitate these facilities. At present irrigable area is about 200 ha in single recession cropping. With rehabilitation of all of the facilities, water storage for irrigation can be increased to more than 1 MCM and the irrigable area can be extended up to 1,500 ha for the recession cropping.

(3) Project Components

- a. Repair of existing reservoir dike and check structures.
- b. Study of the available water in the reservoir
- c. Plan for irrigation and drainage canal systems.
- d. Land use plan

20. Kampong Damrie Reservoir Agricultural Development Project

The project area is located in Bati district, Takeo province, about 50km. from Phnom Penh

by National Road No.2. This area has been studied by JICA under Tonle Bati Irrigation Project in “ the Master Plan Study on the Integrated Agricultural and Rural Development Project in the Suburbs of Phnom Penh ” in February 1995.(See the report for detail.)

21. Rehabilitation of Canal 87 Irrigation Project

The project area is located in Angkor Borey district, Takeo province, about 13 km east of the Takeo PC. The rehabilitation components consist of dredging the bottom of the main canal and construction of the secondary canals. The project is under implementation by EU and therefore is omitted as priority project.

Table D.4.1 (1) Summary of the Priority Project in the Study Area

No.	Zone No.	Project Name	System No.	Province Name	District Name	Study Area (ha)	Service Area (ha) *1		Project Cost (US \$)	Development component **		Comment
							Wet Season	Dry Season		Description	unit	
1	(2)	Boeung Veam Area Agricultural Development Project	SST 2, SST 3	K. Cham	Srey Santhel / Koh Sotin	20,000	0/5,000	610/10,000	15,174,000	Flood protection dike Reh. of colmatage canal Reh. of reservoir dike Gate structure New irrigation canal	km km km place km	23.0 - Rehabilitation & extend irrigation system 16.5 - Double cropping 13.0 - F/S is needed 8 80.0
2	(2)	Prek Fou Canal Irrigation System Rehabilitation Project	SST 1	K. Cham	Srey Santhel	11,000	2,966/3,000	0/1,500	5,015,000	Upgrade of pump station Reh. of main canal New main canal New secondary canal Gate structure	site km km km place	11 - Rehabilitation & extend irrigation system 7.0 - Double cropping 3.0 85.0 9
3	(3)	Pdav Chum Flood Dam Irrigation Project	CP 1	K. Cham	Cheung Prey	6,000	3,085/5,000	0/0	8,713,000	Flood protection dike New reservoir dike Gate structure New irrigation canal	km km place km	13.5 - Construction of flood protection dike 11.0 - Wet season cropping 13 - F/S is needed 24.0
4	(7)	O Chrey Flood Dam Irrigation Project	BT 4	K. Cham	Bathasy	2,500	800/2,000	0/950	4,320,700	Flood protection dike Polder dike Gate structure Irrigation canal	km km place km	8.5 - Construction of flood protection dike 2.5 - Wet season cropping 6 18.8
5	(7)	Tambouk Reservoir Area Agricultural Development Project	PL 1, PL 3, PL 4	Kandal	Ponhea Leu	10,000	180/900	2,052/4,000	7,293,000	Reh. of reservoir dike Polder dike Intake regulator Gate structure Reh. of irrigation canal	km km site place km	13.0 - Rehabilitation & extend irrigation system 8.0 - Recession cropping 1 - F/S is needed 5 27.0
6	(9)	Boeung Thom Area Agricultural Development Project	KSV 1	Kandal	Kean Svay	20,000	700/1,400	2,300/3,500	6,189,000	Reh. of reservoir dike Reh. of colmatage canal Reh. of irrigation canal Gate structure	km km km place	13.0 - Rehabilitation & extend irrigation system 9.0 - Double cropping 50.0 - F/S is needed 11
7	(6)	Chhey Thom Area Agricultural Development Project	KD 12	Kandal	Ksach Kandal	10,000	3,850/5,000	0/2,000	7,170,000	Flood protection dike Reh. of main canal Reh. of secondary canal Intake structure Pump station	km km km place site	13.0 - Rehabilitation & extend irrigation system 14.0 - Double cropping 60.0 - F/S is needed 2 2

Note *1 : Service area is estimated by the study team on the existing map (scale=1:50,000).

Wet Season (ha) : 0/5,000 means the existing service area / estimated development service area.

Dry Season (ha) : 610/10,000 means the existing service area / estimated development service area.

**2 : Development components are roughly planned by the study team on the existing map (scale=1:50,000).

Table D.4.1 (2) Summary of the Priority Project in the Study Area

No. / Zone No.	Project Name	System No.	Province Name	District Name	Study Area (ha)	Service Area (ha) *1		Project Cost (US \$)	Development component *2		Comment
						Wet Season	Dry Season		Description	Quantity	
8	Makleach Krobeaykon Area Agricultural Development Project	KT1,H	Kandal	Koh Thom	4,000	0/0	844/4,000	7,177,000	Reh. of polder dike Reh. of colmatage canal Gate structure Pump station Irrigation canal	13.0 17.0 9 1 24.0	Rehabilitation & extend irrigation system Recession cropping F/S is needed
9	Boeng Phlea Area Small Pump Irrigation Project	KD 1-6, KD 13-18	Kandal	Ksach Kandal	8,000	136/250	2,085/4,000	5,414,000	Irrigation canal Intake structure Mobile pump	50.0 18 1	Double cropping F/S is needed
10	Tasen Area Flood Dam Irrigation Project	MP 1	Kandal	Muk Kampoul	2,000	0/0	1,245/2,000	4,207,200	Flood protection dike Reh. of colmatage canal Gate structure Reh. of irrigation canal Reh. of reservoir dike	12.0 1.2 4 6.0 4.0	Rehabilitation of reservoir, canal system
11	Sras Bram Boay Irrigation System Rehabilitation Project	KT2,H	Kandal	Koh Thom	6,000	0/0	1,389/3,000	3,963,000	Flood protection dike Reh. of irrigation canal New irrigation canal Gate structure	10.0 18.0 6.5 3	Rehabilitation & extend irrigation system Recession cropping F/S is needed
12	Boeng Pring Area Small Pump Irrigation Project	PP 1,3,5, PM 12, PRO 7,8	Prey Veng	Prey Veng DC /Kamp. Leav / Puam Ro	10,000	370/3,000	160/600	4,733,000	Main canal Secondary canal Intake structure Pump station Mobile pump	22.0 40.0 5 1 1	Double cropping F/S is needed
13	Oakambok Area Canal System Rehabilitation Project	KT84	Prey Veng	Kamp. Travék	5,000	0/3,000	0/200	3,237,000	Intake facility Reh. of main canal Reh. of colmatage canal New main canal Secondary canal	1 10.0 3.5 4.0 45.0	Rehabilitation of canal system F/S is needed
14	Khsachar Reservoir Area Pump Irrigation Rehabilitation Project	BPH 1	Prey Veng	Ba Phnom	10,000	0/6,200	0/6,200	7,137,000	Reh. of pump station Reh. connection canal Reh. of main canal Secondary canal	1 7.0 19.5 80.0	Pump rehabilitation Double cropping F/S is needed

Note *1: Service area is estimated by the study team on the existing map (scale=1:50,000).

Wet Season (ha) : 0/5,000 means the existing service area / estimated development service area.

Dry Season (ha) : 616/10,000 means the existing service area / estimated development service area.

*2: Development components are roughly planned by the study team on the existing map (scale=1:50,000).

Table D.4.1 (3) Summary of the Priority Project in the Study Area

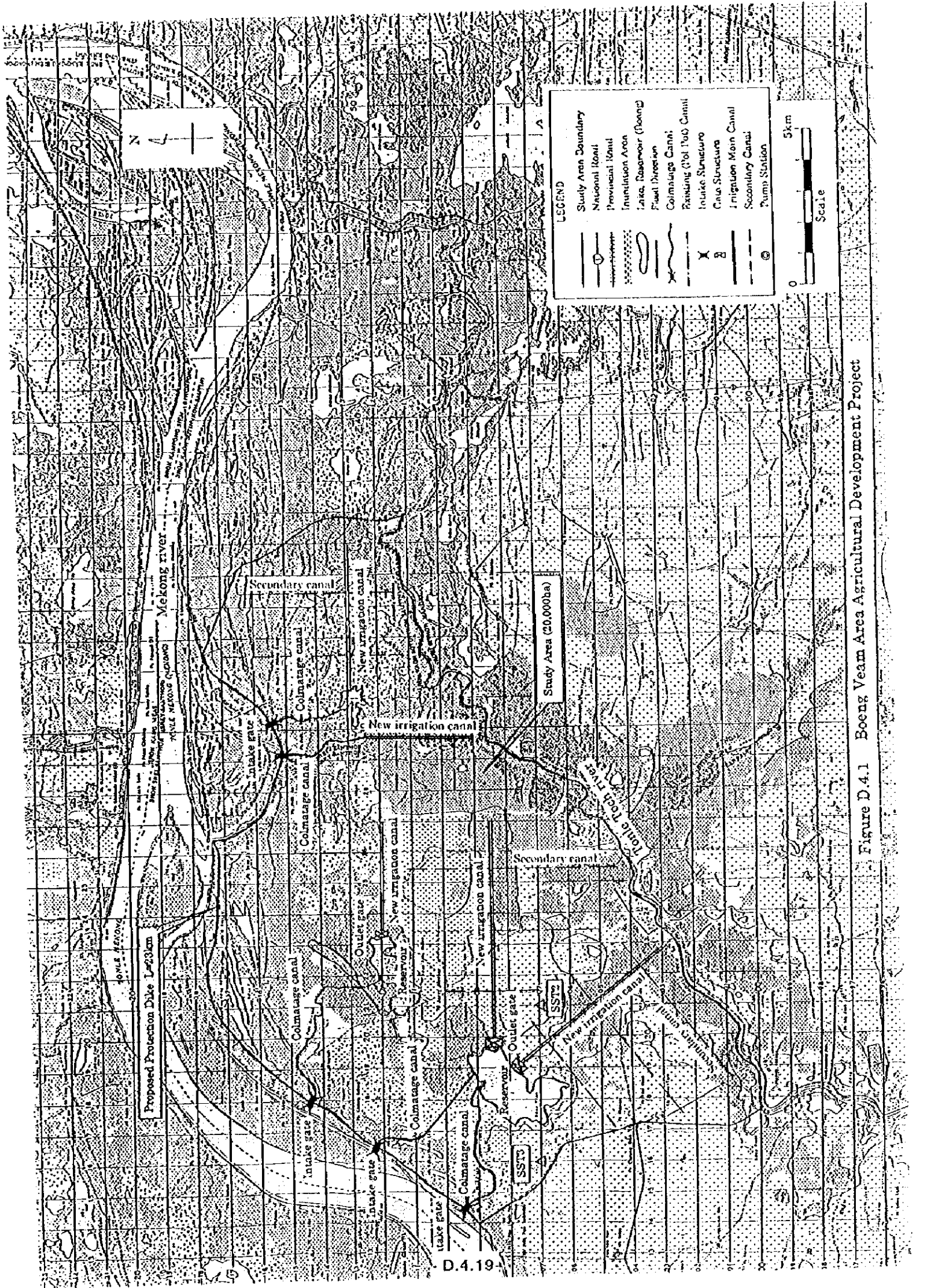
No. / Zone No.	Project Name	System No.	Province Name	District Name	Study Area (ha)	Service Area (ha) *1		Project Cost (U.S.\$)	Development component *2		Comment
						Wet Season	Dry Season		Description	Quantity	
15 (11)	Tourl Rolok Reservoir Irrigation System Rehabilitation Project	PK 1	Takeo	Prey Kabass	3,000	250/500	1,250/2,000	2,096,000	Reh. of reservoir dike Intake facility Reh. of main canal Secondary canal	7.0 5 8.0 18.0	- Reservoir rehabilitation - Double cropping
16 (11)	Thnot Konehrueng Irrigation System Rehabilitation Project	KA 1	Takeo	Koh Andet	9,000	0/0	1,700/3,000	3,362,000	Reh. of reservoir dike Reh. of irrigation canal Gate structure Upgrade of pump facility Secondary canal	7.0 11.0 9 1 30.0	- Rehabilitation of irrigation system - Recession cropping
17 (8)	Svay Khom Reservoir Irrigation System Rehabilitation Project	BT 4	Takeo	Bati	6,000	0/0	350/3,000	3,848,000	Reh. of reservoir dike Gate facility Intake facility Reh. of irrigation canal	10.0 1 6 22.0	- Reservoir rehabilitation - Recession cropping
18 (11)	Stung Takeo Irrigation System Rehabilitation Project	T 4	Takeo	Koh Andet / Treang	13,000	0/0	4,000/6,000	10,720,000	Reh. of Takeo river Reh. of diversion weir Reh. of irrigation canal	18.0 1 80.0	- Stung Takeo rehabilitation - Recession cropping
19 (11)	Samaki Irrigation System Rehabilitation Project	BCH 2	Takeo	Borey Chhluasur	3,300	0/0	200/1,500	1,810,000	Diversion weir Reh. of main canal Secondary canal	1 5.0 20.0	- Reservoir rehabilitation - Recession cropping
20 (8)	Kampong Damrei Reservoir Agricultural Development Project	BT 1, BT 2, BT 3	Takeo	Bati	9,000	2,000/2,100	2,150/2,350	-			- Study has done by JICA - Double cropping
21 (11)	Rehabilitation of Canal 87 Irrigation Project	AB 1	Takeo	Angkor Borey	2,000	0/0	1,000/1,200	-			- Canal rehabilitation - EU is implementing

Note *1 : Service area is estimated by the study team on the existing map (scale=1:50,000).

Wet Season (ha) : 0/5,000 means the existing service area / estimated development service area.

Dry Season (ha) : 610/10,000 means the existing service area / estimated development service area.

*2 : Development components are roughly planned by the study team on the existing map (scale=1:50,000).



D.4.19

Figure D.4.1 Boeng Veam Area Agricultural Development Project

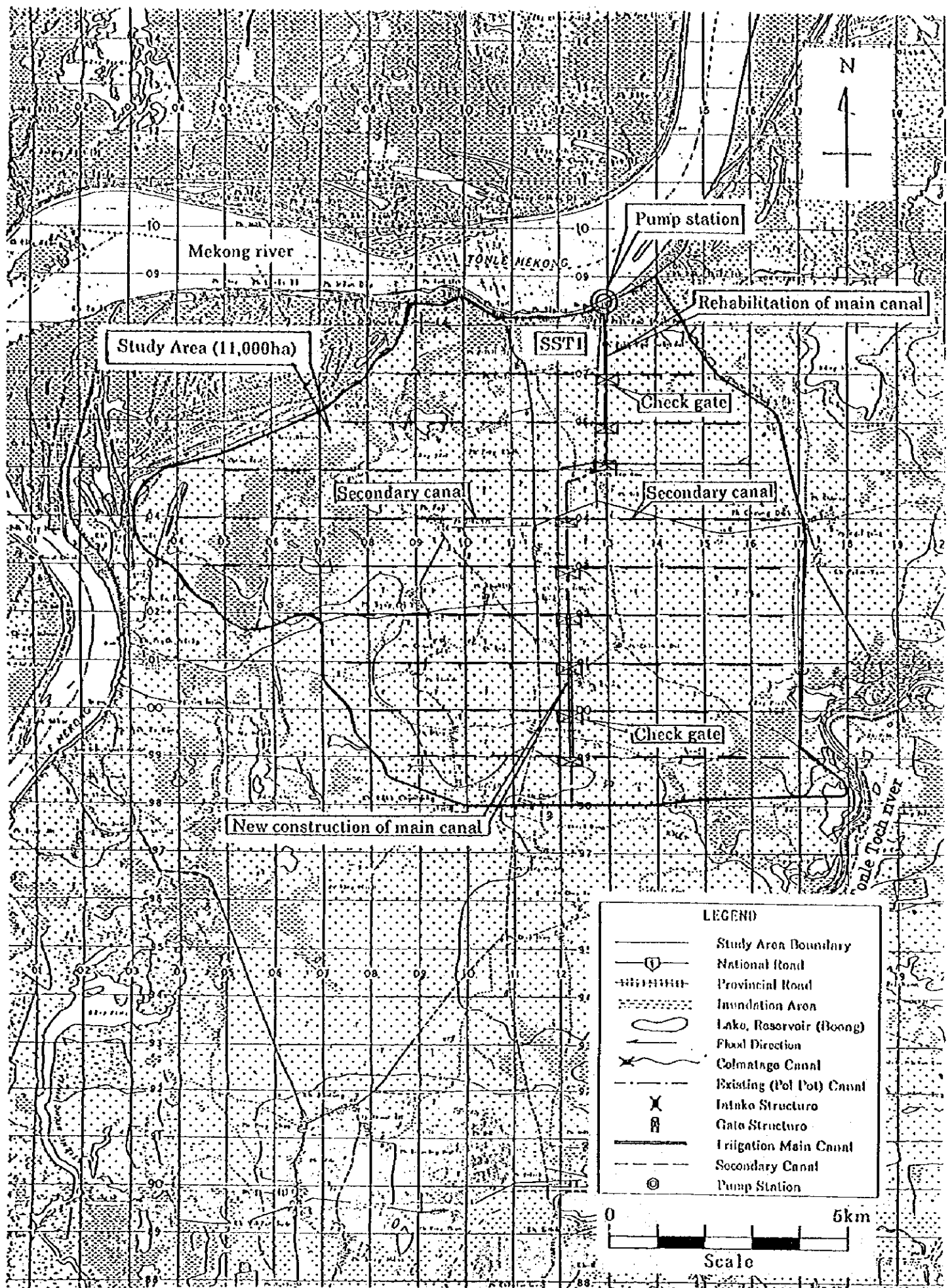
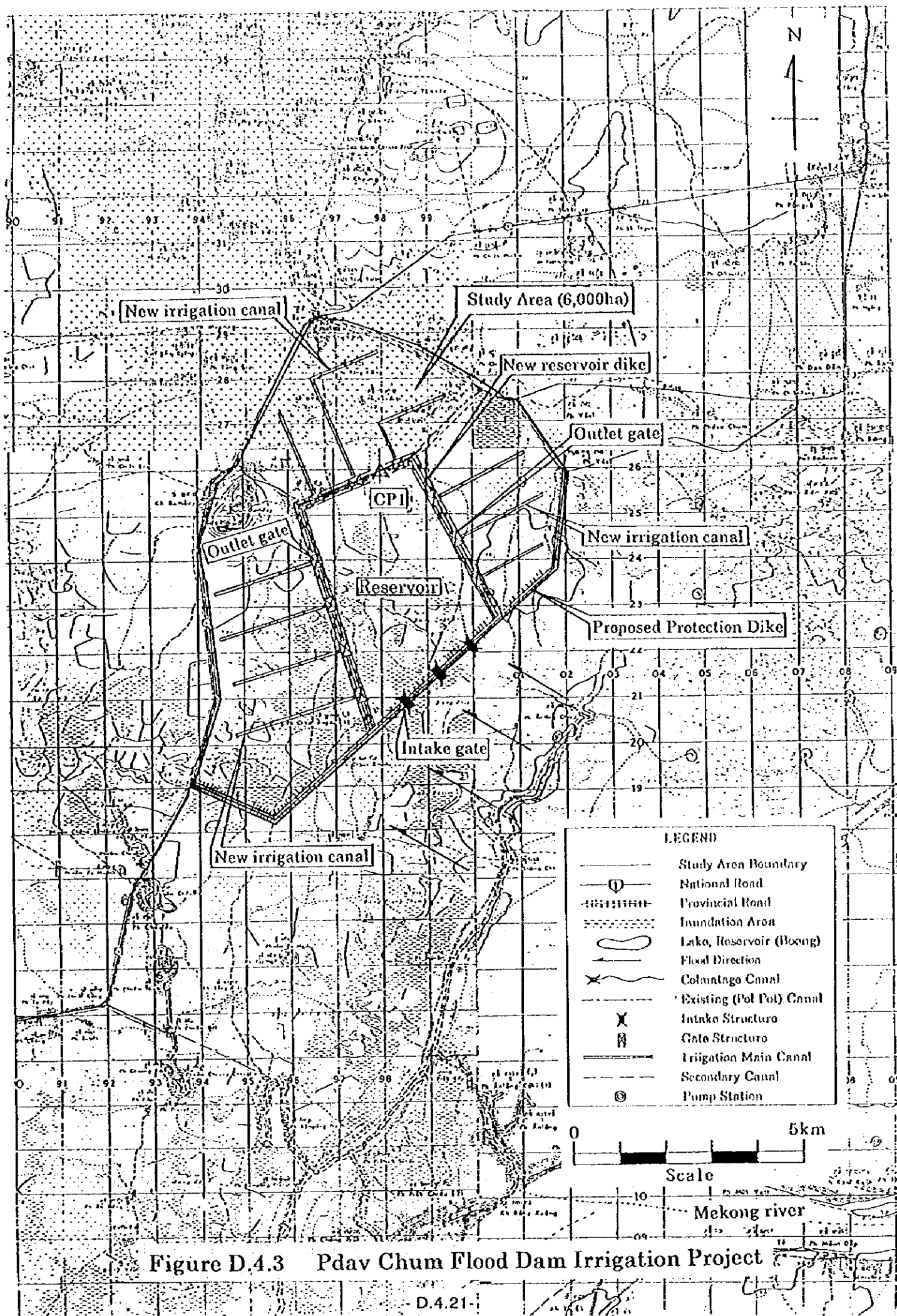


Figure D.4.2 Prek Pour Canal Irrigation System Rehabilitation Project



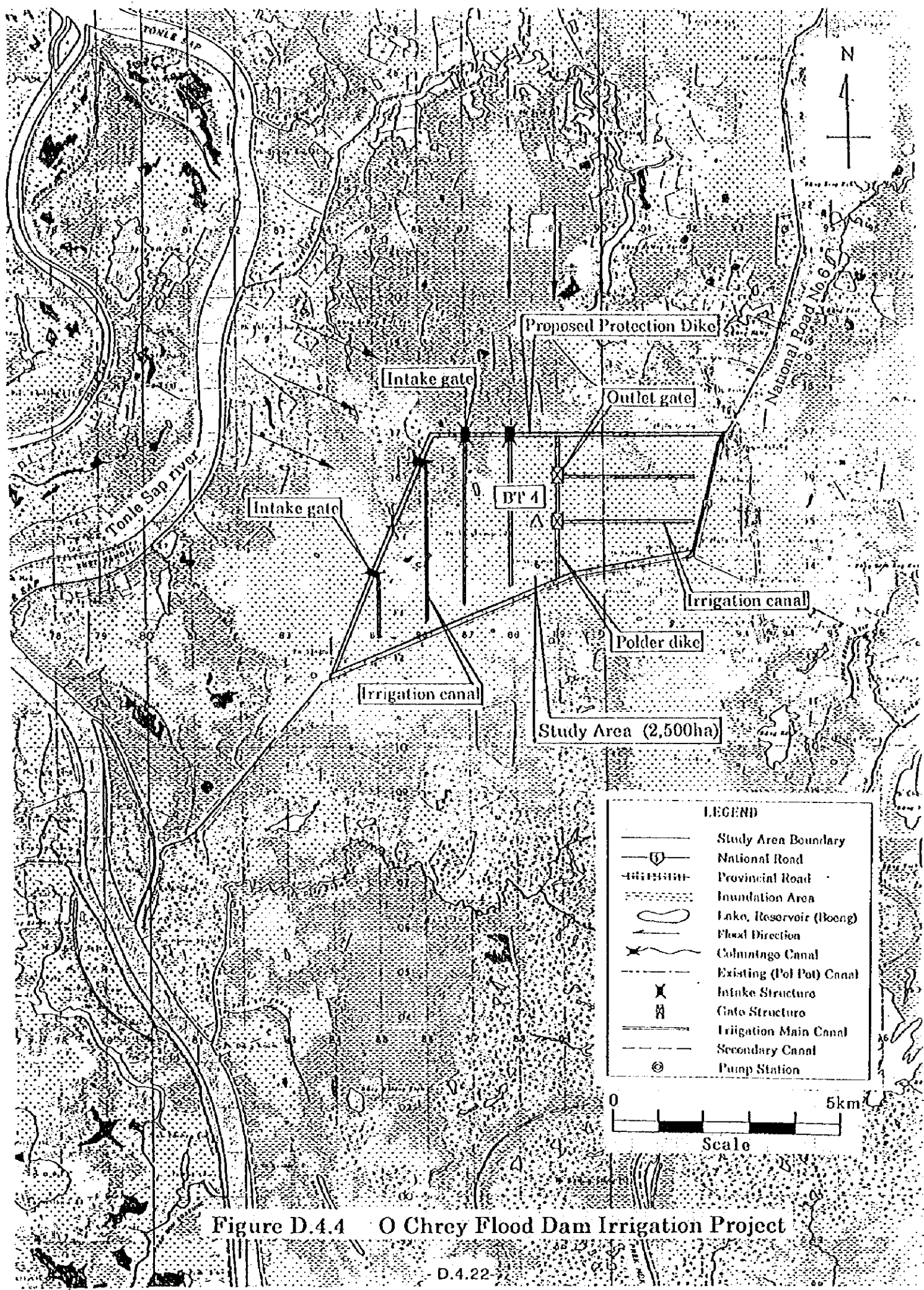


Figure D.4.4 O Chrey Flood Dam Irrigation Project

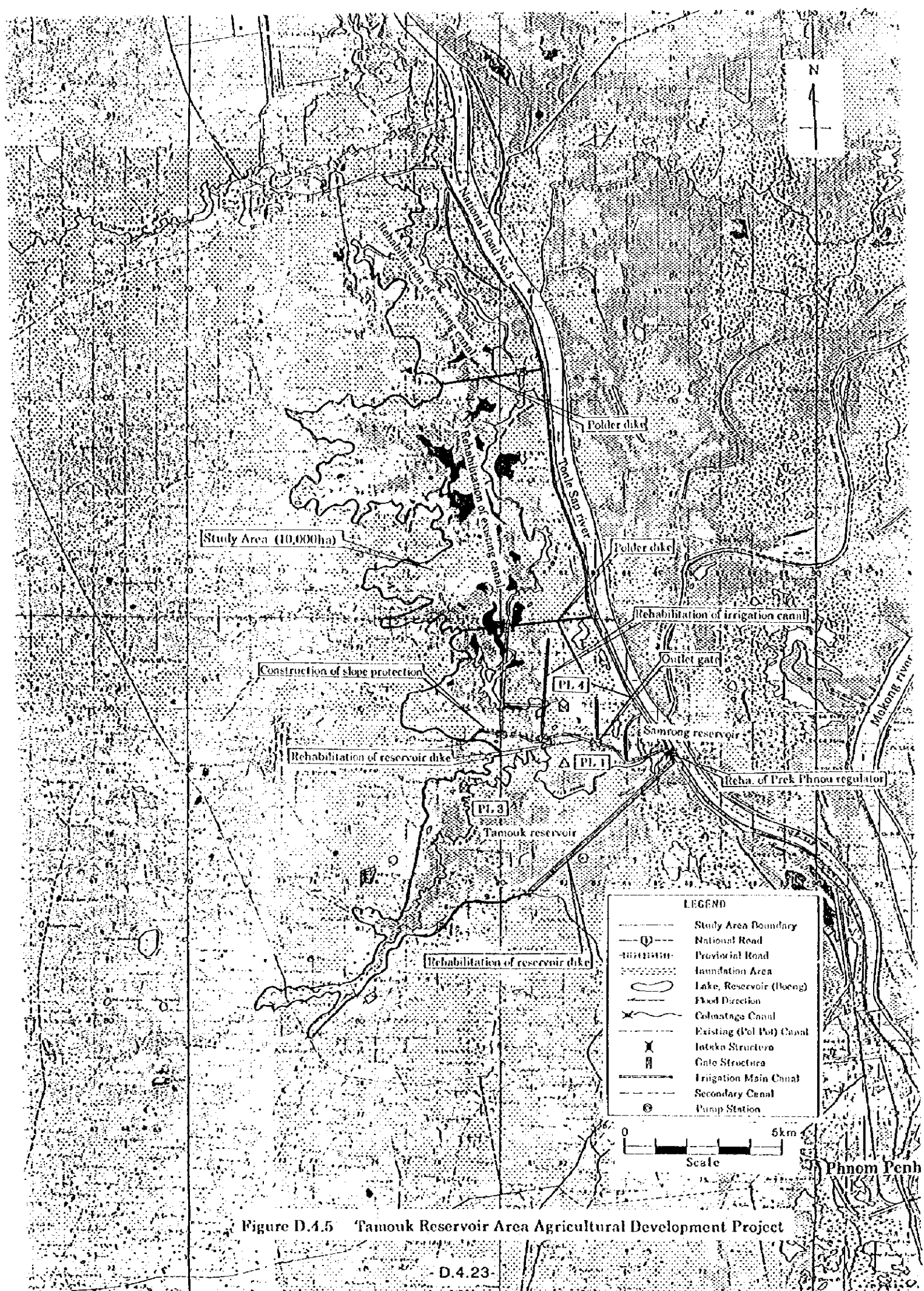
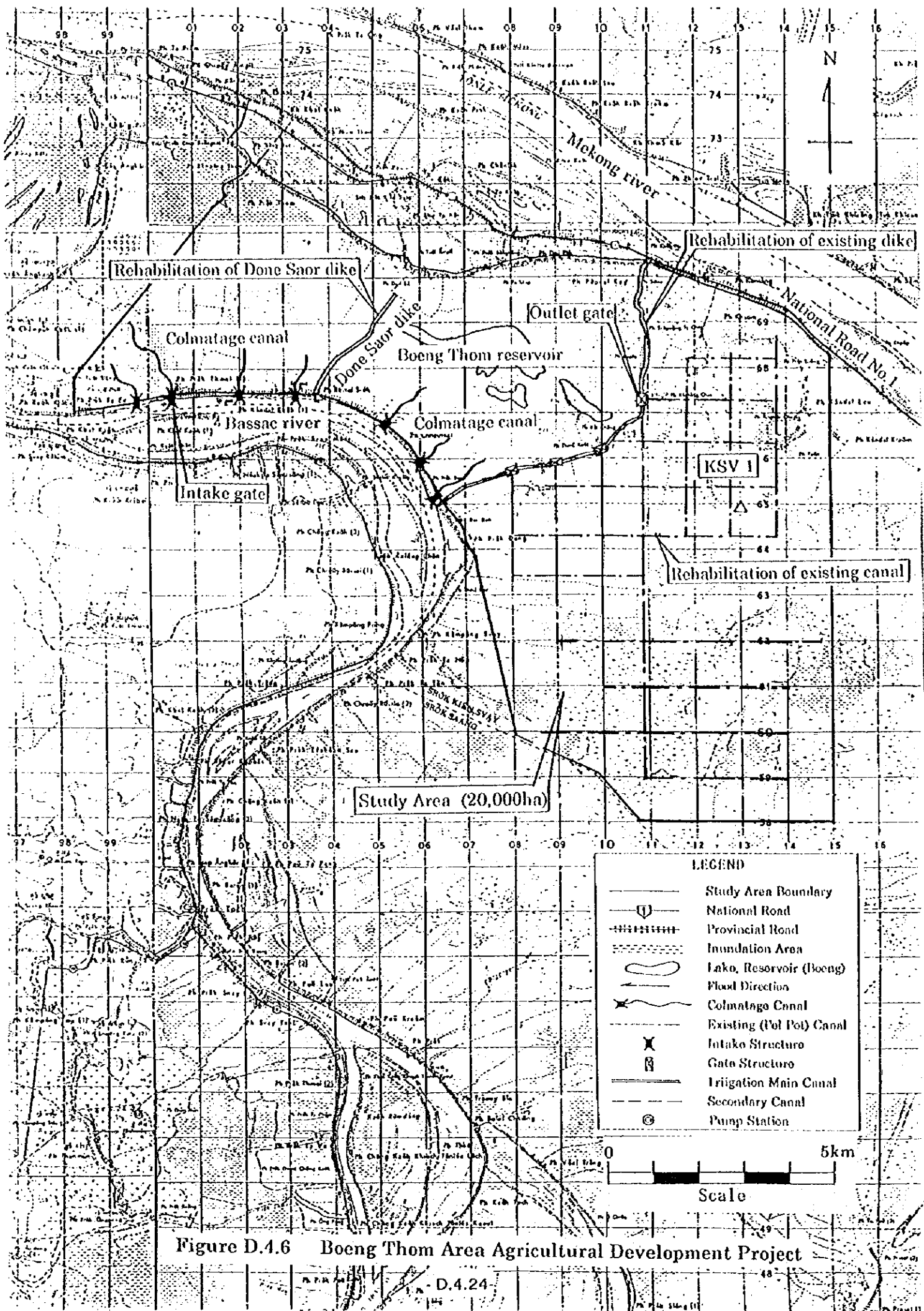


Figure D.4.5 Tamouk Reservoir Area Agricultural Development Project



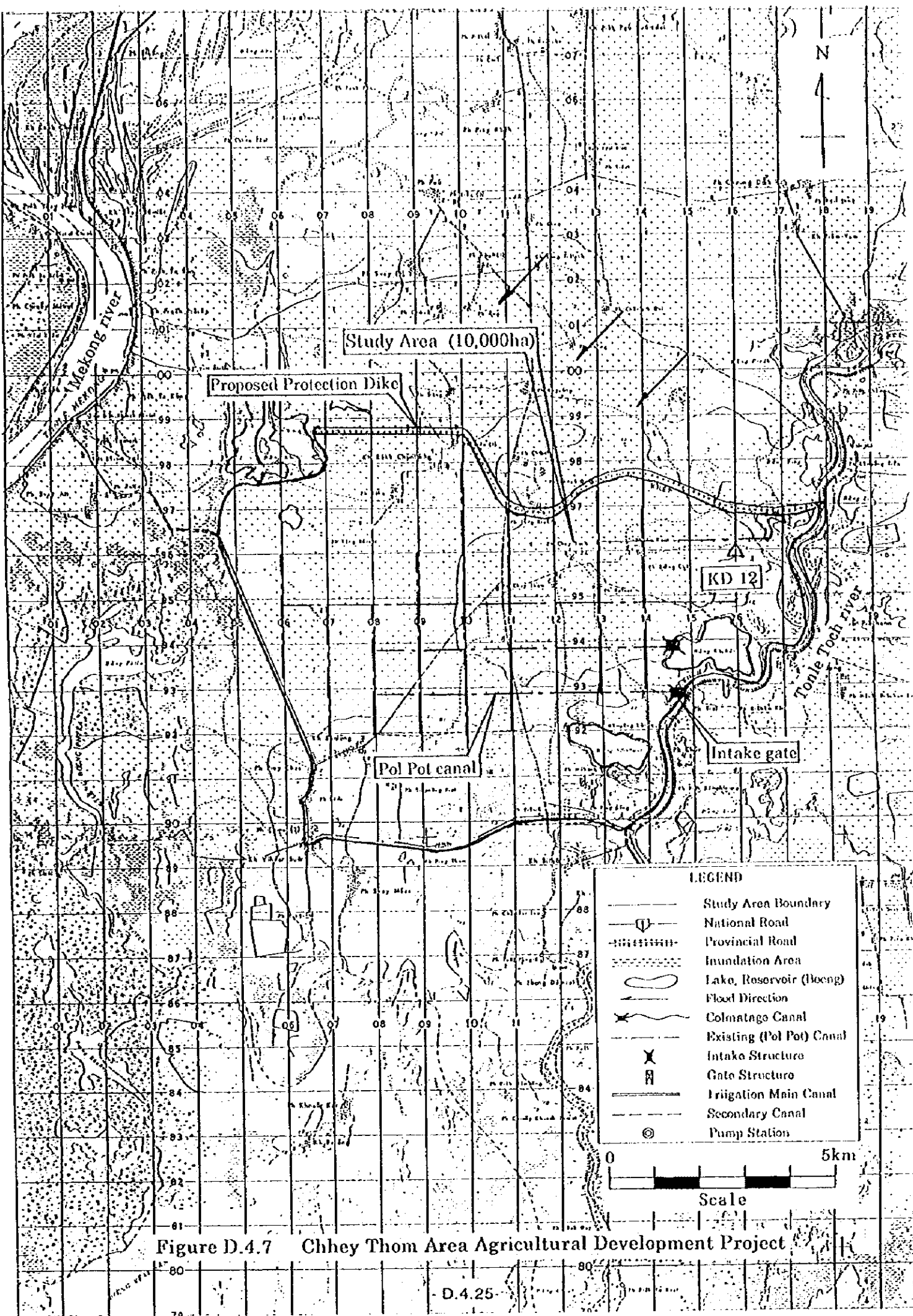


Figure D.4.7 Chhey Thom Area Agricultural Development Project

