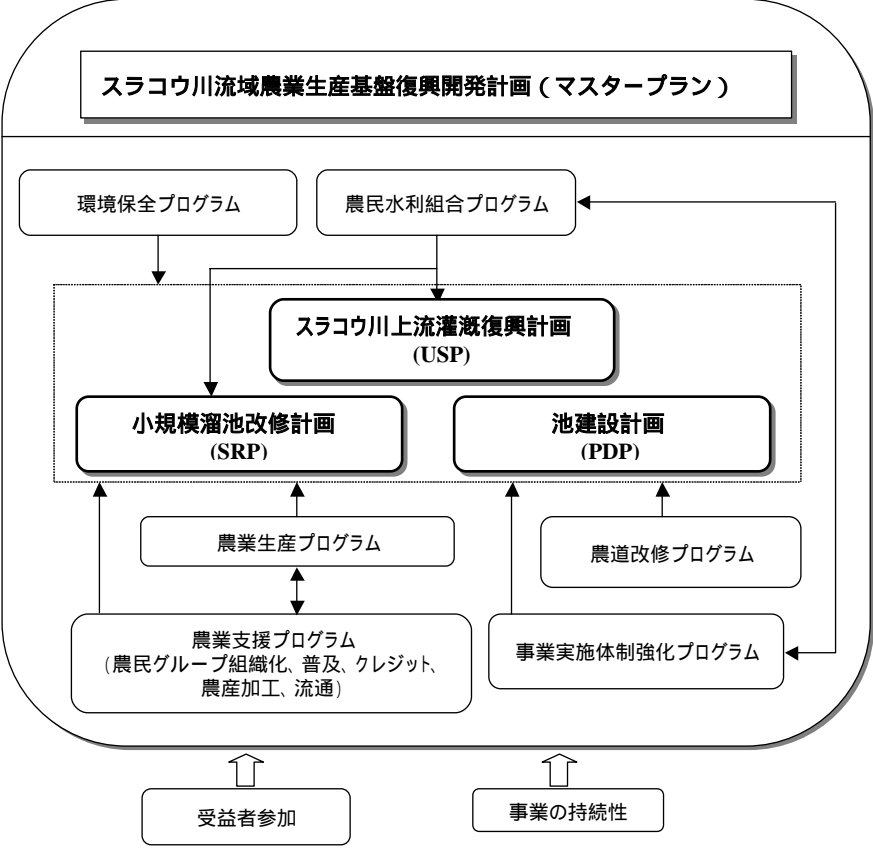


上位目標：本件をモデルとして、「カ」国全土に広がる復興事業に適用し、

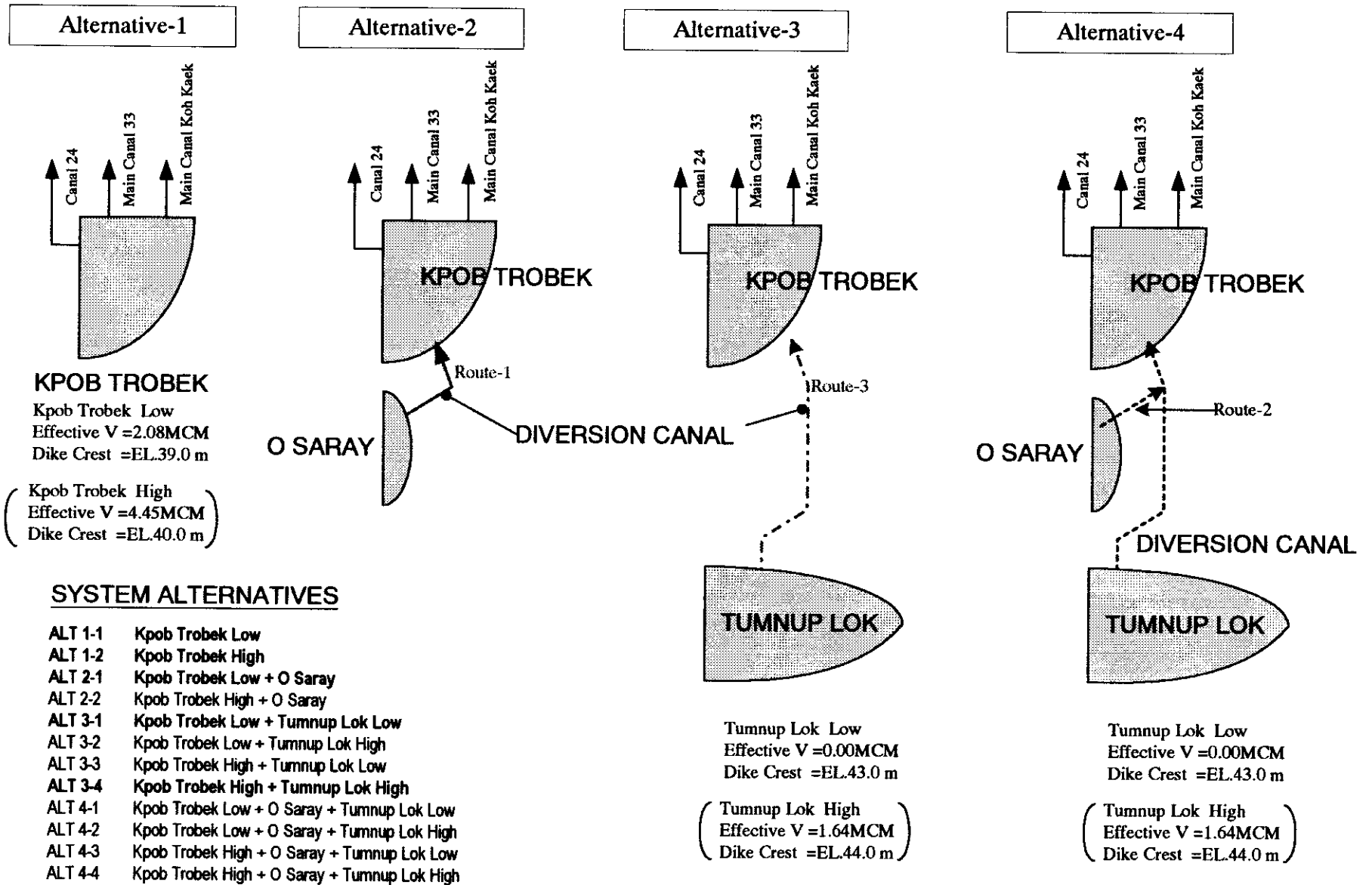
プロジェクト目標：  
 「カ」国の農業生産基盤復興開発事業に対するモデル事業  
 調査対象地域における農家所得・生活水準の向上  
 調査対象地域の食料安定供給に対する貢献



カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

図 II-4.1.1  
開発基本概念図

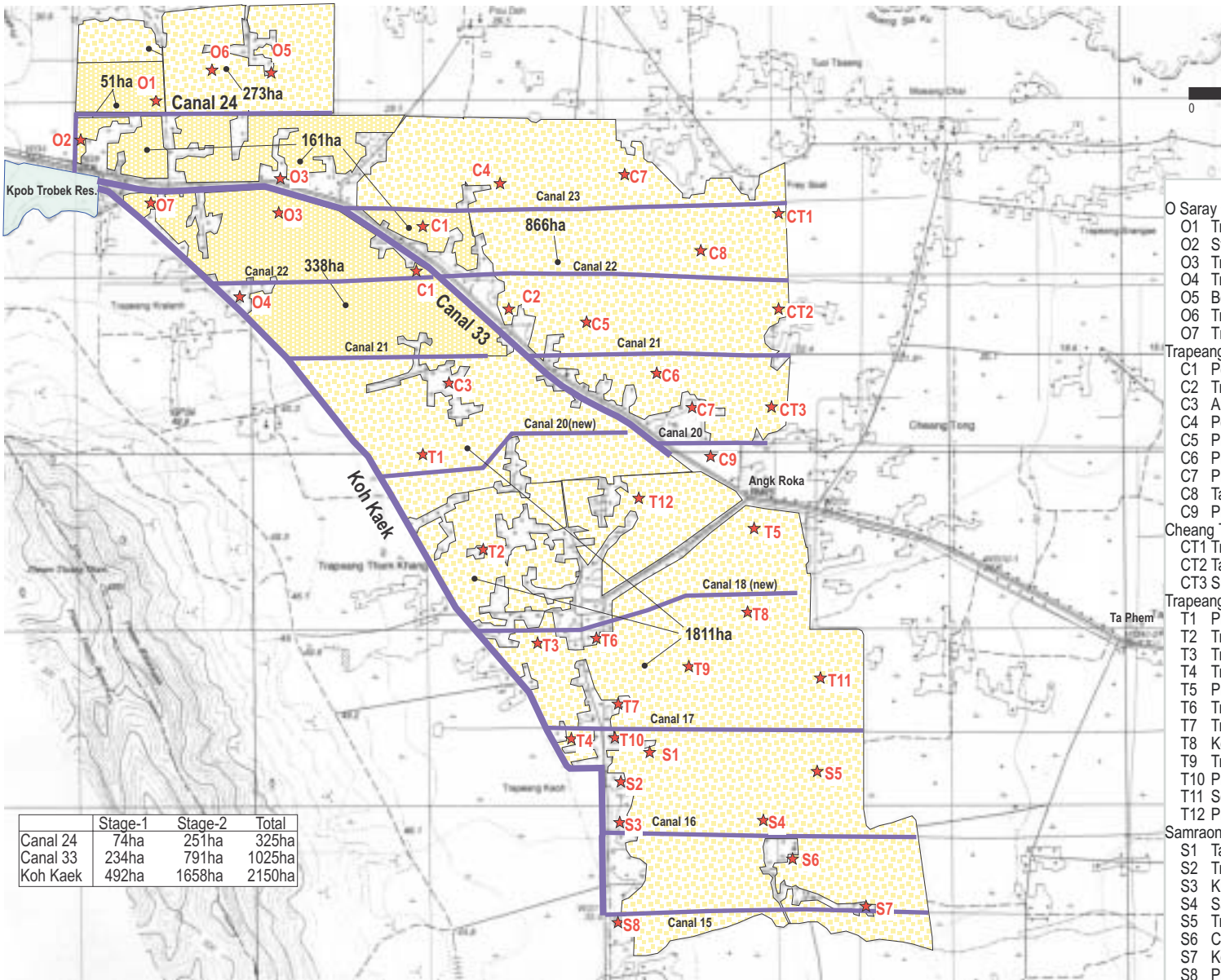
国際協力事業団



**SYSTEM ALTERNATIVES**

- ALT 1-1 **Kpob Trobek Low**
- ALT 1-2 **Kpob Trobek High**
- ALT 2-1 **Kpob Trobek Low + O Saray**
- ALT 2-2 **Kpob Trobek High + O Saray**
- ALT 3-1 **Kpob Trobek Low + Tumnup Lok Low**
- ALT 3-2 **Kpob Trobek Low + Tumnup Lok High**
- ALT 3-3 **Kpob Trobek High + Tumnup Lok Low**
- ALT 3-4 **Kpob Trobek High + Tumnup Lok High**
- ALT 4-1 **Kpob Trobek Low + O Saray + Tumnup Lok Low**
- ALT 4-2 **Kpob Trobek Low + O Saray + Tumnup Lok High**
- ALT 4-3 **Kpob Trobek High + O Saray + Tumnup Lok Low**
- ALT 4-4 **Kpob Trobek High + O Saray + Tumnup Lok High**

Note: Bold faced alternatives were selected for detailed evaluation.(Sub-section II-4.2.1)



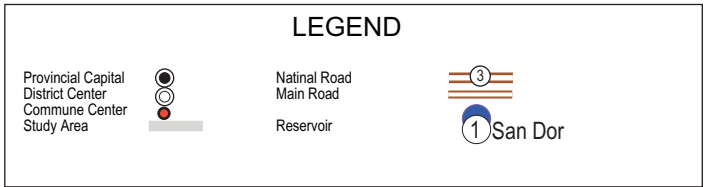
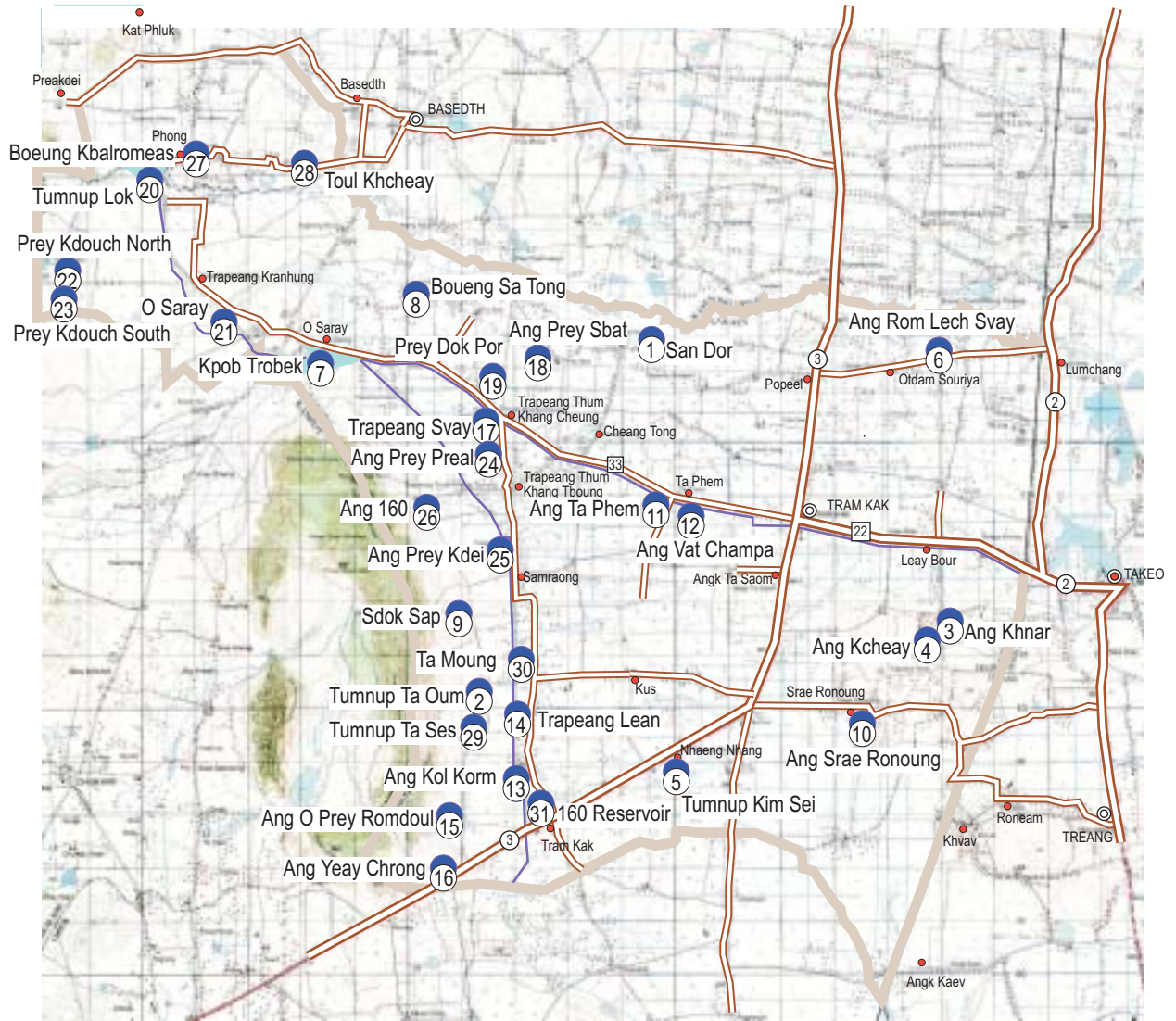
- Village List**
- O Saray Commune
  - O1 Trapeang Dang Tuek
  - O2 Stueng
  - O3 Trapeang Krasang
  - O4 Trapeang Kralanh
  - O5 Boeng Satong
  - O6 Trapeang Khchau
  - O7 Tnaot Chum
  - Trapeang Thum Khan Cheung Commune
  - C1 Peak Bang'aong
  - C2 Trapeang Svay
  - C3 Angk Trav
  - C4 Pou Doh
  - C5 Prey Dak Por
  - C6 Prey Khvav
  - C7 Prey Sbat
  - C8 Ta Soun
  - C9 Prey Ta Lei
  - Cheang Tong Commune
  - CT1 Trapeang Tuk
  - CT2 Ta Tim
  - CT3 Srae Kruo
  - Trapeang Thum Khan Tboung Commune
  - T1 Prey Preal
  - T2 Trapeang Saom
  - T3 Trapeang Chhuk
  - T4 Trapeang Prey
  - T5 Prey Rumduol
  - T6 Trapeang Tnaot
  - T7 Trapeang Kaoh
  - T8 Kou Chen Leaeng
  - T9 Trapeang Khan
  - T10 Prey Kdei
  - T11 Som Rong
  - T12 Prakeab
  - Samraong Commune
  - S1 Ta Pen
  - S2 Trapeang Thmar
  - S3 Krabei Prey
  - S4 Sambuor
  - S5 Trapeang Chaeng
  - S6 Chan Teab
  - S7 Koah Nhae
  - S8 Prey Ta Dok

	Stage-1	Stage-2	Total
Canal 24	74ha	251ha	325ha
Canal 33	234ha	791ha	1025ha
Koh Kaek	492ha	1658ha	2150ha

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スラコウ川流域農業生産基盤復興開発計画調査

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図 II-4.2.2  
スラコウ川上流灌漑復興開発計画対象地域



カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

図 II-4.3.1  
既存小規模溜池位置図

国際協力事業団

### Technical Evaluation on Proposed Rehabilitation and Reconstruction

Evaluation	Water source	5	No=0, some=3, stream or river=5
	Construction volume	3	Large=0, Fair=3, Little=5
	Technical soundness	5	Low=0, Fair=3, High=5
	Increase of irrigation area	5	Less than 15 ha=0, 15~30ha=3, over 30 ha=5
	Possibility of participation	5	Doubtful=0, Possible=3, High=5
	Total Score	23	
	Total Evaluation	A	A: 21~25, B:16~20, C:11~15, D:6~10, E:0~5

**Comment:**

Advantage of this scheme is the natural stream flowing to the reservoir. Even in the driest month, some water is flowing, and reservoir efficiency is considered higher. Also, a village-based water users group has been organized to request rehabilitation of the reservoir. Participation of water users' group is expected.

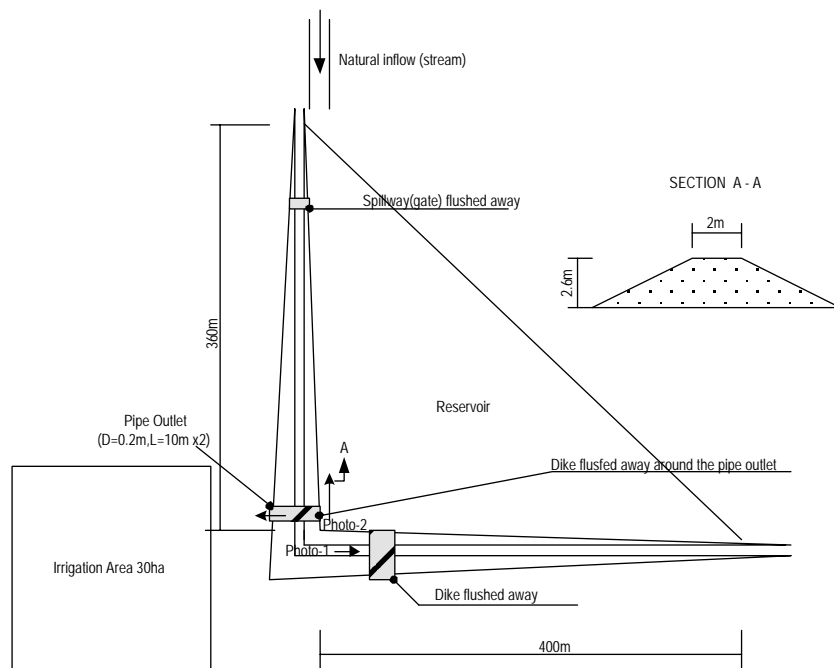


Photo-1



Dike was flushed away for 10 m long

Photo-2



Reservoir (dead water)

カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

国際協力事業団

図 II-4.3.2

Trapeang Thum Khang Tbound 行政村、  
Ang 160 溜池の評価結果

### Technical Evaluation on Proposed Rehabilitation and Reconstruction

Evaluation	Water source	5	No=0, some=3, stream or river=5
	Construction volume	3	Large=0, Fair=3, Little=5
	Technical soundness	5	Low=0, Fair=3, High=5
	Increase of irrigation area	5	Less than 10 ha=0, 10~20ha=3, over 20 ha=5
	Possibility of participation	5	Doubtful=0, Possible=3, High=5
	Total Score	23	A: 21~25, B: 16~20, C: 11~15, D: 6~10, E: 0~5
	Total Evaluation	A	

**Comment:**

Water source itself seems to be sufficient even without water flow from the Slakou River, because the Canal No.8 drains much water on the upstream. According to the village chief, the reservoir was operated well before 1999. However, The dike would be reconstructed for 10m long.

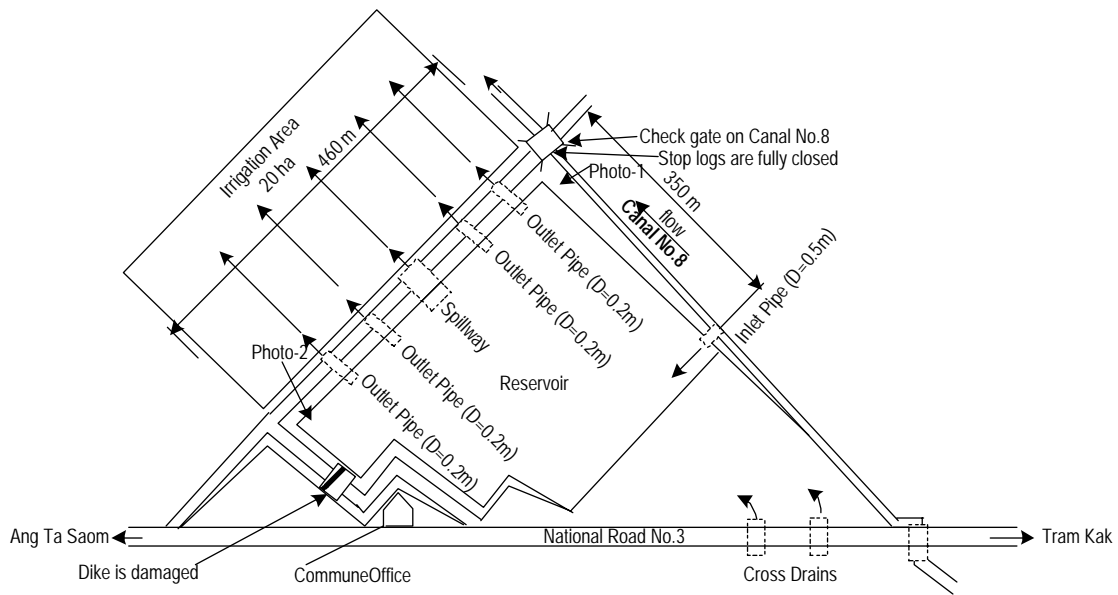


Photo-1



Reservoir (dead water)

Photo-2



Dike was flushed by the stored water

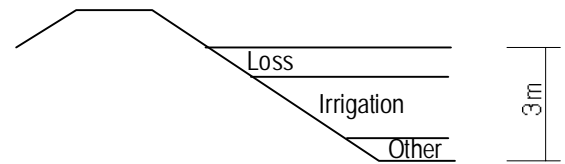
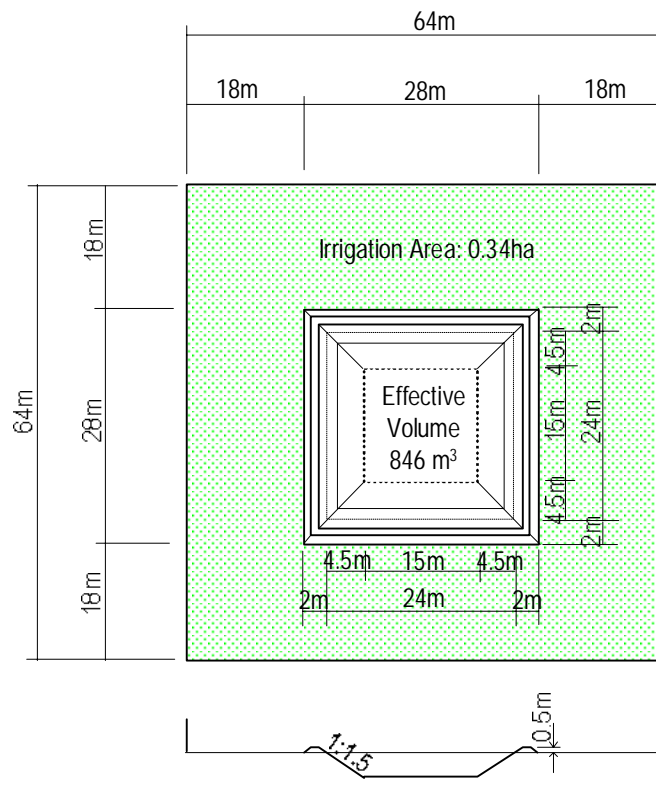
カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

国際協力事業団

図 II-4.3.3

Nhaeng Nhang 行政村、Tumnup Kim Sei 溜池の  
評価結果





### Irrigable Area

#### Crop-1 (August to October)

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=240mm (Takeo Town, August - October)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 200 mm  
 Other Water Requirement = 50 mm  
 Evaporation Loss=5mm/day x 90 days = 450mm  
 Percolation Loss=2mm/day x 90 days = 180mm  
 Effective Depth = 2.37m (3.00 - 0.45 - 0.18)  
 Side slope of pond = 1:1.5  
 Effective Volume:  
 $(15\text{m} \times 15\text{m} + 22.11\text{m} \times 22.11\text{m}) \div 2 \times (3\text{m} - 0.45\text{m} - 0.18\text{m}) = 846\text{m}^3$   
 $846\text{m}^3 \times 200 / 250 \div 200\text{mm} = 3,384\text{m}^2 = \mathbf{0.34\text{ ha}}$

#### Crop-2 (November to January)

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=0 mm (Negligibly small)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 500 mm  
 Other Water Requirement = 50 mm  
 Effective Volume: 846m<sup>3</sup>  
 $846\text{m}^3 \times (500/550) \div 500\text{mm} = 1,538\text{m}^2 = \mathbf{0.15\text{ha}}$

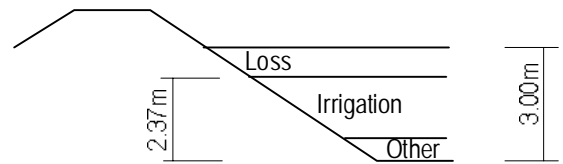
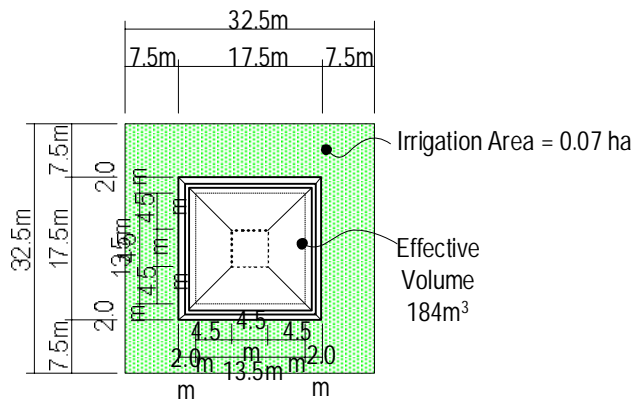
### Required Catchment for the Pond

#### Crop-1 (August to October)

Monthly 80% dependable specific runoff in July = 42 m<sup>3</sup>/ha/month  
 Initial Storage Requirement (by end of July)= 30 % = 253.8 m<sup>3</sup>  
 Required Catchment =  $253.8 \div 42 = 6.0\text{ ha}$   
 = **6.0 ha (about 104 times of the pond area)**

#### Crop-2 (November to January)

Monthly 80% dependable specific runoff in October = 327 m<sup>3</sup>/ha/month  
 Storage Requirement (by end of October)= 100% = 846 m<sup>3</sup>  
 Required Catchment =  $846 \div 327 = 2.6\text{ ha}$   
 = **2.6 ha (about 45 times of the pond area)**



### Irrigable Area

#### Crop-1 (August to October)

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=240 mm (Takeo Town, August to October)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 200 mm  
 Other Water Requirement = 50 mm  
 Evaporation Loss=5mm/day x 90 days = 450mm  
 Percolation Loss=2mm/day x 90 days = 180mm  
 Effective Depth = 2.37m (3.00 - 0.45 - 0.18)  
 Side slope of pond = 1:1.5  
 Effective Volume:  
 $(4.5\text{m} \times 4.5\text{m} + 11.61\text{m} \times 11.61\text{m}) \div 2 \times (3\text{m} - 0.45\text{m} - 0.18\text{m}) = 184\text{m}^3$   
 $184\text{m}^3 \times (200/250) \div 200\text{mm} = 1,287\text{m}^2 = \mathbf{0.07\text{ha}}$

#### Crop-2 (November to January)

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=0 mm (Negligibly small)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 500 mm  
 Other Water Requirement = 50 mm  
 Effective Volume: 184m³  
 $184\text{m}^3 \times (500/550) \div 500\text{mm} = 335\text{m}^2 = \mathbf{0.03\text{ha}}$

### Required Catchment for the Pond

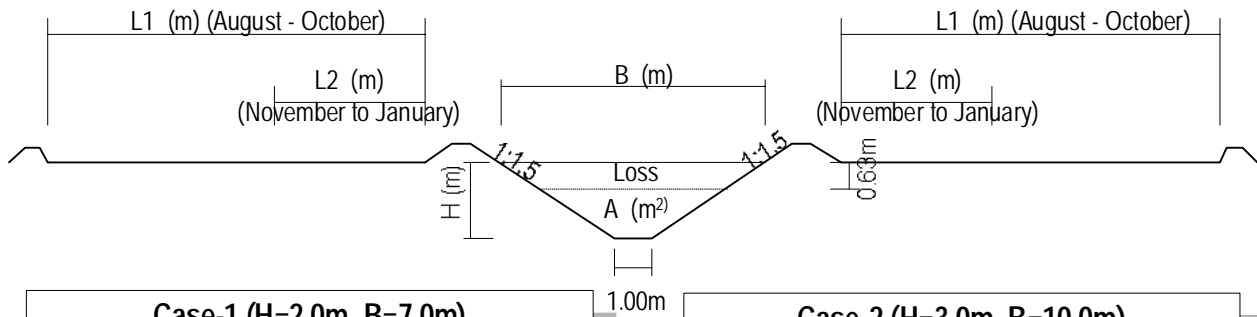
#### Crop-1 (August to October)

Monthly 80% dependable specific runoff in July = 42 m³/ha/month  
 Initial Storage Requirement (by end of July)= 30 % = 55.2 m³  
 Required Catchment =  $55.2 \div 42 = 1.314\text{ ha}$   
 = **1.3 ha (about 72 times of the pond area)**

#### Crop-2 (November to January)

Monthly 80% dependable specific runoff in October = 327m³/ha/month  
 Storage Requirement (by end of September)= 100% = 184 m³  
 Required Catchment =  $184 \div 327 = 0.563\text{ ha}$   
 = **0.6 ha (about 33 times of the pond area)**





**Case-1 (H=2.0m, B=7.0m)**

**Crop-1 (August to October)**

**H=2.0 m --> B=7.0 m**  
 Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=240 mm (Takeo Town)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 200 mm  
 Evaporation Loss=5mm/day x 90 days = 450mm  
 Percolation Loss=2mm/day x 90 days = 180mm  
 Effective Depth = 1.37m (2.00 - 0.45 - 0.18)  
 Side slope of pond = 1:1.5  
 Effective volume per meter:  
 $(1.00 + 5.11) / 2 \times 1.37 = 4.19 \text{ m}^3/\text{m (A)}$   
 $4.19 \text{ m}^3 / 200 \text{ mm} = \underline{20.95 \text{ m}^2}$   
**10 m (L1) on both sides of the canal**  
 For getting 0.34 ha, the pond length should be **170m**.

**Case-2 (H=3.0m, B=10.0m)**

**Crop-1 (August to October)**

**H=3.0 m --> B=10.0 m**  
 Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall=240mm (Takeo Town)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 200 mm  
 Evaporation Loss=5mm/day x 90 days = 450mm  
 Percolation Loss=2mm/day x 90 days = 180mm  
 Effective Depth = 2.37m (2.00 - 0.45 - 0.18)  
 Side slope of pond = 1:1.5  
 Effective volume per meter:  
 $(1.00 + 8.11) / 2 \times 2.37 = 10.80 \text{ m}^3/\text{m (A)}$   
 $10.80 \text{ m}^3 / 200 \text{ mm} = \underline{54.0 \text{ m}^2}$   
**27 m (L1) on both sides of the canal**  
 For getting 0.34 ha, the pond length should be **63 m**.

**Crop-2 (December to February)**

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall = 0 mm (Takeo Town, Negligible)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 500 mm  
 $4.19 \text{ m}^3 / 500 \text{ mm} = \underline{8.38 \text{ m}^2}$   
**4 m (L2) on both sides of the canal**

**Crop-2 (December to February)**

Net Water Requirement = 400 mm (90 days)  
 Effective Rainfall = 0 mm (Takeo Town, Negligible)  
 Irrigation Efficiency=0.80  
 Gross Water Requirement for Irrigation= 500 mm  
 $10.80 \text{ m}^3 / 500 \text{ mm} = \underline{21.6 \text{ m}^2}$   
**11 m (L2) on both sides of the canal**

**Required Catchment for the Pond**

**Crop-1 (August to October)**

Monthly 80% dependable specific runoff in July  
 =  $42 \text{ m}^3/\text{ha}/\text{month}$   
 Initial Storage Requirement (by end of July)= 30 % =  
 $1.257 \text{ m}^3$   
 Required Catchment =  $1,257 \div 42 = 0.030 \text{ ha}$   
 = **0.03 ha (about 43 times of the pond area)**

**Crop-2 (November to January)**

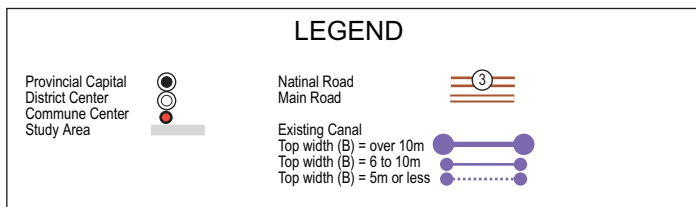
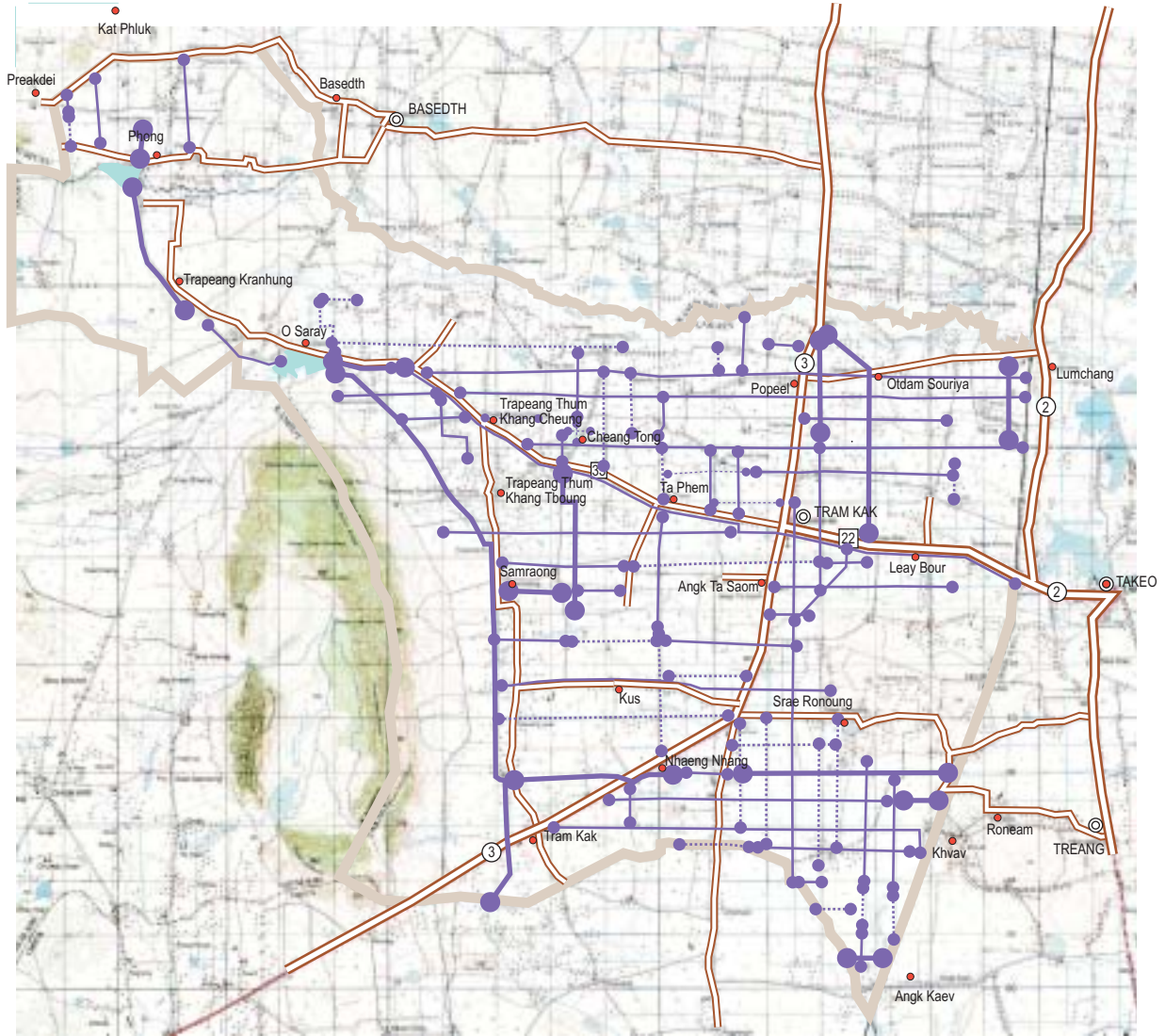
Storage Requirement (by end of October)= 100% =  
 $4.19 \text{ m}^3$   
 Required Catchment =  $4.19 \div 327 = 0.013 \text{ ha}$   
 = **0.02 ha (about 29 times of the pond area)**

**Crop-1 (August to October)**

Monthly 80% dependable specific runoff in July  
 =  $42 \text{ m}^3/\text{ha}/\text{month}$   
 Initial Storage Requirement (by end of July)= 30 % =  
 $3.240 \text{ m}^3$   
 Required Catchment =  $3,240 \div 42 = 0.077 \text{ ha}$   
 = **0.08 ha (about 80 times of the pond area)**

**Crop-2 (November to January)**

Storage Requirement (by end of October)= 100% =  
 $10.8 \text{ m}^3$   
 Required Catchment =  $10.8 \div 327 = 0.033 \text{ ha}$   
 = **0.04 ha (about 40 times of the pond area)**

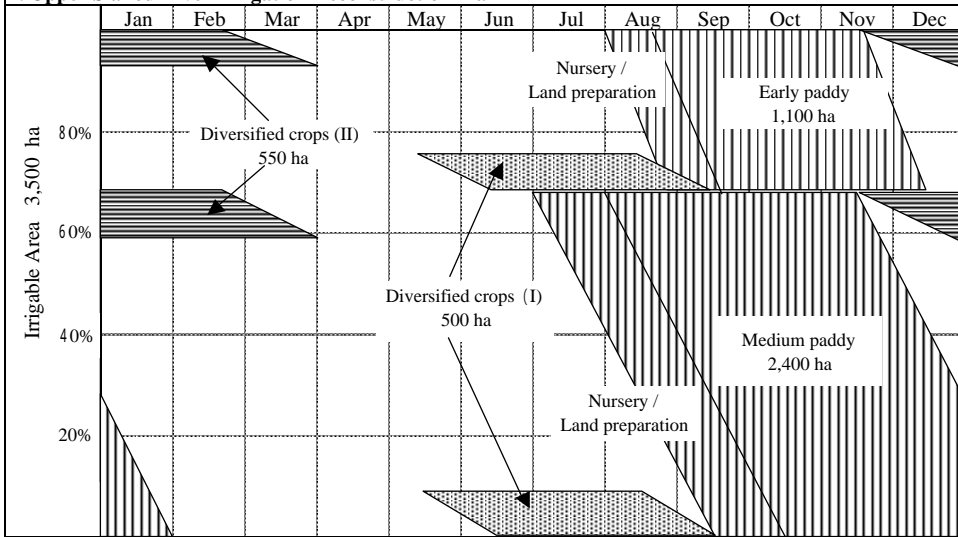


カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

図 II-4.4.4  
既存水路の水路幅

国際協力事業団

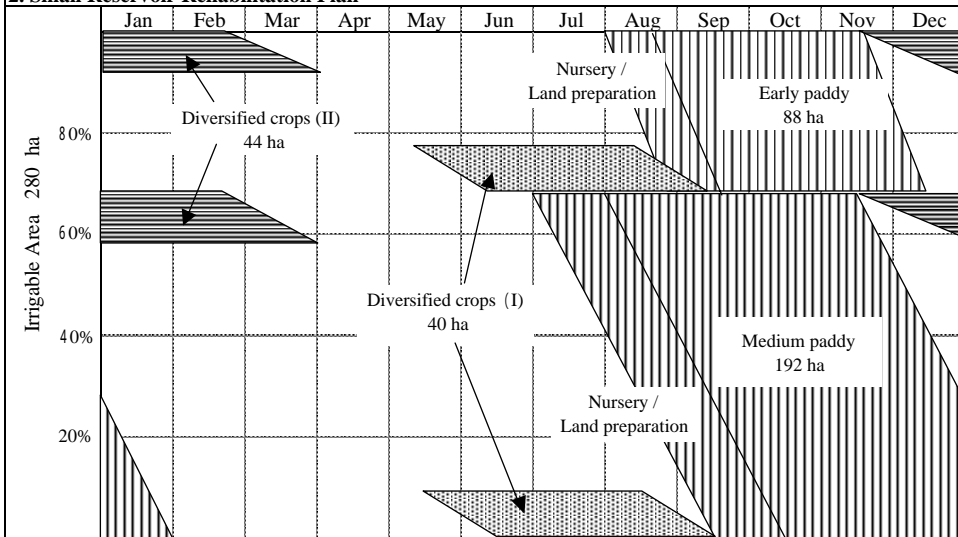
**1. Upper Slakou River Irrigation Reconstruction Plan**



Paddy		Area (ha)		
Medium paddy		1,100		
Early paddy		2,400		
<b>Total</b>		<b>3,500</b>		
Diversified cro		(I)	(II)	Total
Maize	80	0	80	
Groundnut	60	70	130	
Soybean and mung-bean	80	200	280	
Sesame	60	70	130	
Vegetables	220	210	430	
<b>Total</b>	<b>500</b>	<b>550</b>	<b>1,050</b>	<b>4,550</b>

Cropping Intensity 130%

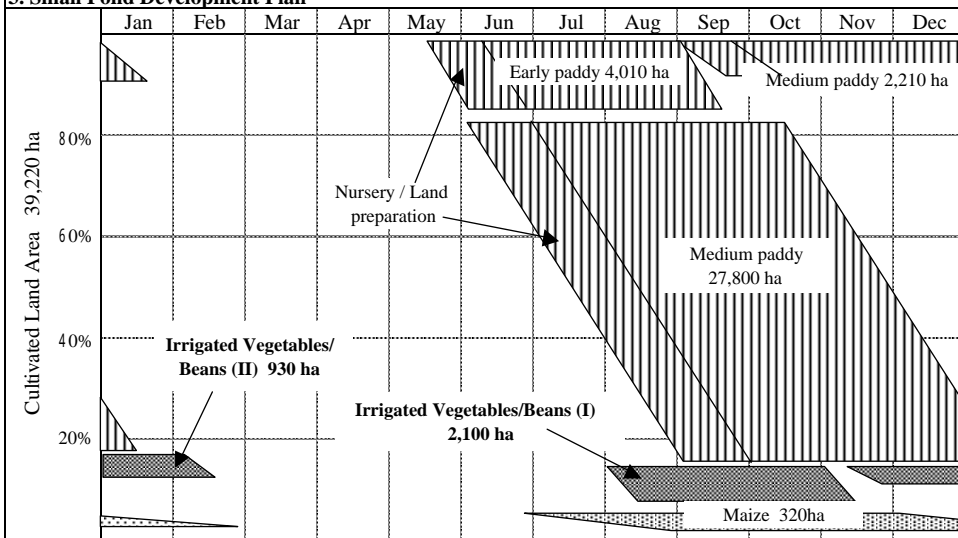
**2. Small Reservoir Rehabilitation Plan**



Paddy		Area (ha)		
Medium paddy		88		
Early paddy		192		
<b>Total</b>		<b>280</b>		
Diversified cro		(I)	(II)	Total
Maize	6.4	0.0	6.4	
Groundnut	4.8	5.6	10.4	
Soybean and mung-bean	6.4	16.0	22.4	
Sesame	4.8	5.6	10.4	
Vegetables	17.6	16.8	34.4	
<b>Total</b>	<b>40</b>	<b>44.0</b>	<b>84.0</b>	<b>364.0</b>

Cropping Intensity 130%

**3. Small Pond Development Plan**



Irrigated	Area (ha)		
	(I)	(II)	Total
Groundnut	260	120	380
Soybean and mung-bean	530	225	755
Sesame	260	120	380
Vegetables	1,050	465	1,515
<b>Total</b>	<b>2,100</b>	<b>930</b>	<b>3,030</b>
Rain-fed paddy			
Medium paddy			30,010
Early paddy			4,010
<b>Total</b>			<b>34,020</b>
Rainfed secondary crops			
Maize and sugarcane etc.			320
<b>Total</b>			<b>37,370</b>

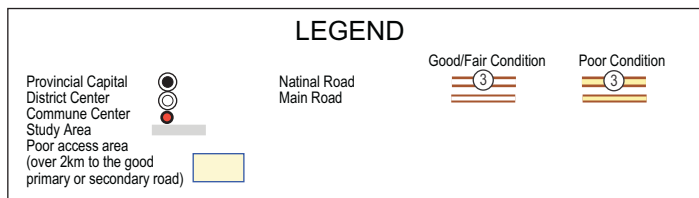
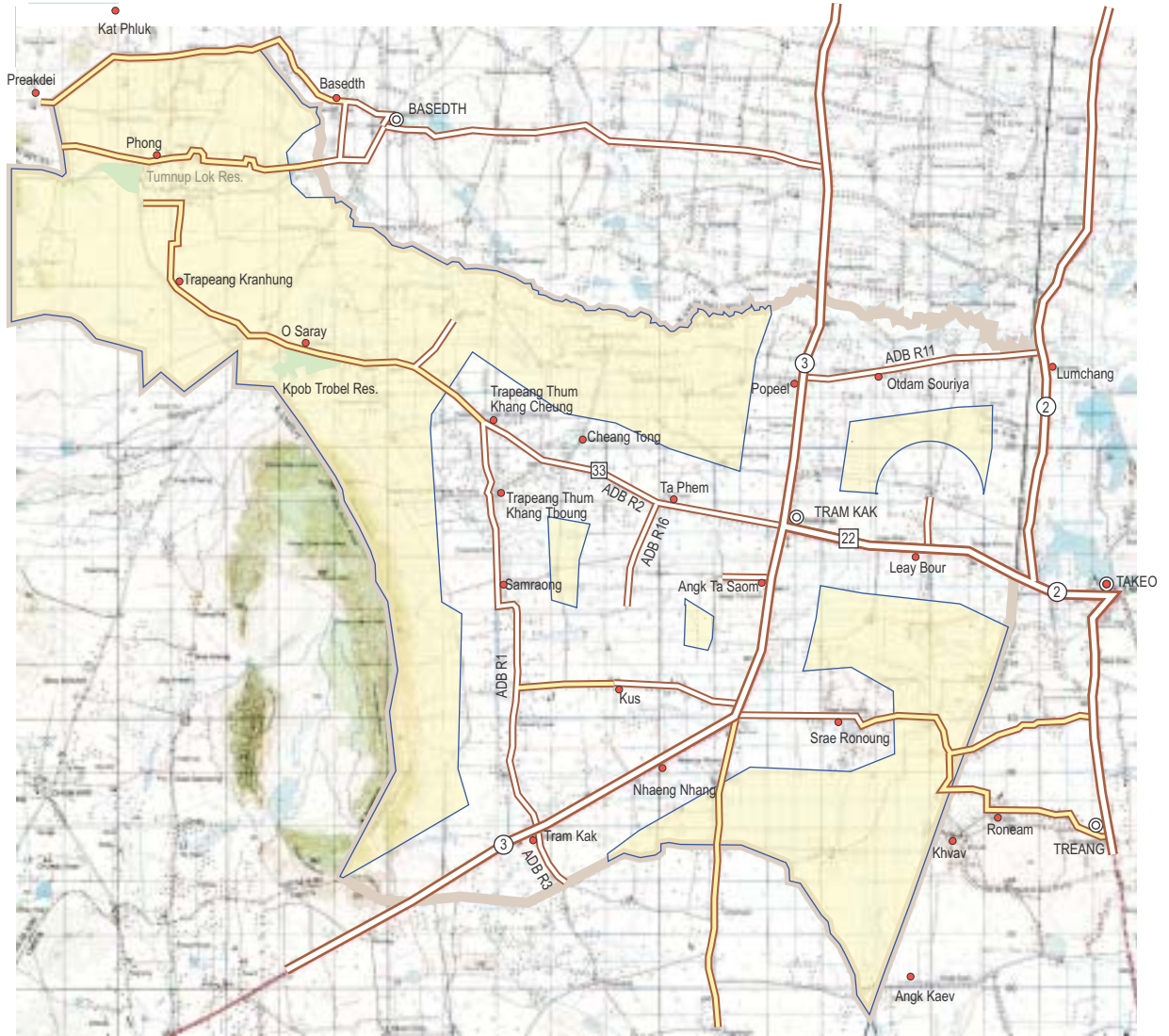
Cropping Intensity 95%

カンボディア国  
スラコウ川流域農業生産基盤復興開発計画調査

国際協力事業団

図 II-4.5.1

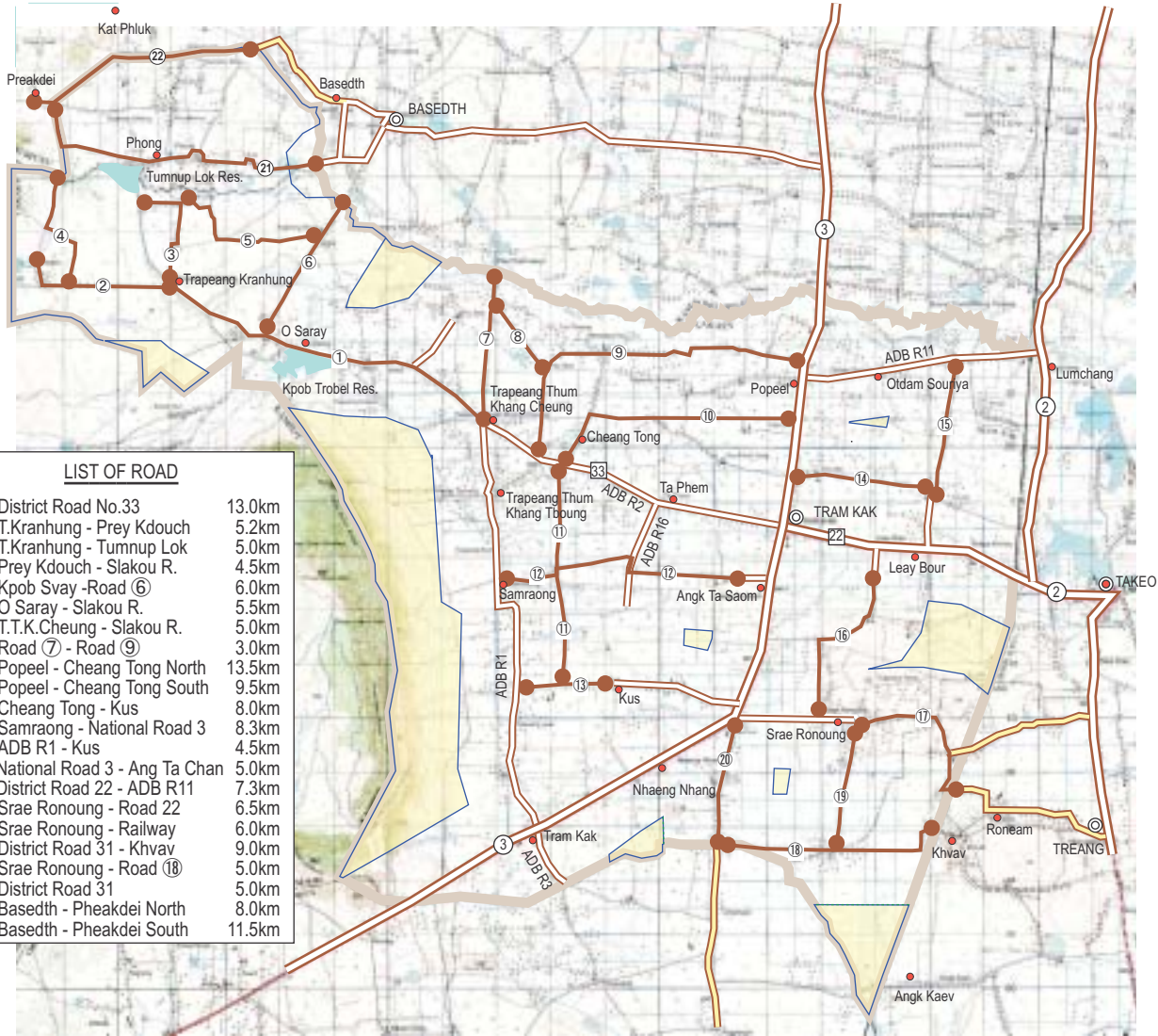
スラコウ川上流灌漑復興計画、小規模溜池改修計画及び池建設計画の作付体系



カンボディア国  
スラコウ河流域農業生産基盤復興開発計画調査  
国際協力事業団

図 II-4.6.1  
調査対象地域における幹線道路及び状況の  
良好な道路





**LIST OF ROAD**

① District Road No.33	13.0km
② T.Kranhung - Prey Kdouch	5.2km
③ T.Kranhung - Tumnup Lok	5.0km
④ Prey Kdouch - Slakou R.	4.5km
⑤ Kpob Svay - Road ⑥	6.0km
⑥ O Saray - Slakou R.	5.5km
⑦ T.T.K.Cheung - Slakou R.	5.0km
⑧ Road ⑦ - Road ⑨	3.0km
⑨ Popeel - Cheang Tong North	13.5km
⑩ Popeel - Cheang Tong South	9.5km
⑪ Cheang Tong - Kus	8.0km
⑫ Samraong - National Road 3	8.3km
⑬ ADB R1 - Kus	4.5km
⑭ National Road 3 - Ang Ta Chan	5.0km
⑮ District Road 22 - ADB R11	7.3km
⑯ Srae Ronoung - Road 22	6.5km
⑰ Srae Ronoung - Railway	6.0km
⑱ District Road 31 - Khvav	9.0km
⑲ Srae Ronoung - Road ⑱	5.0km
⑳ District Road 31	5.0km
㉑ Basedth - Pheakdei North	8.0km
㉒ Basedth - Pheakdei South	11.5km

**LEGEND**

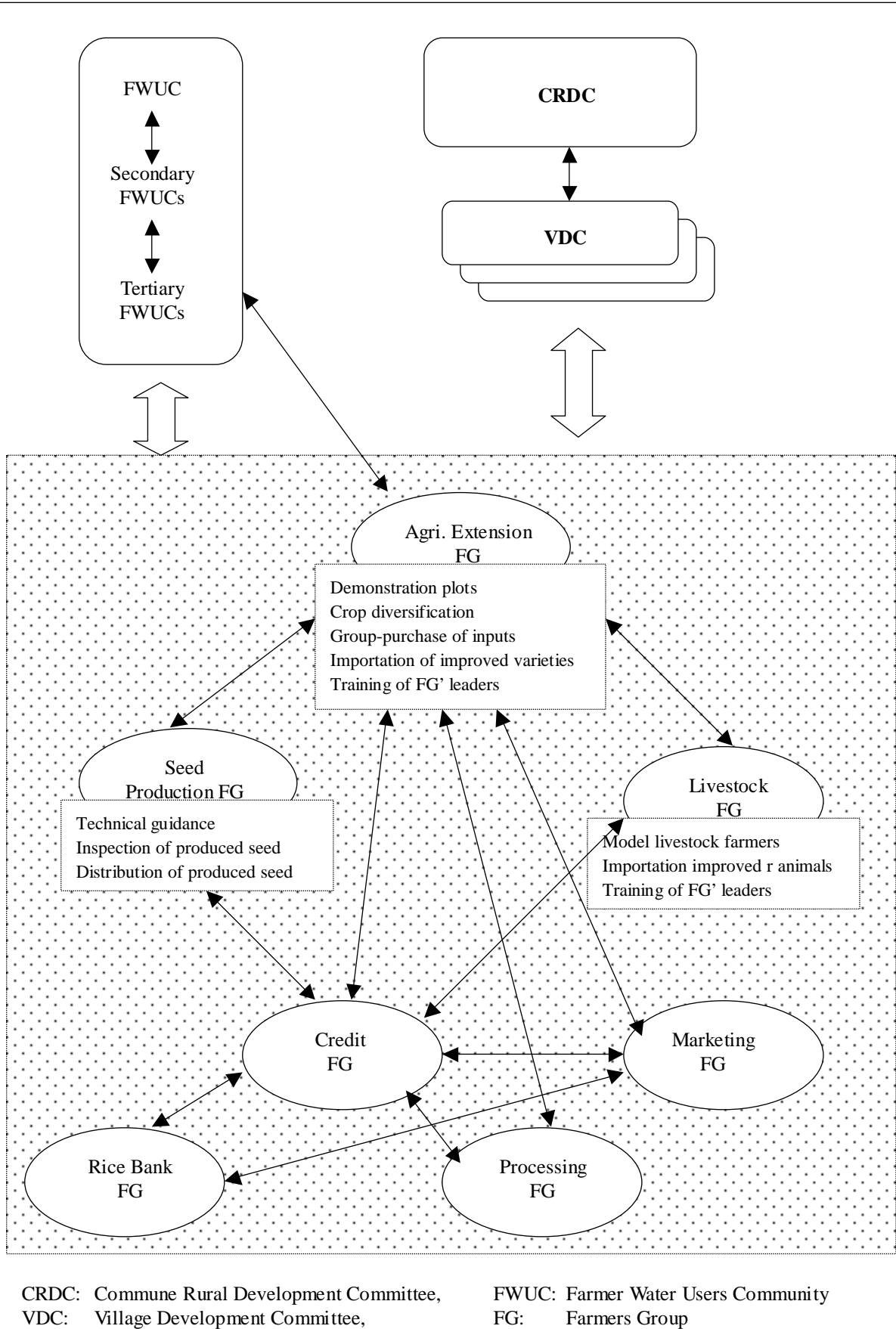
Provincial Capital	⊙	Natinal Road	③	Good/Fair Condition	③	Poor Condition	③
District Center	⊙	Main Road	③				
Commune Center	●	Road to be Rehabitated	⑫				
Study Area	■						
Poor access area (over 2km to the good primary or secondary road)	■						



カンボディア国  
スラコウ河流域農業生産基盤復興開発計画調査

図 II-4.6.2  
農道改修プログラム

国際協力事業団

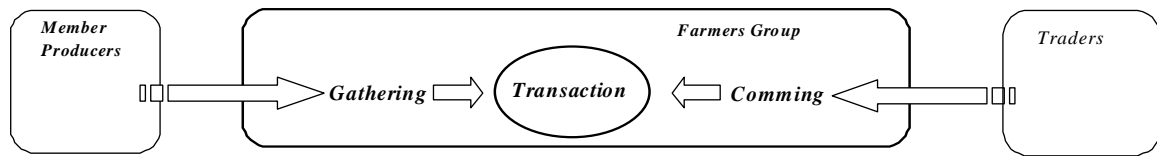


カンボディア国  
 スラコウ川流域農業生産基盤復興開発計画調査

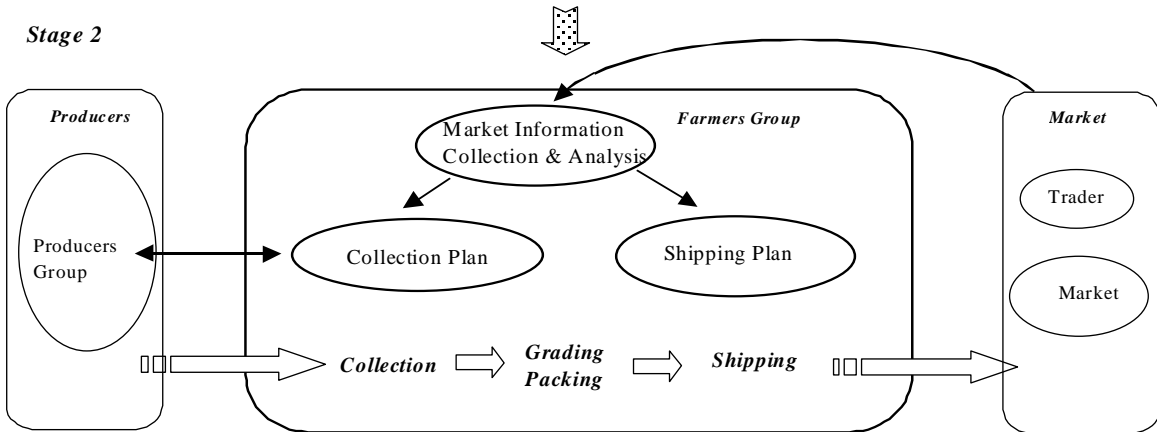
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図 II-4.7.1  
 農業普及農民グループと他の農民グループとの  
 関係

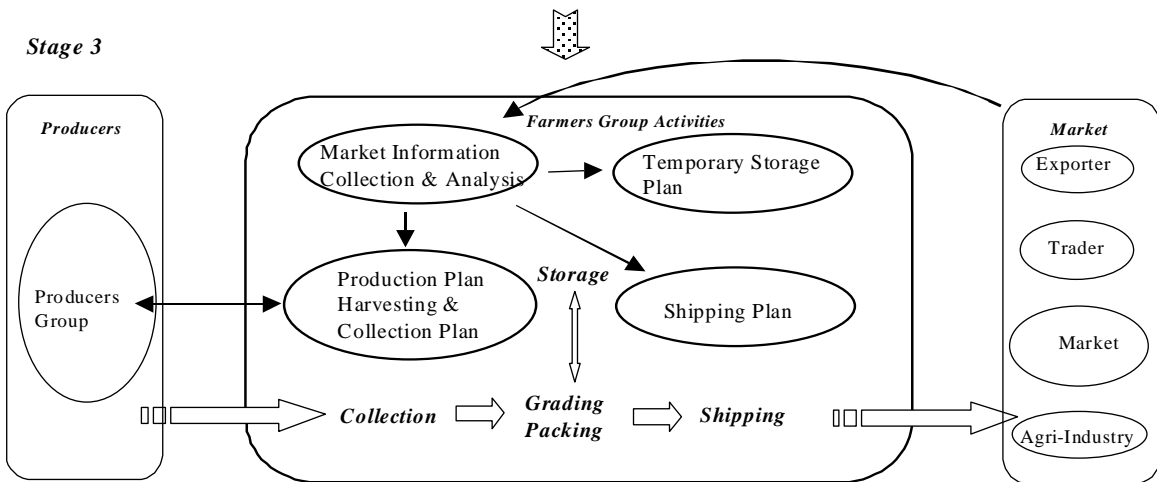




Stage 2



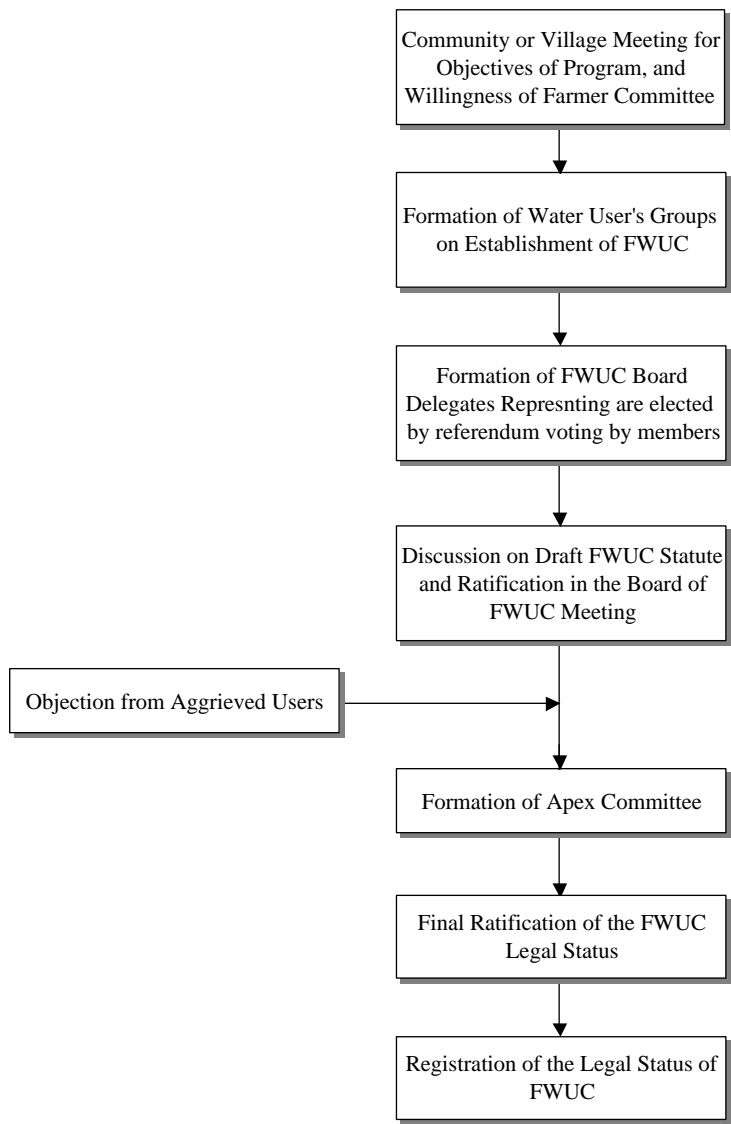
Stage 3



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図 II-4.7.2  
共同出荷活動概念図

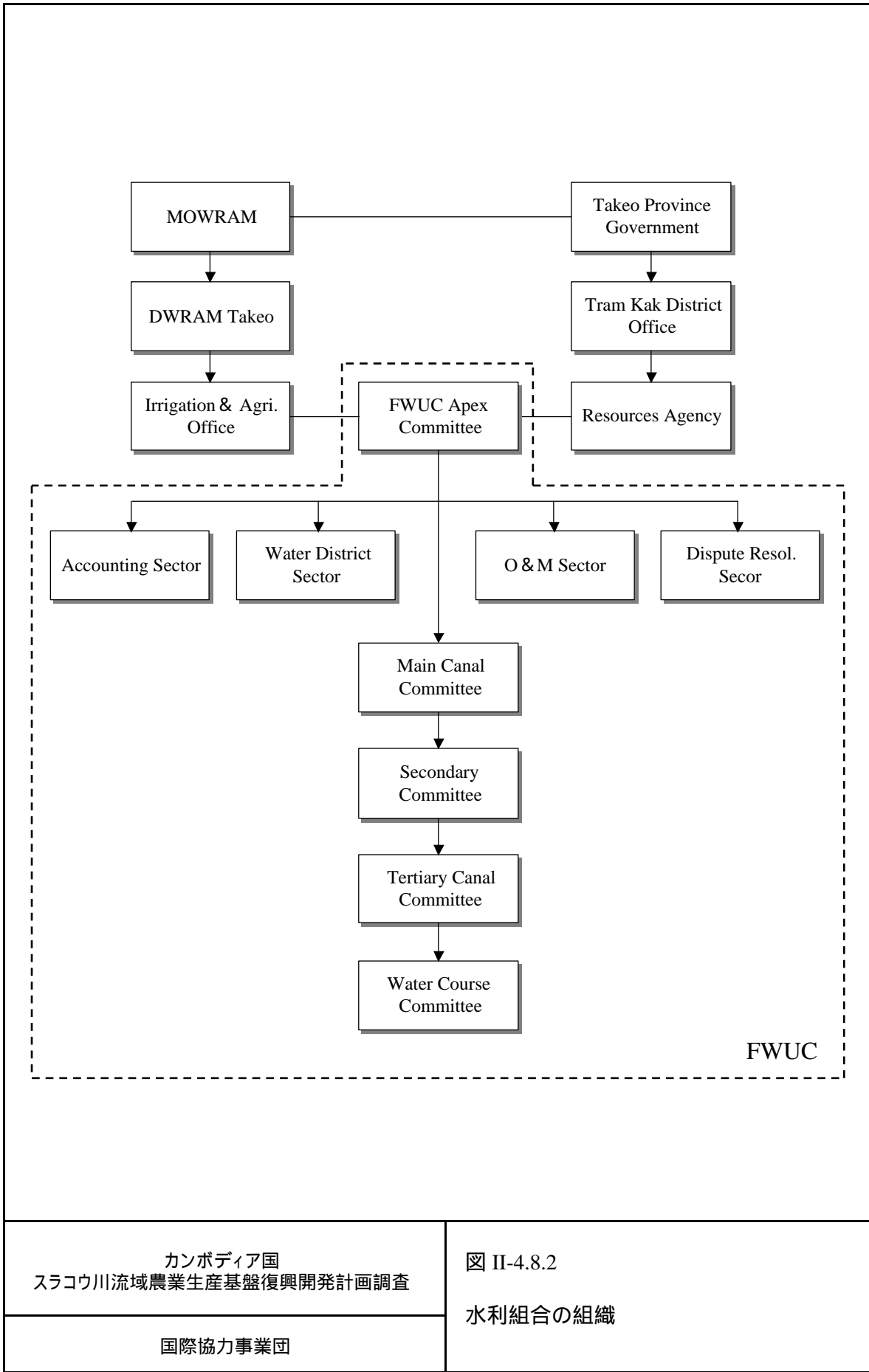


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図 II-4.8.1

水利組合の設立の手順

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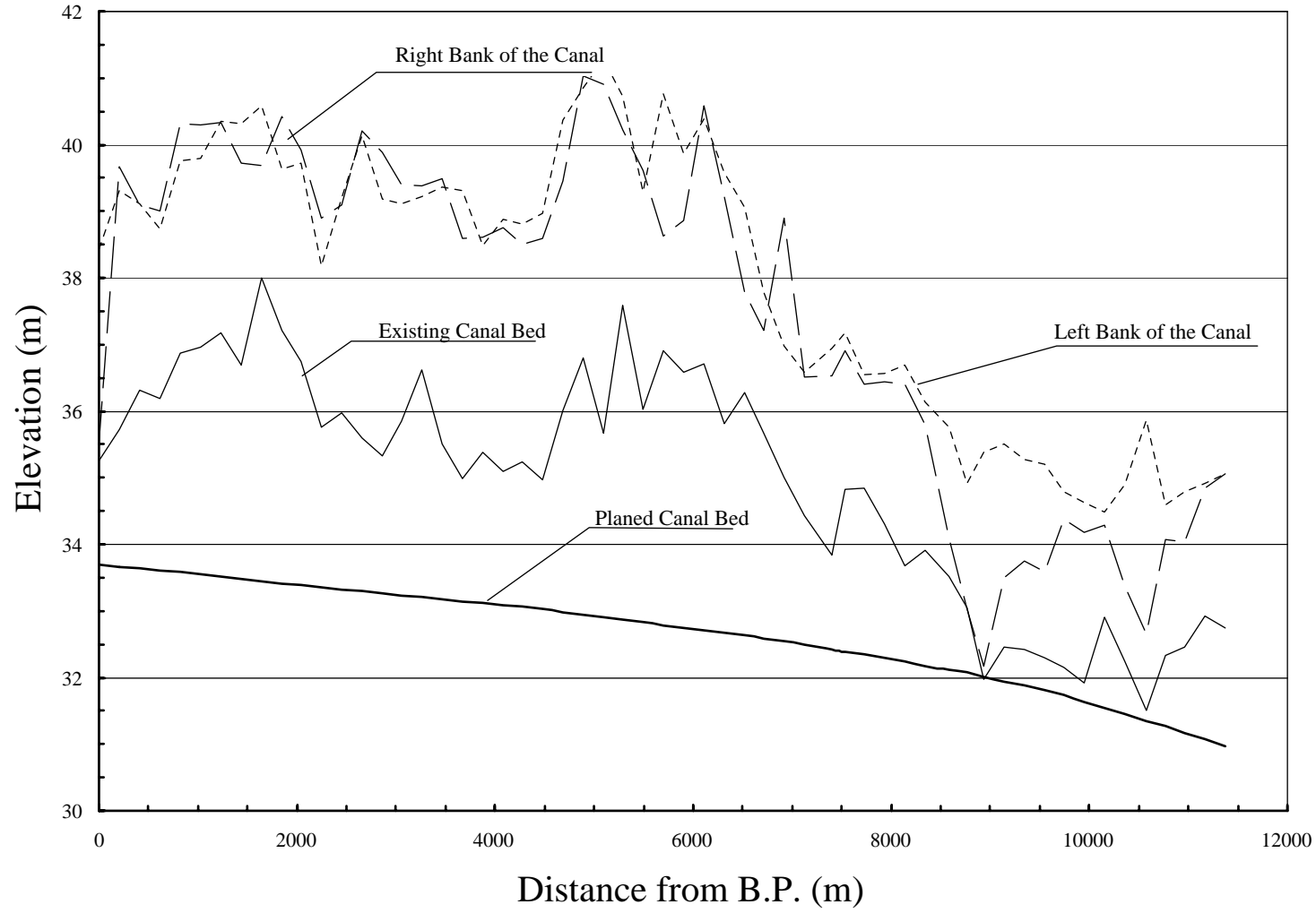


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図 II-4.8.2

水利組合の組織

国際協力事業団

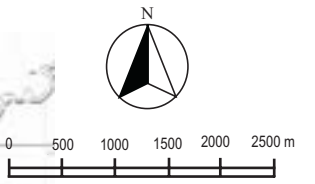
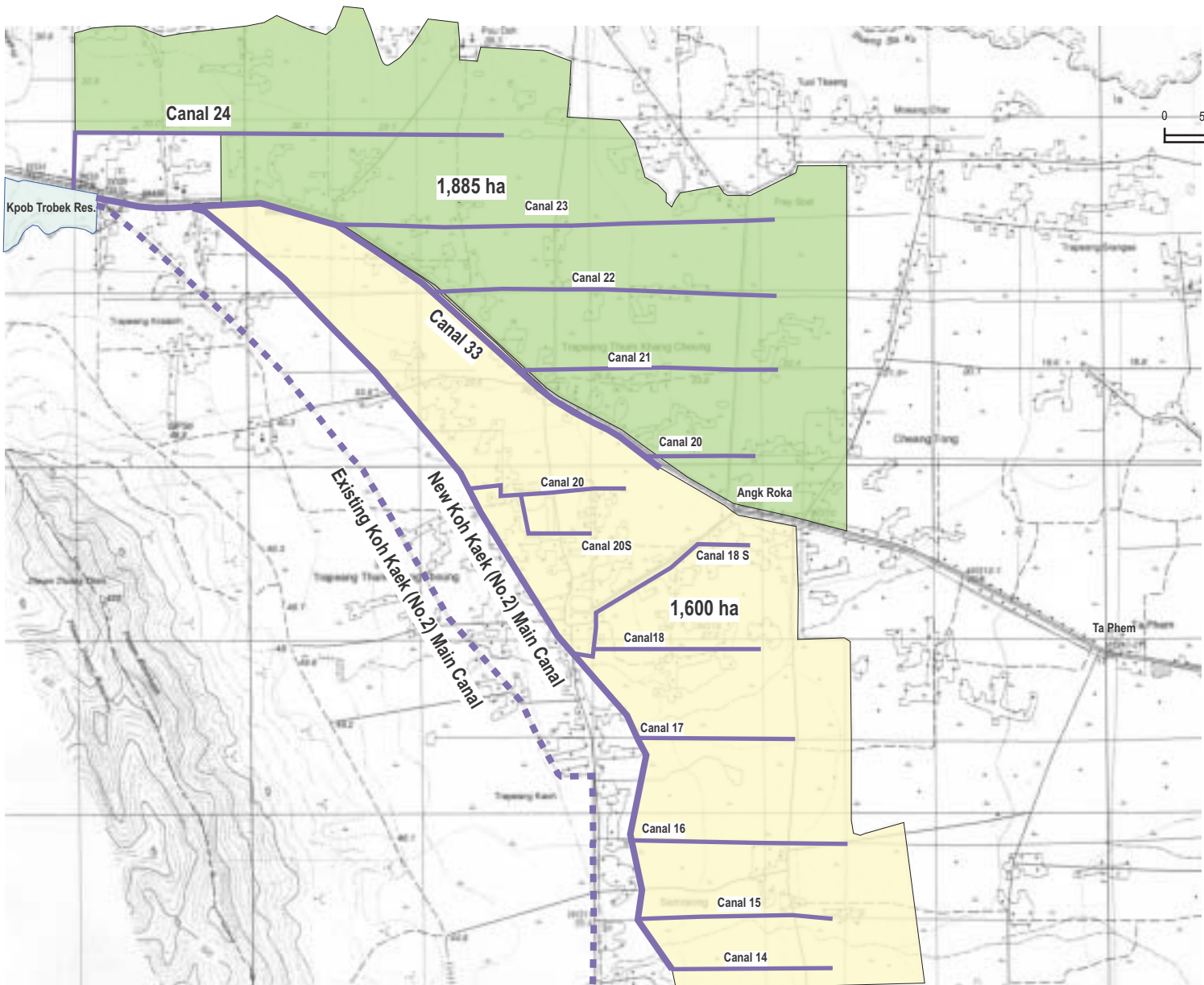


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図 III-1.1

既存Koh Kaek 水路縦断面図

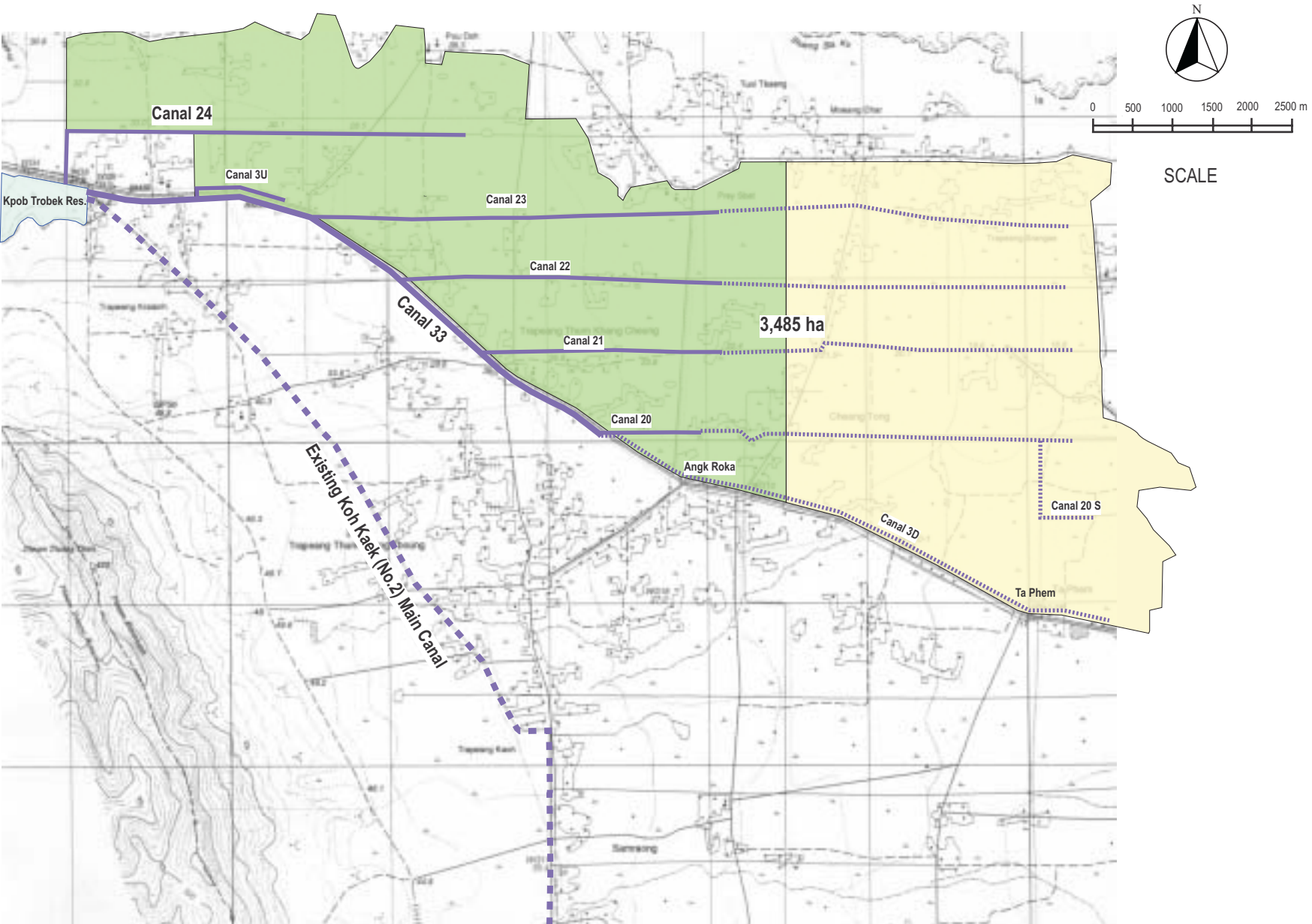


SCALE

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図 III-2.1  
代替案-1の灌漑地区



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図 III-2.2  
 代替案-2の灌漑地区