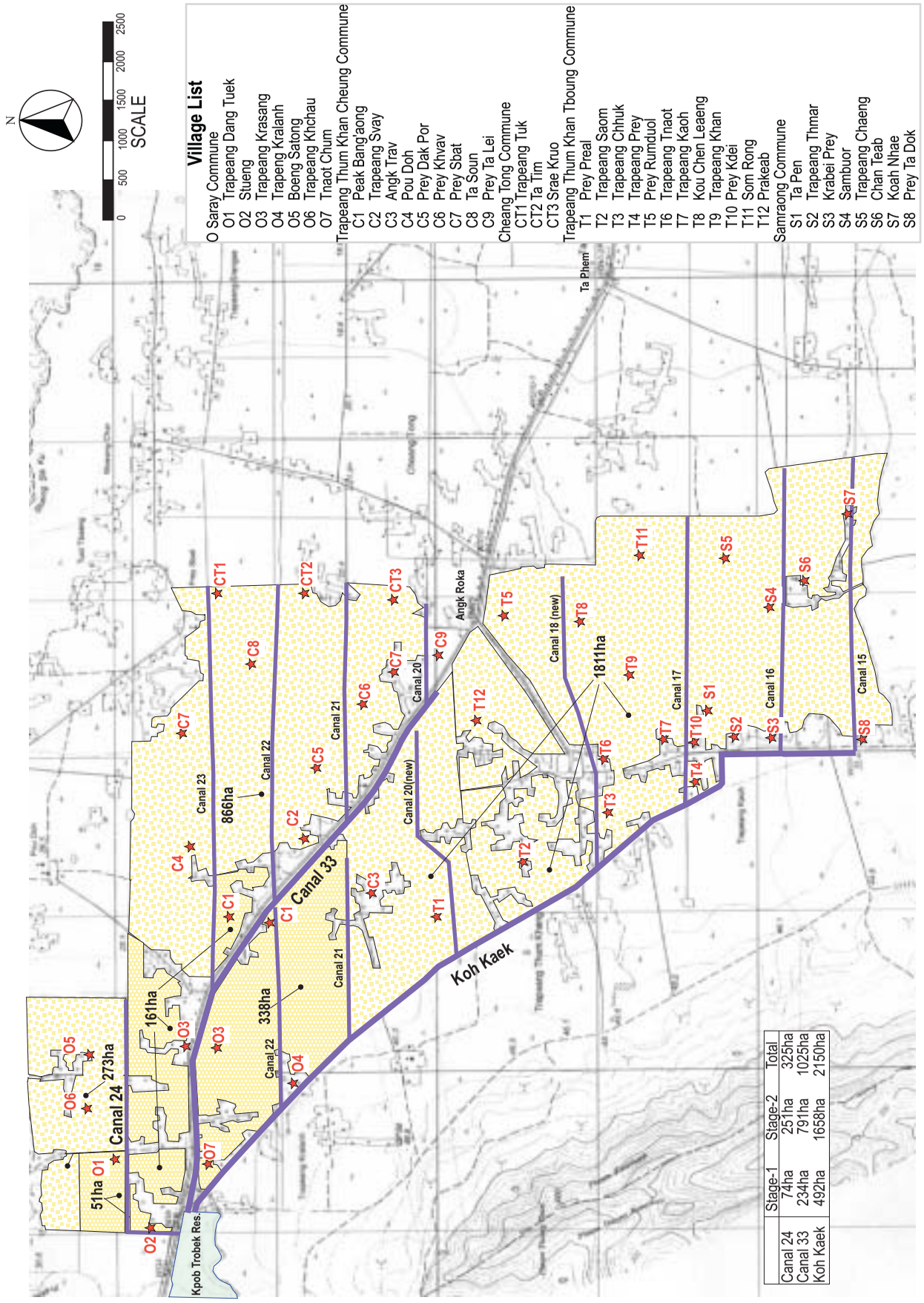

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Figure II-4.2.2

Irrigation Area of the Upper Slakou River Irrigation System

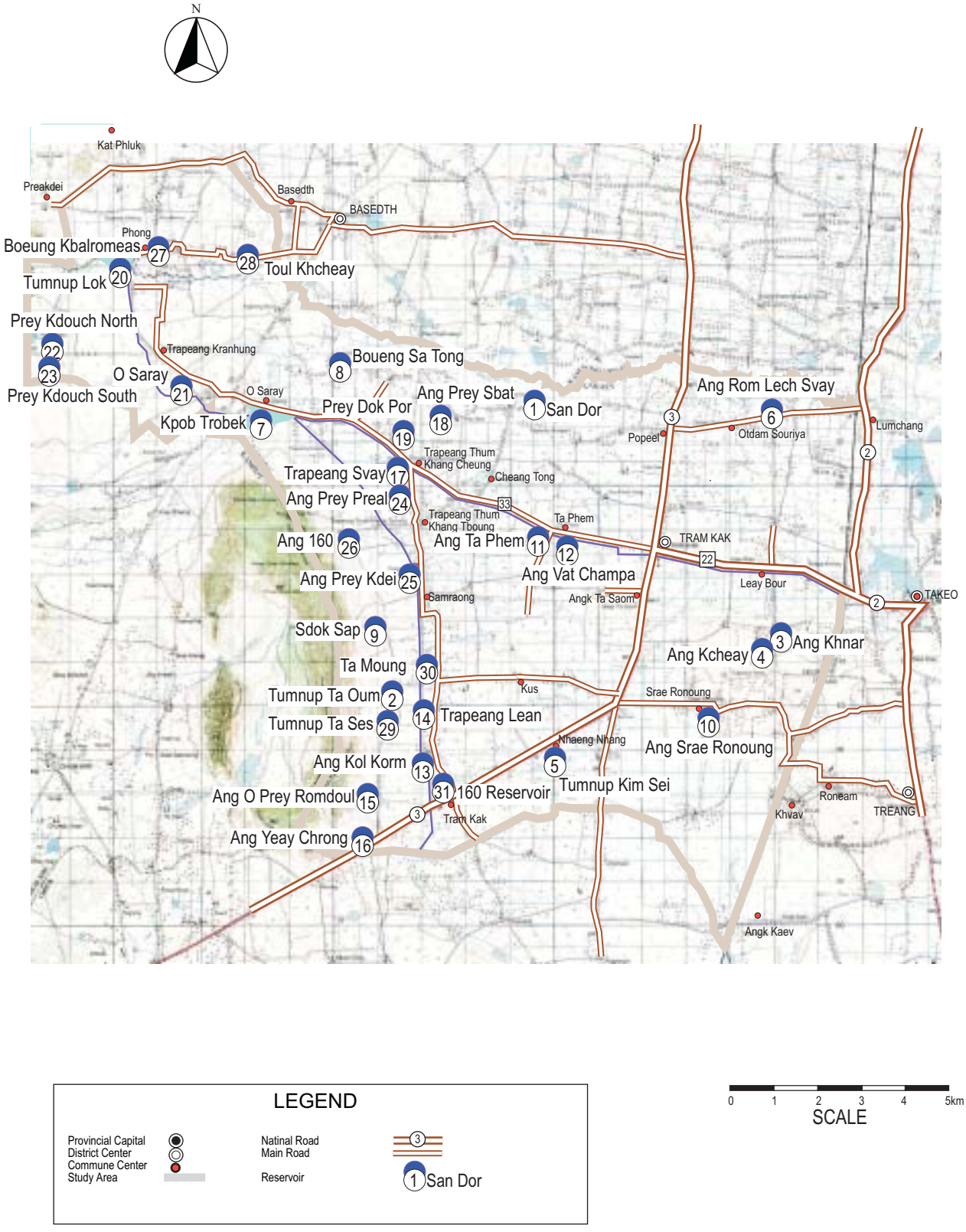

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Fig. II-4.3.1

Existing Small Reservoirs

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	A: 21~25, B:16~20, C:11~15, D:6~10, E:0~5
	Total Evaluation	**A**	

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.

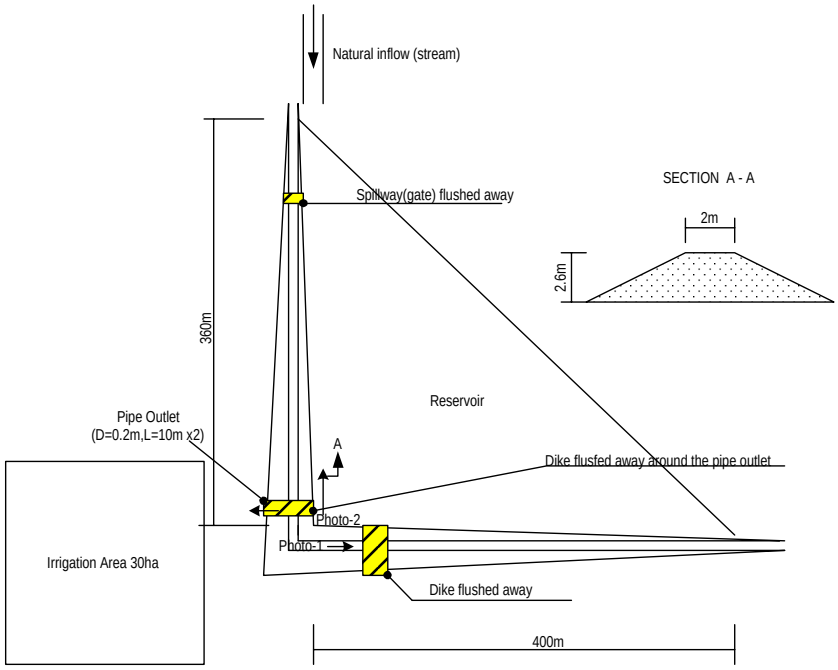

Photo-1

Dike was flushed away for 10 m long

Photo-2

Reservoir (dead water)

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Fig. II-4.3.2

Results of Evaluation of Ang 160 Reservoir, Trapeang Thum Khang Tboung Commune

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.

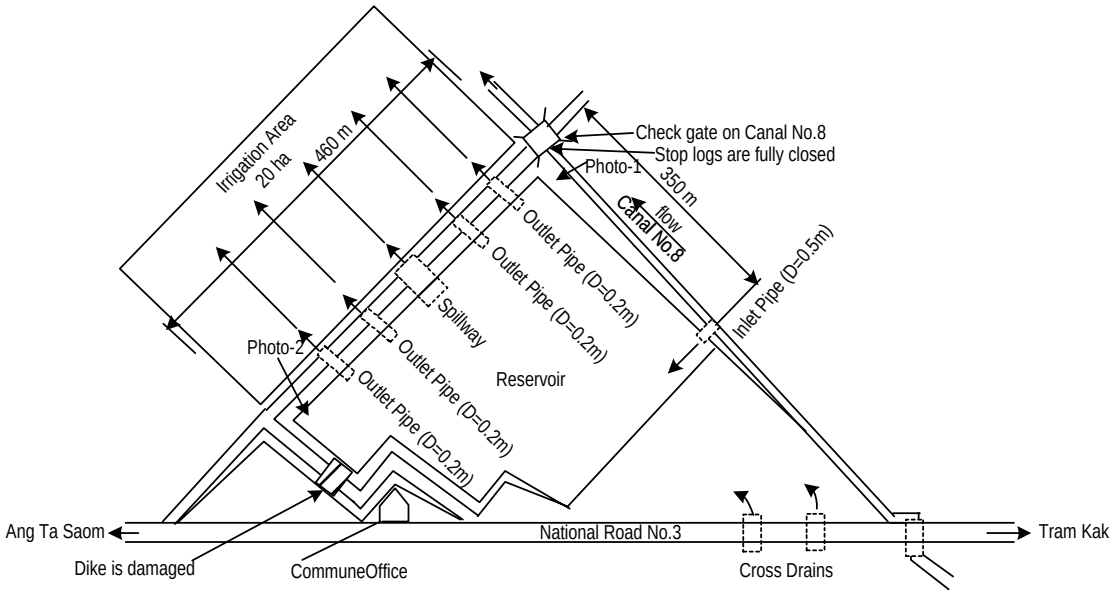

Photo-1

Reservoir (dead water)

Photo-2

Dike was flushed by the stored water

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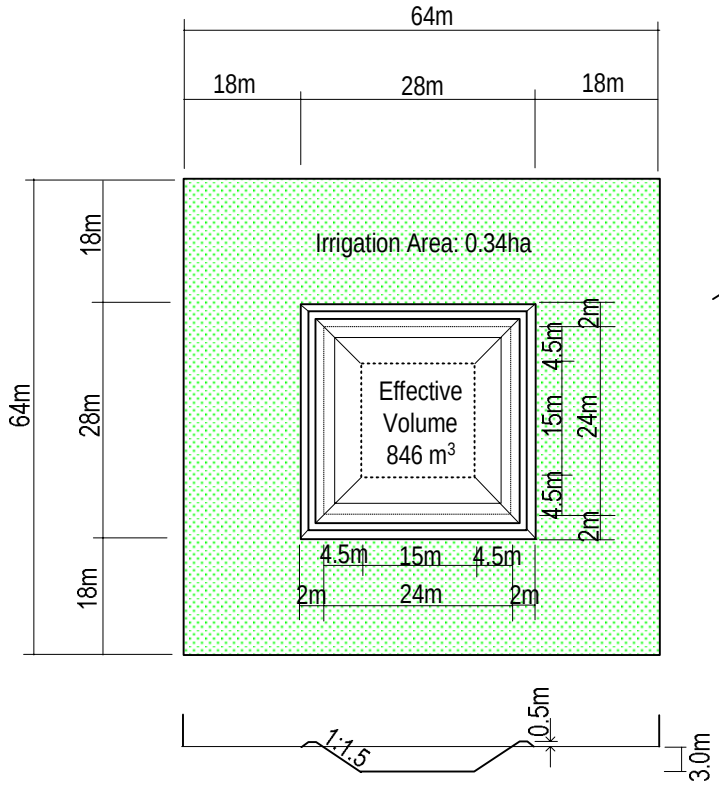
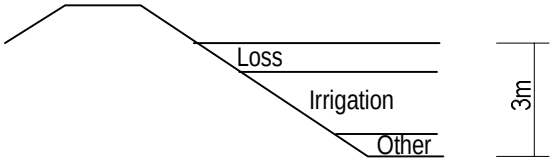
Fig. II-4.3.3

Results of Evaluation of Tumnup Kim Sei Reservoir, Nhaeng Nhang Commune





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
Percplation 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:
(15m x15m +22.11m x 22.11m) €2 x (3m-0.45m-0.18m)=846m^3
846m^3 x200/250) €200mm=3,384m^2=0.34 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^3
846m^3 x (500/550) €500mm=1,538m^2=0.15ha

Required Catchment for the Pond

Crop-1 (August to October)

Monthly 80% dependable specific runoff in July
= 42 m^3/ha/month
Initial Storage Requirement (by end of July)= 30 %
= 253.8 m^3
Required Catchment = 253.8 € 42 =6.0 ha
= 6.0 ha (about104 times of the pond area)

Crop-2 (November to January)

Monthly 80% dependable specific runoff in October
= 327 m^3/ha/month
Storage Requirement (by end of October)= 100% = 846 m^3
Required Catchment = 846 € 327=2.6 ha
= 2.6 ha (about 45 times of the pond area)

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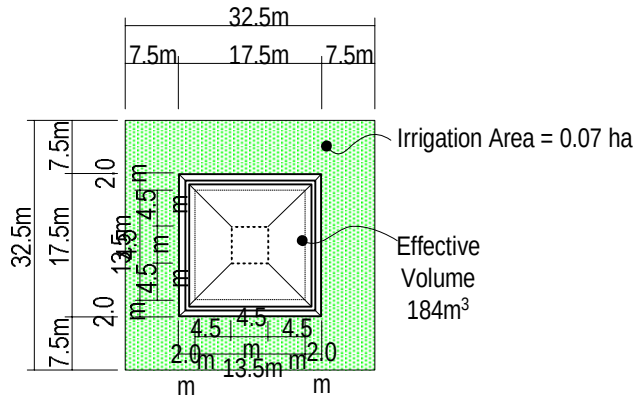
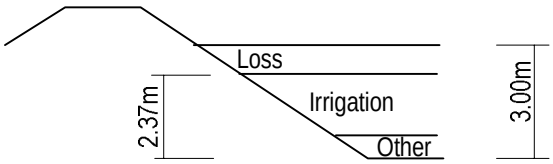
Fig.II-4.4.1

Model Pond Plan Operated by Farmers Group





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
Percplation 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:
(4.5m x4.5m +11.61m x 11.61m) €2 x (3m-0.45m-0.18m)=184m^3
184m^3 x(200/250) €200mm=1,287m^2=<u>0.07ha</u>

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: 184m^3
184m^3 x (500/550) €500mm=335m^2=<u>0.03ha</u>

Required Catchment for the Pond

Crop-1 (August to October)

Monthly 80% dependable specific runoff in July
= 42 m^3/ha/month
Initial Storage Requirement (by end of July)= 30 %
= 55.2 m^3
Required Catchment = 55.2 € 42=1.314 ha
= <u>1.3 ha (about 72 times of the pond area)</u>

Crop-2 (November to January)

Monthly 80% dependable specific runoff in October
= 327m^3/ha/month
Storage Requirement (by end of September)= 100%
= 184 m^3
Required Catchment = 184 € 327 =0.563 ha
= 0.6 ha (about 33 times of the pond area)

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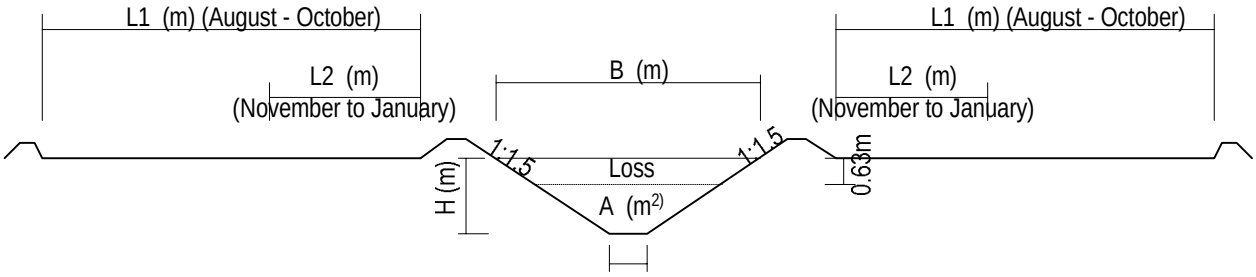
Fig. II-4.4.2

Model Pond Plan Operated by Individual Farmers



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
Percplation 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 x 1.37 = 4.19 m^3/m (A)
4.19 m^3 / 200 mm= 20.95m^2
10 m (L1) on both sides of the canal
For getting 0.34 ha, the pond length should be 170m.

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 m^3 / 500 mm= 8.38m^2
4 m (L2) on both sides of the canal

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
Percplation 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 x 2.37 = 10.80 m^3/m (A)
10.80 m^3 / 200 mm= 54.0 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
10.80 m^3 / 500 mm= 21.6 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 m^3/ha/month
Initial Storage Requirement (by end of July)= 30 % = 1.257 m^3
Required Catchment = 1,257 € 42 =0.030 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 m^3
Required Catchment = 4.19 €327 =0.013 ha
= 0.02 ha (about 29 times of the pond area)

Crop-1 (August to October)

Monthly 80% dependable specific runoff in July
= 42 m^3/ha/month
Initial Storage Requirement (by end of July)= 30 % = 3.240 m^3
Required Catchment = 3.240 € 42=0.077 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 m^3
Required Catchment = 10.8 €327 =0.033 ha
= 0.04 ha (about 40 times of the pond area)

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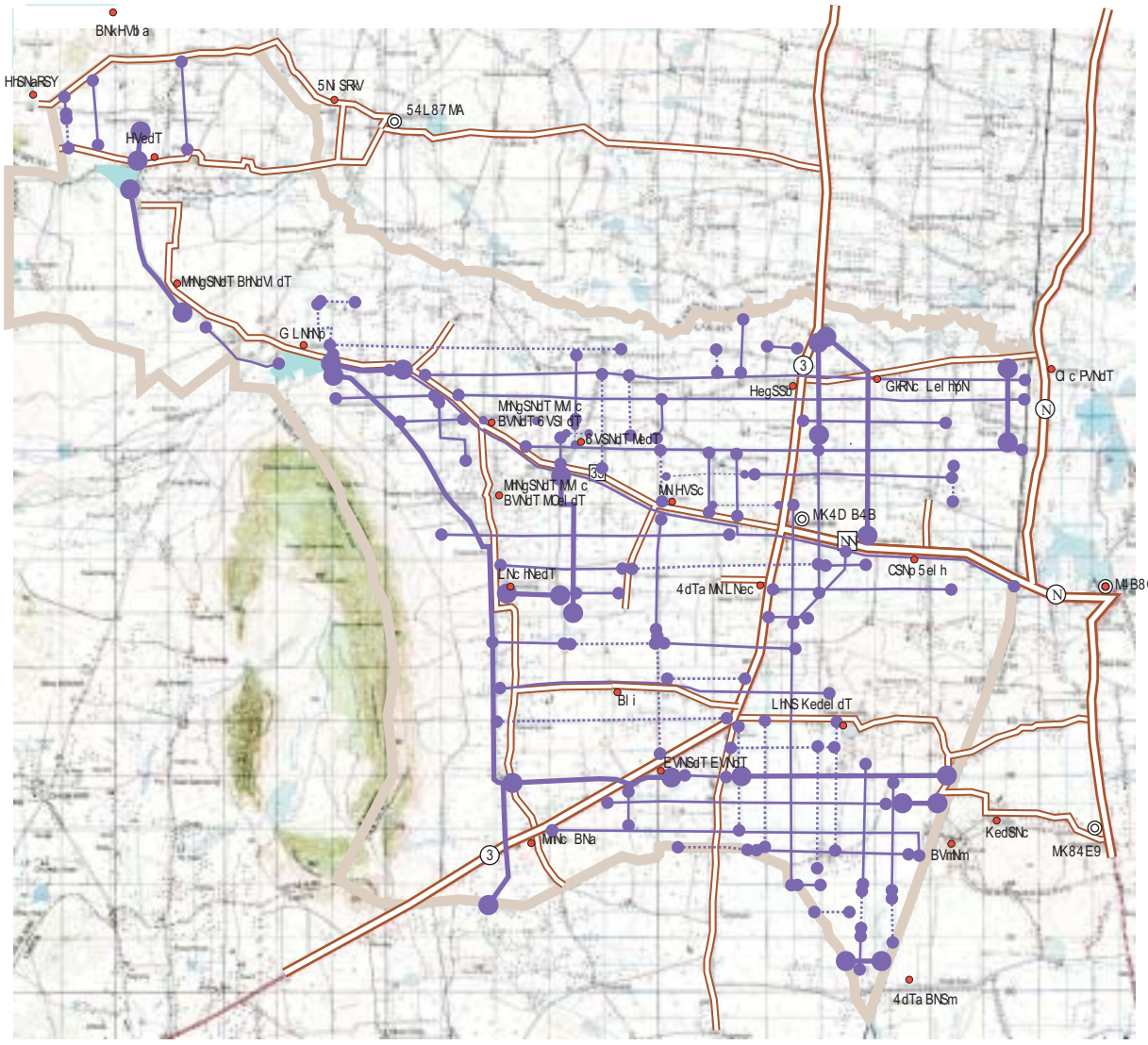
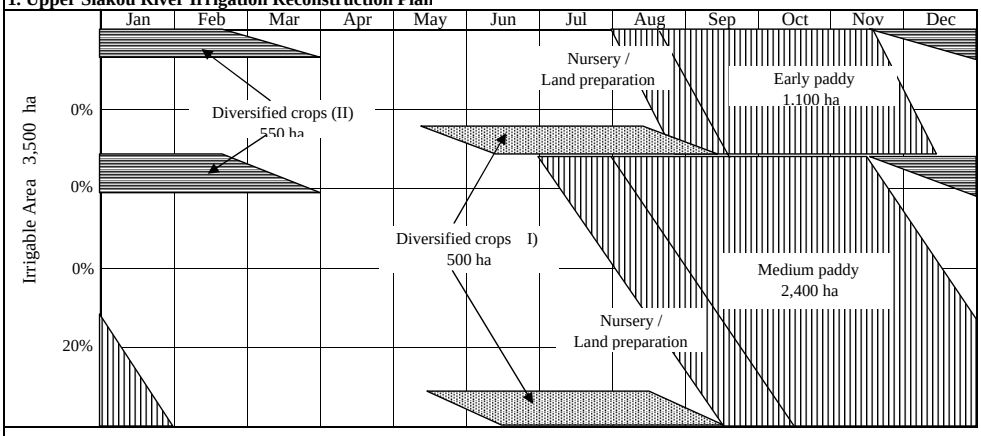
Fig. II-4.4.3

Model Pond Plan Utilizing Existing Canal



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin,The Kingdom of Cambodia	Fig. II-4.4.4 Existing Canal by Width
Japan International Cooperation Agency	

1. Upper Slakou River Irrigation Reconstruction Plan

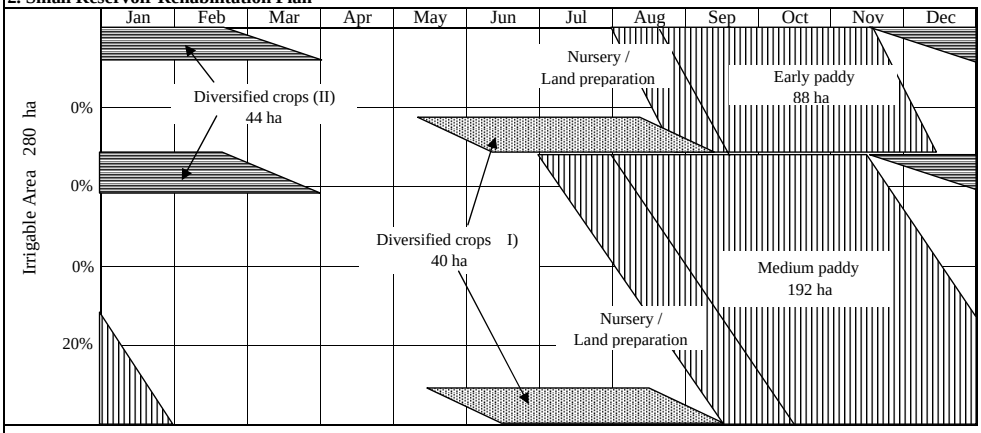


Paddy	Area (ha)
Medium paddy	1,100
Early paddy	2,400
Total	3,500

Diversified crop (	(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
Total	500	550	1,050
Total			4,550

Cropping Intensity 130%

2. Small Reservoir Rehabilitation Plan

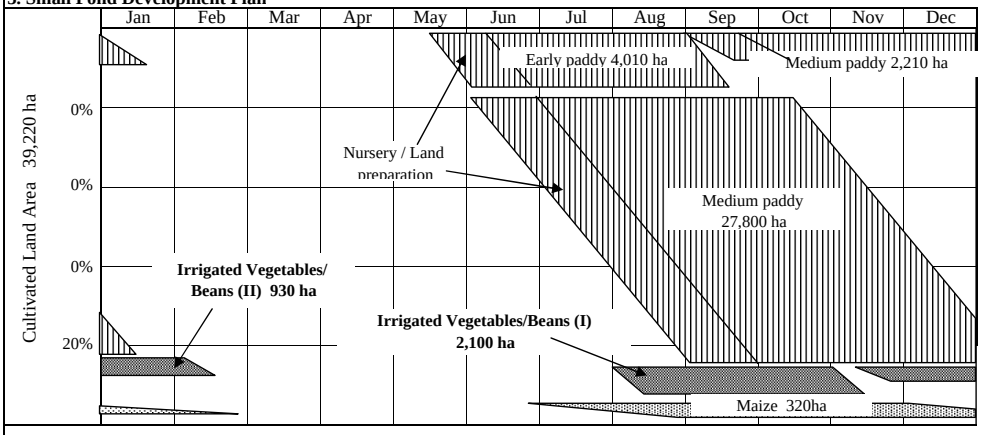


Paddy	Area (ha)
Medium paddy	88
Early paddy	192
Total	280

Diversified crop (	(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
Total	40	44.0	84.0
Total			364.0

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
Total	2,100	930	3,030
Rain-fed paddy			
Medium paddy			30,010
Early paddy			4,010
Total			34,020
Rainfed secondary crops			
Maize and sugarcane etc.			320
Total			37,370

Cropping Intensity 95%

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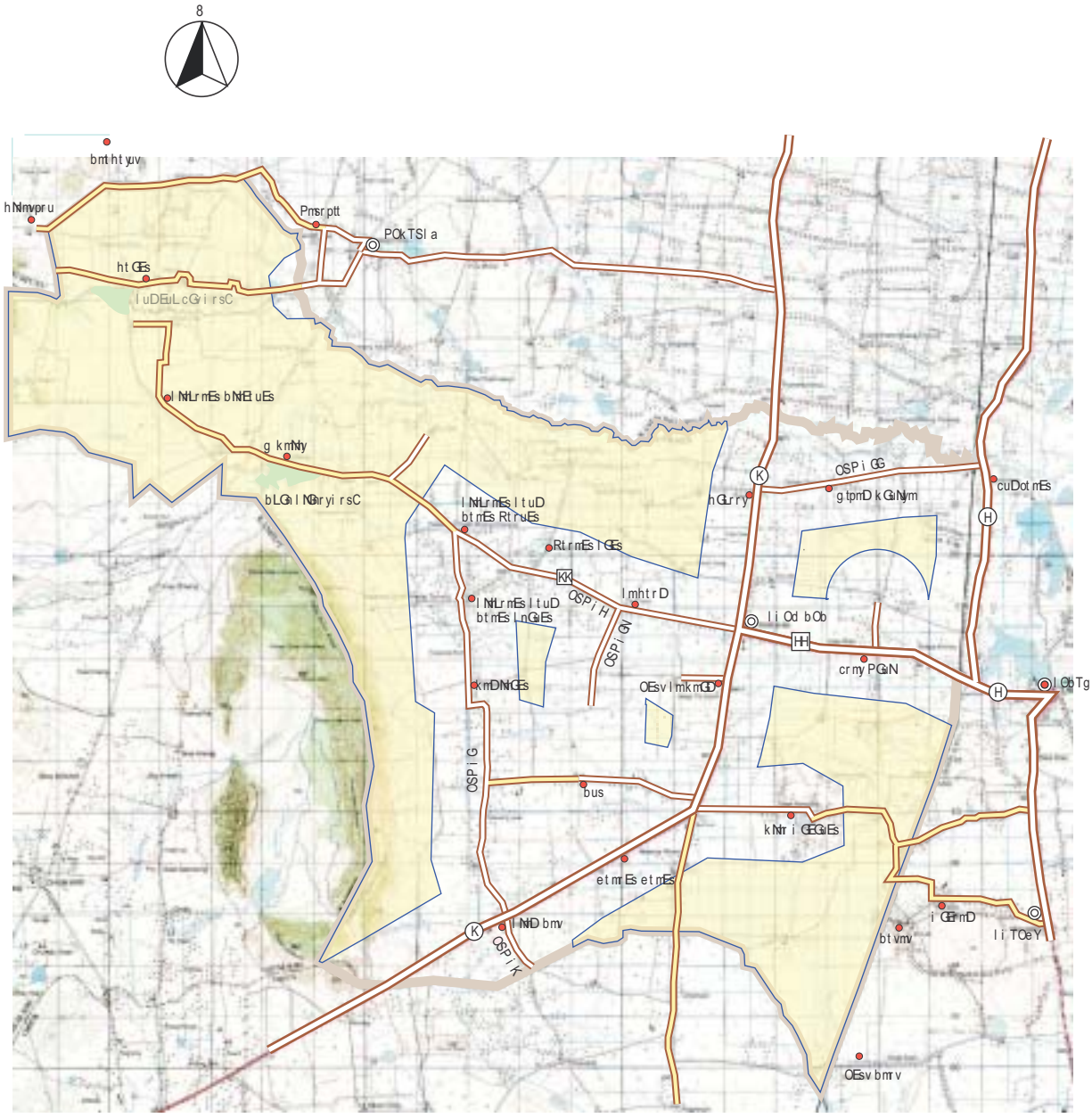
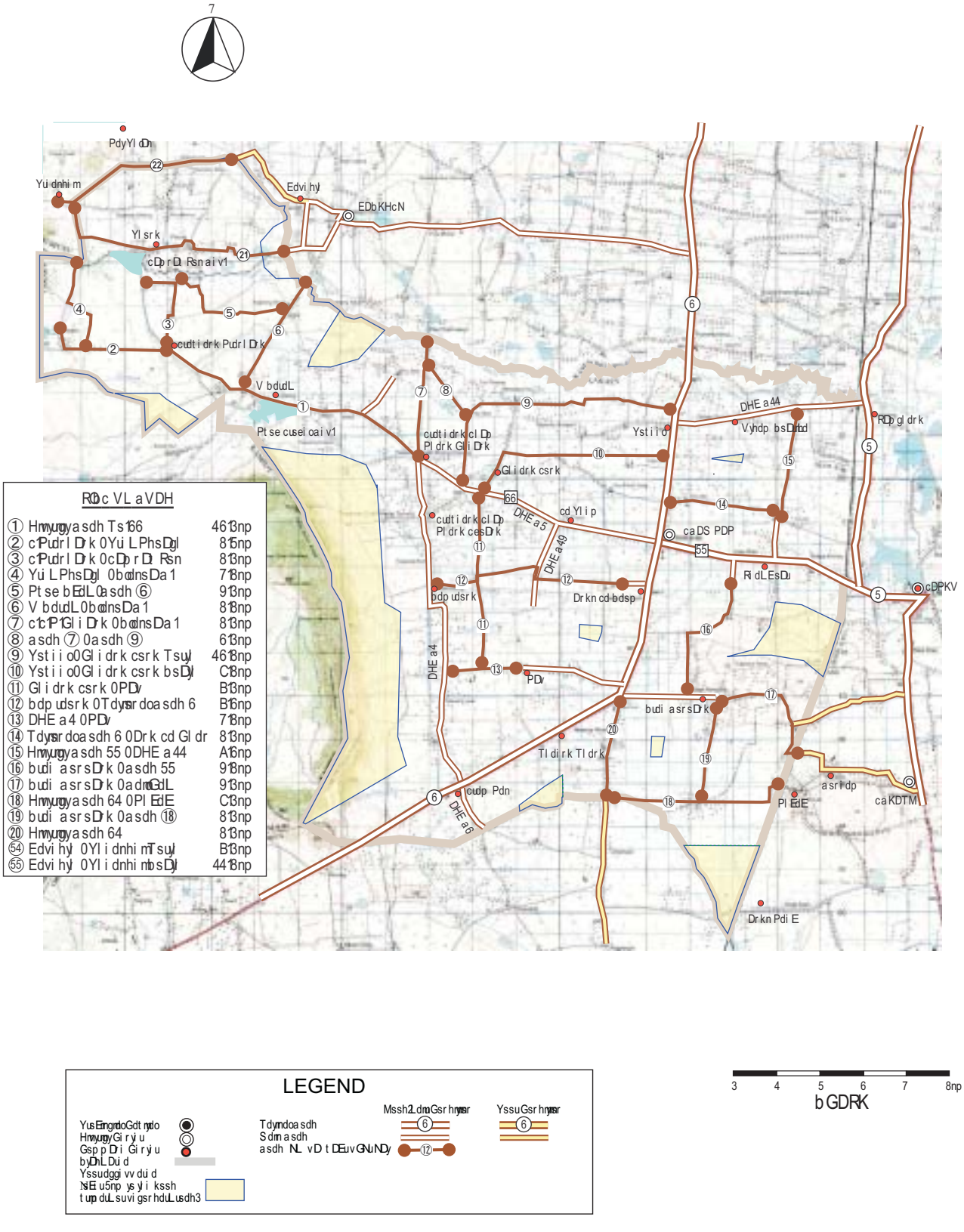
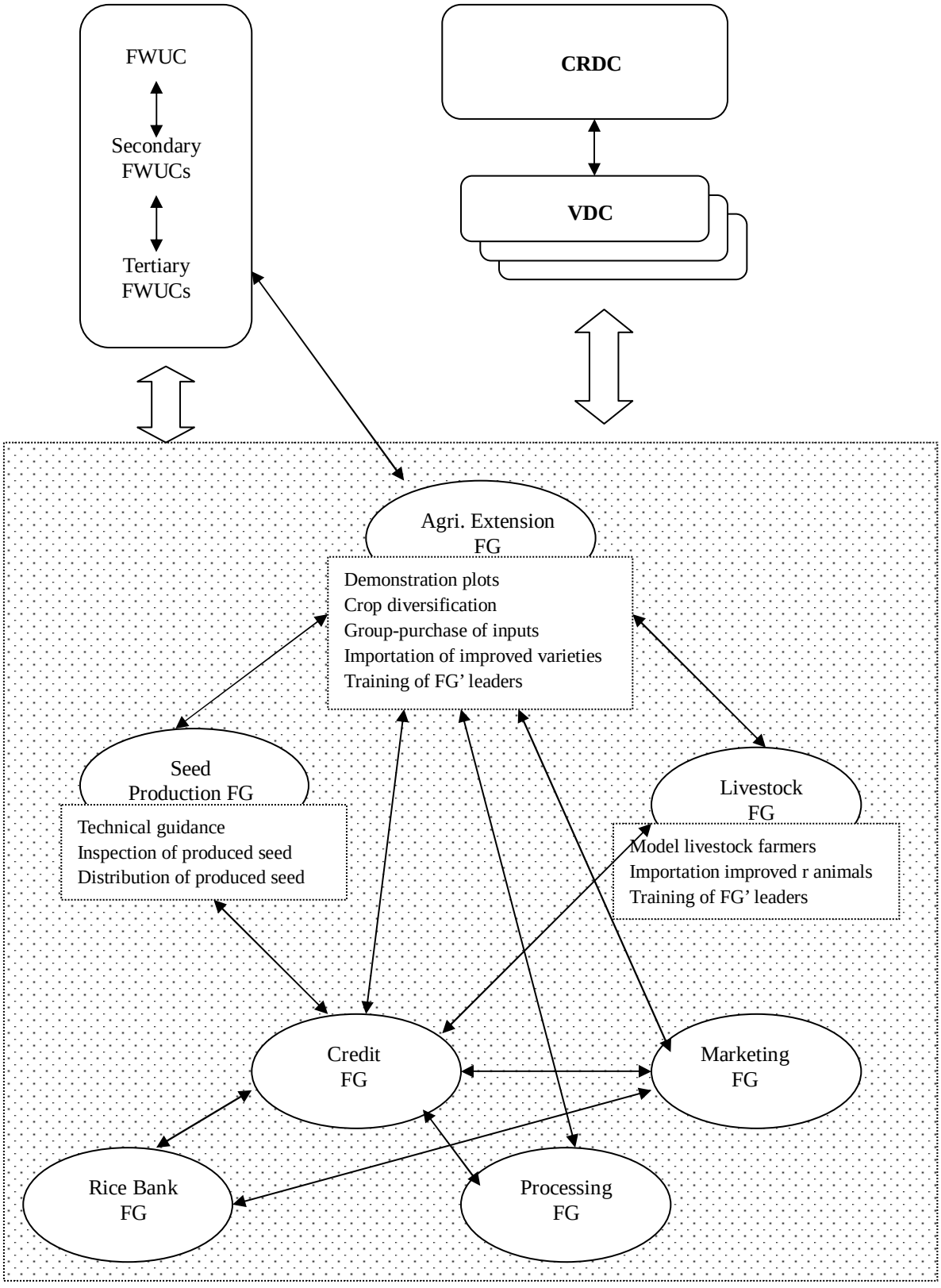
Figure II-4.5.1
Proposed Cropping Patterns of Three Development Plans



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin,The Kingdom of Cambodia	Fig. II-4.6.1 Primary Roads and Roads in Good Condition in the Study Area
Japan International Cooperation Agency	



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin,The Kingdom of Cambodia	Fig. II-4.6.2 Improvement Plan of Rural Roads
Japan International Cooperation Agency	



CRDC: Commune Rural Development Committee, FWUC: Farmer Water Users Community
VDC: Village Development Committee, FG: Farmers Group

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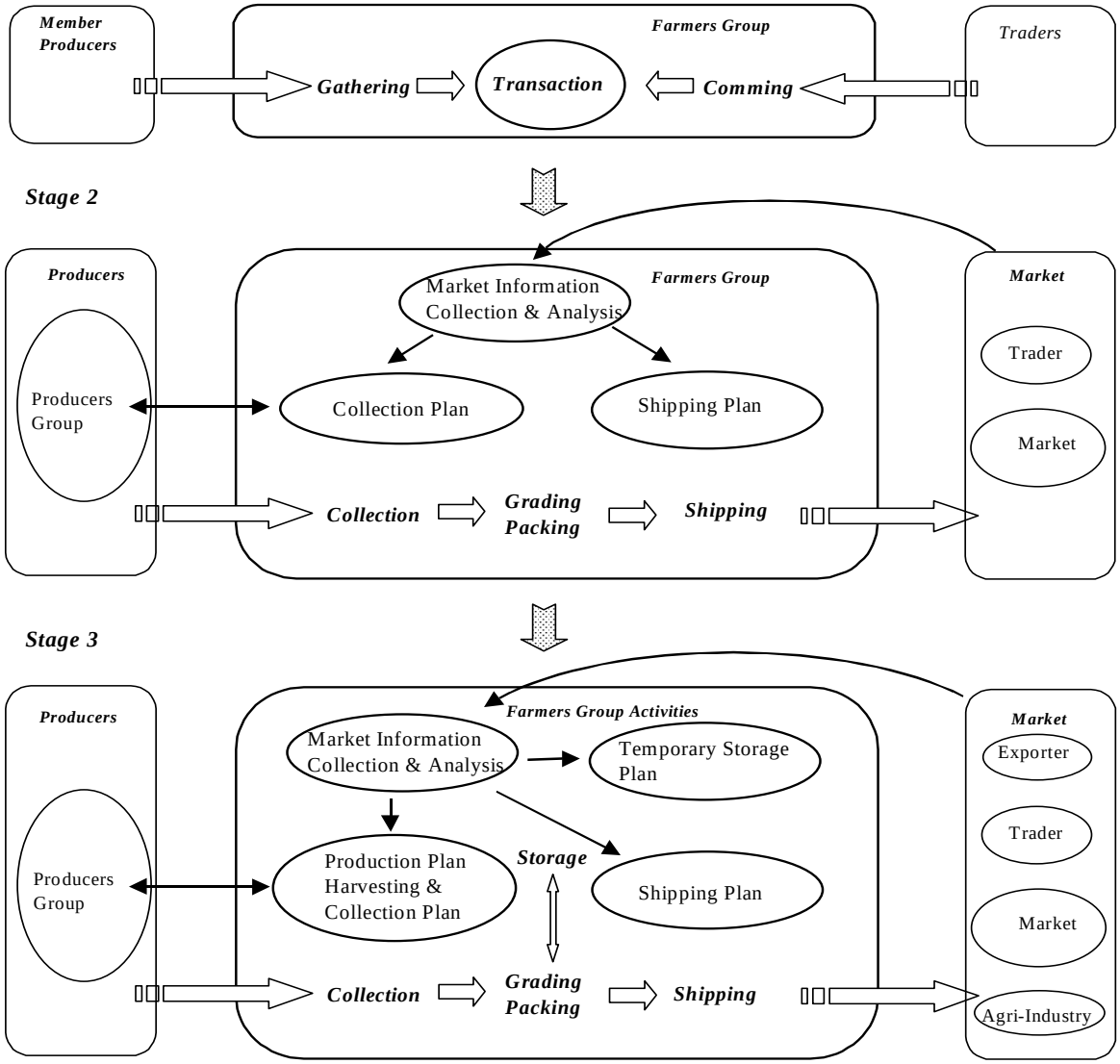
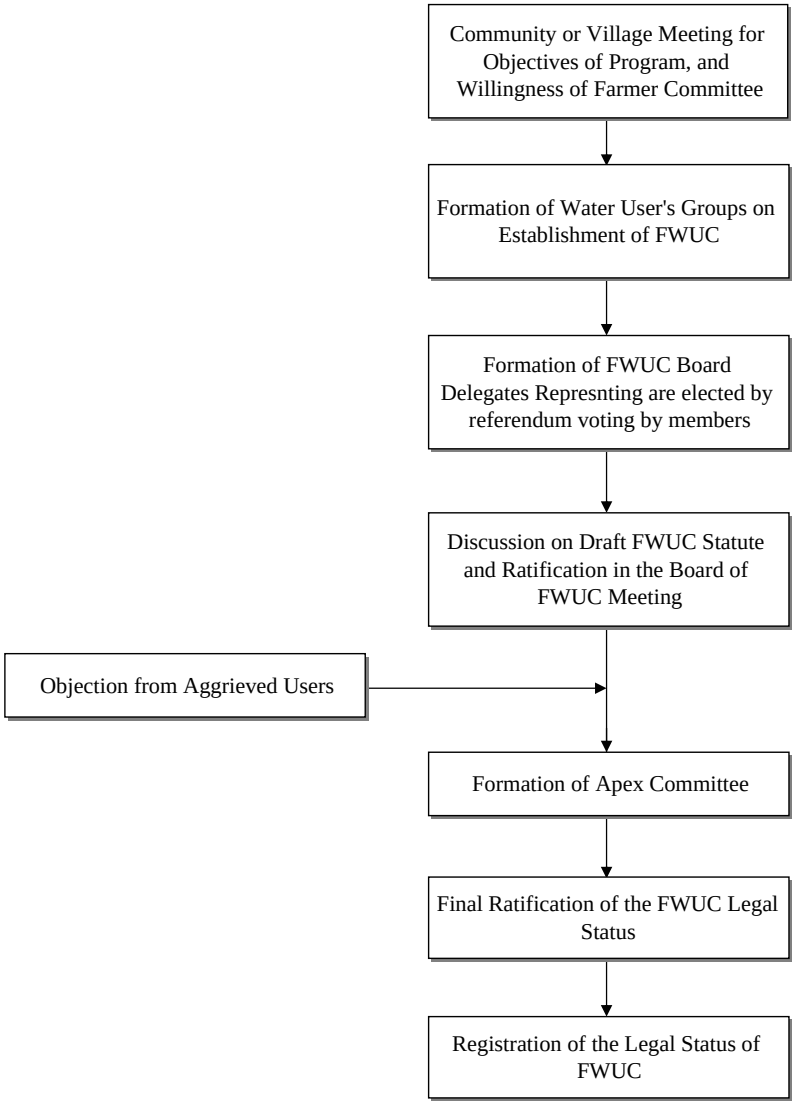
Figure II-4.7.1

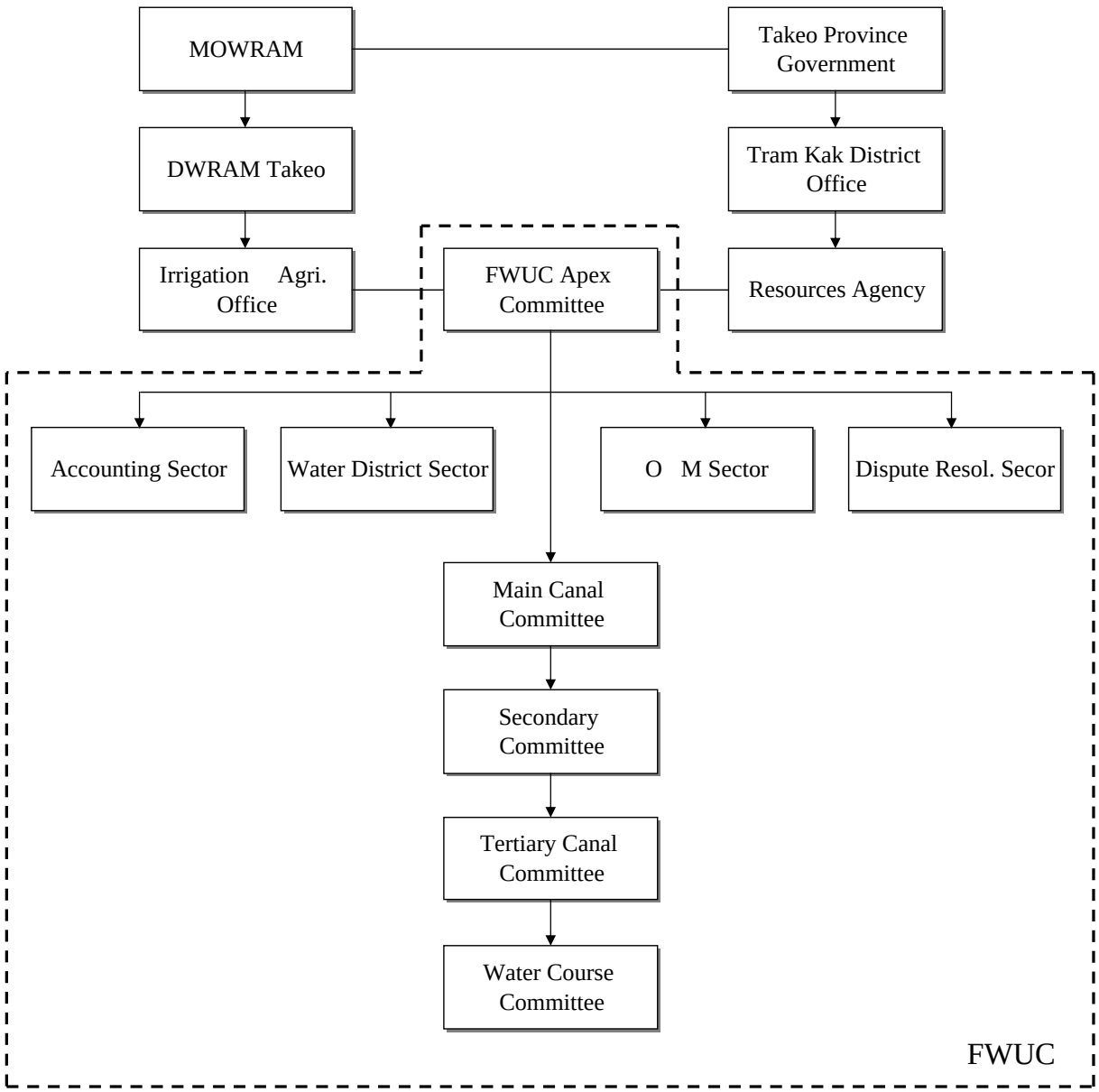
Relationships of Extension Farmers Groups and Other Farmers Groups



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin, The Kingdom of Cambodia	Figure II-4.7.2 Activities of Group Assembling Program
Japan International Cooperative Agency	



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin, The Kingdom of Cambodi	Figure II-4.8.1
Japan International Cooperation Agency	Formation of Process of FWUC



The Study on The Rehabilitation and Reconstruction of Agricultural Production System in The Slakou River Basin, The Kingdom of Cambodia	Figure II-4.8.2
Japan International Cooperation Agency	Organization of FWUC