2. IRRIGATION AND DRAINAGE PLANS

2.1 Irrigation Water Requirements

2.1.1 General

In planning of irrigation project, a full knowledge of irrigation water requirements of crops from time of seeding until harvest is needed. It is also necessary to know the total amount of water required in each season to produce optimum yields for the climate and soils involved.

Peak water requirement by crop must be known in order to determine the capacity of irrigation system. It is also important to check whether the peak use periods for different crops in the study area occur at the same time or at different months. This can be a very important consideration where water resources are limited compared with the magnitude of irrigable area.

Since field measurement relating to estimation of water requirements is not carried out fully in the study period because of shortage of time, the study is mainly depending on the field measurement results for "Komering-I Irrigation Development Project" by JICA in 1981, "Way Sekampung Irrigation Project" by the Lampung Provincial Public Works in 1978 and "Way Seputih Irrigation Project" by I.P.B. in 1973. The empirical and theoretical formulas developed in the past by various experts are also used in this study.

2.1.2 Consumptive Use of Water (CU)

The consumptive use of water is the sum of the volume of water used by vegetative growth in a given area, i.e. the transpiration for building of plant tissue, and that evaporated from adjacent soil or intercepted precipitation on the area in any specified time. In the case of rice cultivation where a water level is maintained above the ground surface, evaporation from the water surface will be substituted for evaporation from soil surface. Then, the consumptive use of water can be calculated by the following formula.

$$CU = kc \times ET_p$$

where, CU: consumptive use of water

ET_p: potential evapotranspiration

kc: crop coefficient

(1) Potential evapotranspiration (ET_p)

Potential evapotranspiration is defined as the rate of evapotranspiration from an extensive water surface covered by green grass of uniform height, completely shading the ground.

In the study area, the evaporation data are available at Belitang (1971-1980), Palembang (1976-1980) and Menggala (1972-1980), but these data are not used in this study, because there found some disturbances in these data, i.e. extremely high and low values and many blanks in the daily data. Instead, the potential evapotranspiration calculated using the Modified Penman Formula is used in the study. In the selection of formula among the various empirical and theoretical formulas, the latitudinal and altitudinal location of the study area and availability of meteorological data are fully taken into consideration.

The following is a calculated result of ETp using the meteorological data at Belitang.

(Unit: mm)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
124	115	136	132	130	117	127	140	135	143	132	127	1,558

(2) Crop coefficients (kc)

Crop coefficients are employed to relate the potential evapotranspiration to the consumptive use of water. Values of crop coefficients vary with the crop characteristics, time of planting and/or sowing and climatic conditions.

The crop coefficient of paddy is referred to the kc-curve mentioned in the FAO series No.24 "Irrigation and Drainage Paper" published in 1977. This curve is also shown in Fig. VI-1. As for the kc-curves for maize, soybeans and peanuts, the curves shown in "The Technical Release No.21" published by USDA in 1967 are used in the calculation. These curves are shown in Fig. VI-2 through VI-4.

2.1.3 Unit Irrigation Water Requirements

After knowing the consumptive use of water, the unit irrigation water requirements for each crop are calculated using the daily water balance method. For this method, the following equations are employed:

Equation for Paddy:

$$IWD = (CU + PL + NW + PW - ER)/Ei$$

Equation for Upland Crop:

$$IWS = (CU + FA - ER)/Ei$$

where, IWD, IWS: unit irrigation water requirements
- CU: consumptive use of water
- PL: percolation loss (for paddy field only)
- NW: nursery water requirement (for paddy field only)
- PW: puddling water requirement (for paddy field only)
- ER: daily effective rainfall
- FA: farm application losses (for upland crop only)
- Ei: combined irrigation efficiency

(1) Percolation loss (PL)

In addition to the percolation rates observed in the study area this time and in the Komering-I Irrigation Project Area, the values observed in the Way Sekampung Irrigation and the Way Seputih Irrigation Project Areas in Lampung Province are fully referred to for the estimate of percolation rates in the development areas. As the result, the percolation rates mentioned below are used in the calculation:

	Percolation Rate (mm/day)	
	Dry Season (June-Sept.)	Wet Season (Oct.-May)
Elevated paddy field	4	2
Lowland paddy field	2	1

(2) Nursery water requirement (NW)

The nursery water requirement is estimated for the following assumptions.

(a) Area required for nursery bed: 1/20 of main field

(b) Nursery period: 25 days

(c) Water required for 25 days period:

- Preparation of nursery bed	150 mm
- Evaporatranspiration, 5 mm/day	125 mm
- Percolation loss	50 mm
Total	325 mm

The calculated results of nursery water requirements for Cropping Pattern-I and -II are shown in Table VI-1.

(3) Puddling water requirement (PW)

The quantity of water required for puddling works is theoretically assessed for the soil depth to be puddled and porosity, which vary relatively from place to place. In this study, the following formula and assumptions are adopted for the approximation.

(a) Formula:

$$PW = DS + WS + FL - RF$$

where,
- PW: puddling water requirement in mm
- DS: required water depth above soil surface after puddling in mm
- WS: difference in soil moisture contents before and after puddling in mm
- FL: field loss including percolation evaporation, and other application losses
- RF: effective rainfall during 10 days of puddling period with a 80% probability of exceedance of drought year.

(b) Assumption:

i) Water depth above soil after puddling is 30 mm.

ii) Porosity is 50% in both surface soil (20 cm depth) and sub-soil (10 cm depth).

iii) Vapor phase in soils after puddling is 5%.

iv) Soil moisture before irrigation is assumed to be 20% in volume.

v) Field loss is assumed as follows:
- percolation loss : 20 mm
- evaporation : 45 mm
- other application loss: 40% of (DS + WS)

vi) Effective rainfall during the puddling period is calculated to be 60 mm.

The calculated result is as follows:

$$PS = (30 + 300 \times (0.5 - 0.05) - 300 \times 0.20) \times (1 + 0.40) + 20 + 45 - 60 \fallingdotseq 150 \text{ mm}$$

The watering schedules of puddling work for Cropping Pattern-I and -II are also shown in Table VI-1.

(4) Daily effective rainfall (ER)

The daily rainfall data have been collected from the following stations mainly.

i)	Belitang BK-IX	(1956-1974, 1978-1980)
ii)	Belitang BK-XVII	(1972-1980)
iii)	Kurungan Nyawa	(1956-1974, 1978-1980)
iv)	Martapura	(1972-1975, 1977-1980)
v)	Simpang	(1973-1980)
vi)	Muaradua	(1972-1980)
vii)	Banding Agung	(1973-1980)
viii)	Cempaka	(1972-1980)
ix)	Tanjung Lubuk	(1972-1980)
x)	Kayu Agung	(1972-1980)
xi)	Padamaran	(1972-1980)
xii)	Menggala	(1972-1980)

Among them, the data at the Belitang BK-IX are used for the estimation of effective rainfall in the project area.

The daily rainfalls at this station are processed in the calculation of effective rainfalls on the basis of the following assumptions for each crop which were introduced in the FAO series No.24 and No.25 "Irrigation and Drainage Paper".

For paddy

(a) 80% of daily rainfall is used in the calculation, taking into consideration the locality of rainfall in case that the spot rainfall data is applied to the whole project area.

(b) Effective water depth to be stored in paddy field is taken at 30 mm. If the sum of daily rainfall and the residual water depth from the previous day exceeds 30 mm, the exceeding amount is regarded as the non-effective rainfall. According to the various agricultural experiments on the relation between the water depth in the paddy field and the production rate of rice, it is known that the shallower water depth usually gives the more favourable benefits. However, the surface soil of paddy field should be covered with water to avoid the denitrofication phenomenon. In addition, in order to maintain equal water depth everywhere in a plot, each plot must carefully be levelled. Such land levelling practice requires considerable investment, and this may not be carried out accurately in most cases. Considering this actual situation, the allowable water surface fluctuation in paddy field is determined to be 30 mm.

For upland crop

(a) Daily rainfall less than 2 mm is not effective for the calculation.

(b) If the daily rainfall is more than 3 mm, 80% of the rainfall is used for the calculation.

(c) If the sum of daily rainfall and the residual moisture from the previous day exceeds the water depth to be available for crop growth, the exceeding amount is regarded as the non-effective rainfall. The water depth to be stored in soil is governed by holding capacity of soil and effective root zone depth of crop. The water depth to be stored in soil is calculated for each crop as follows.

	Root Depth (mm)	Available Soil Moisture (%)	Fraction of Available Soil Moisture	Water Depth to be Available (mm)
Soybeans	800	14	0.5	55
Peanuts	800	14	0.35	40
Maize	1,000	14	0.6	80

The effective rainfall for each crop is determined with a 80% probability of exceedance of drought year which is calculated using the effective rainfall obtained through the above daily water balance methods.

(5) Farm application losses (FA)

Farm application losses in upland irrigation include deep percolation, surface run-off, etc. Taking into account the soil characteristics, topography, climate, irrigation practice and experience, etc., the application efficiency is assumed to be 70% of (CU - ER) on an average over the whole study area.

(6) Combined irrigation efficiency (Ei)

The combined irrigation efficiency is the product of canal operation efficiency and canal conveyance efficiency, and expressed by the following equation:

$$Ei = (1-OL) \cdot (1-CL)$$

where, OL: ratio of operation loss to net irrigation water requirements

CL: ratio of canal conveyance loss to net irrigation water requirements

The operation loss is defined as the irrigation water wasted due to inproper canal gate operations and unskilled water management in fields. According to the actually measured results in the irrigated paddy fields in Lampung Province/1, the total operation loss would be 50 to 100% of net irrigation water requirements. Even after the canal operation practices and water management are improved through the appropriate guidance to the farmers, a certain amount of irrigation water; in the order of 30% to 40% of net irrigation water requirements, would be wasted. Then the operation loss of 40% is conservatively taken in the calculation.

The canal conveyance loss would be caused by seepage through the water perimeter of canal and evaporation from the canal water surface. In the calculation, the canal conveyance loss is taken to be 15% of the net irrigation water requirements.

Those make combined irrigation efficiency (Ei) of 51%.

(7) Results of calculation

The calculation procedures and results of unit irrigation water requirements for each crop are shown in Table VI-2. The unit irrigation water requirements for the respective cropping pattern are calculated based on the crop intensity as shown in Table VI-3. The peak unit irrigation water requirement to be used for determining the design capacities of irrigation facilities are as follows:

(a) for cropping pattern-I (Muncak Kabau and Lempuing areas, Tulangbawang west sub-area and 1.5 ha area of Komering-I area) : 1.28 lit/sec/ha

(b) for cropping pattern-II (Tulangbawang east sub-area) : 0.71 lit/sec/ha

(c) for 1.0 ha area of Komering-I area : 1.45 lit/sec/ha

(d) for Lebak area (cropping pattern-II) : 0.99 lit/sec/ha

/1: "Water Requirement on New Paddy Field" prepared by Mr. J. Inoue, May 1981, Lampung Provincial Public Works.

2.1.4 Design Diversion Requirements

The design diversion requirements are defined as the peak diversion discharge and used for the design of diversion structures at the head of the respective areas. The design diversion requirements for each development area are obtained as below. The detailed calculation is shown in Table VI-4.

(a) for Muncak Kabau area (10,700 ha) : 13.7 m^3/sec

(b) for Lempuing area (13,100 ha) : 16.8 m^3/sec

(c) for Tulangbawang area (44,500 ha) : 48.8 m^3/sec

(d) for the total area of Komering-I, Lempuing and Tulangbawang areas (94,300 ha): 115.9 m^3/sec

2.1.5 Water Requirements for Water Balance Study

The water requirements to be used for the water balance study in the Upper Komering river basin are calculated on the daily basis for the past 18 years (1963-1980) in the same manner as mentioned in the section 2.1.3 "Unit Irrigation Water Requirements".

(1) Assumption

(a) Irrigation area

The irrigation areas considered in the water balance study are the Komering-I area (36,700 ha), the Lempuing area (13,100 ha), the Muncak Kabau area (10,700 ha) and the Tulangbawang area (44,500 ha). Further, in the Lebak area, there exist around 76,000 ha of irrigable areas to be considered in the water balance study as shown in Fig. VI-5.

(b) Return flow from irrigable area

A part of irrigation water supplies is likely to return to the river system as seepage and surface runoff. These return flows are of importance to the projects of which water resources are limited. Since the return flows from the Pisang area (2,900 ha) in the Komering-I area (36,700 ha), 17,800 ha in the Lebak area and the entire Tulangbawang area would not flow into the Komering.

For the approximation of the return flow from the above-mentioned areas, the following assumptions are established.

- Around 50% of both the percolation losses in paddy field and farm application loss in the upland crop fields flow into the Komering as the return flow.

- Around 70% of canal conveyance and operation losses also flow into the Komering as the return flow.

- Ineffective rainfall in the area runs off to the Komering.

(c) Maintenance flow

The minimum water depths required for navigation are as follows:

Kind of Boat	Tonnage	Minimum Depth
Big boat	6 - 7 tons	1.5 m
Medium boat	4	1 m
Small boat	1	0.75m

The discharge for 1.5 m, 1 m and 0.75 m of water depth are calculated at the following places.

- Kurungan Nyawa
- Menanga Tengah
- Suka Bumi
- Tanjung Lubuk

In the above calculation, the water surface slope of the Komering river is determined to be 1/2,200 by taking the water levels at Kurungan Nyawa and at Menanga Tengah, and the roughness coefficient of 0.035 is adopted depending on river bed materials. The above water surface slope is also applied for Suka Bumi and Tanjung Lubuk, though the actual river slope between Suka Bumi and Tanjung Lubuk is more gentle than 1/2,200 and the discharge may be smaller than the estimated discharge. No navigation activity of the Komering river in its middle reach is practiced at present. In view of navigation needs in the future, however, the maintenance flow of 25 m^3/sec, which makes it possible to keep one meter depth at least, is employed for the every reach of the Komering river in this study.

There is traditional water right for domestic use in the downstream reach of Kurungan Nyawa, though there is no legistration concerning water right. According to the survey for municipal water, about 1 m^3/sec of the discharge for the downstream region will be required after 20 years, which is negligible small as compared with the navigation water required; 25 m^3/sec.

(2) Calculation of water requirements

The calculated results of the irrigation water requirements for every development stage are presented in Table VI-5. Furthermore, the required river discharge to the downstream from the Perjaya headworks site to be used for the water balance study is calculated taking into consideration the return flow from the irrigation area and the maintenance flow for the lower reaches of the Komering river, of which schematic flow chart is as shown in Fig. VI-6. The calculated results of the required river discharge are presented in Table VI-6.

2.2 Drainage Water Requirements

2.2.1 Standard for Drainage Plan

Around 4% of the Lempuing area, 14% of the Muncak Kabau area and 2% of the Tulangbawang area extend over low-lying and flat plain and suffer from maldrainage in every rainy season. If the lands are not drained well with a feasible range, the productivity will not go up even after the provision of well-designed irrigation facilities.

From the past experiments and observations in Japan/1 on the relation between the yield reduction rate of paddy and depth and duration of submergence at different growing stages of paddy, the following considerations could be made:

(a) The submergence at the growing stage of young panicle formation gives the serious damage to the yield to paddy, on the contrary, damage due to submergence at the stage of maturing is insignificant.

(b) The duration of submergence within 1 to 3 days is not significant, but damage of paddy remarkably increases due to submergence beyond 3 days.

(c) When a part of leaves still remains above water surface, the damage to paddy is decreased as compared with that when leaves are completely submerged.

The midst of rainy season in the project areas occurs in the period between November and April. The growing stage of paddy between middle stage of tillering and beginning stage of panicle formation would correspond to the midest rainy season.

/1: These are presented in "Hand Book on Yield Reduction Rates of Summer Crop due to Various Causes" published by the Ministry of Agriculture, Forestry and Fisheries of Japan in 1975.

Taking into account the above considerations, the following design standard would be applied for making the future drainage plan in the projects.

(1) The allowable depth of submergence in the paddy fields should be 30 cm, and duration of submergence should not exceed 3 days.

(2) The submergence more than 30 cm in depth should not last more than 24 hours.

2.2.2 Drainage Requirements

In general, the criteria for the calculation of unit drainage requirement defines the rainfall intensity with certain probability and a drain period necessary for removal of excess water to an allowable extent. In the on-going irrigation projects in Indonesia, drainage requirements have been estimated by applying their own ways considering the natural and physical conditions prevailing over the project areas.

In this study, the drainage requirements are estimated on the basis of following assumptions and procedures:

(1) Since long term and reliable daily rainfall data is available only at Belitang, the daily rainfall data of Belitang (1956-1980) are used for this study, and applied to all the development areas.

(2) Design rainfall is estimated to be 245 mm of 3 days consecutive rainfall at Belitang with a 10-year return period.

(3) Based on the average rainfall distribution pattern, the distribution percentage of the design daily rainfall is estimated as follows:

Distribution Percentage

Day	Pattern (%)
1st day	33
2nd day	31
3rd day	36

(4) Relationship between rainfall and runoff distribution is assumed as follows:

Relationship between Cumulative Rainfall and Total Runoff

Cumulative Rainfall (mm)	Runoff Coefficient (f)
less than 10	0
10 - 30	0.1
30 - 50	0.3
50 - 100	0.5
100 - 300	0.8

Relationship between Rainfall and Runoff Distribution (%)

Rainfall (mm)	1st day	2nd day	3rd day	4th day
less than 30	100	-	-	-
30 - 50	70	30	-	-
50 - 100	60	30	10	-
more than 100	50	30	15	5

(5) Based on the above assumptions, the drainage requirements are calculated as follows:

Design Rainfall (mm)	Cumulative Rainfall (mm)	f	Runoff (mm) 1st Day	2nd Day	3rd Day	4th Day	5th Day
81	81	0.5	24.3	12.1	4.1	-	-
76	157	0.8	-	36.5	18.2	6.1	-
88	247	0.8	-	-	42.2	21.1	7.0
Total:			24.3	48.6	64.5	27.2	7.0
Lit/sec/ha			2.8	5.6	7.5	3.1	0.8

From the above calculation, the design drainage requirement for the secondary and tertiary drains is determined to be 7.5 lit/sec/ha which is defined as the peak requirement in the above calculation. As for the Macak river and the Lempuing river to be used as the main drains in the project, the drainage requirement is computed by using the "Rational Method", considering the time lag of outflow to be caused due to their large drainage area. The calculated results are presented in Table VI-7.

3. ALTERNATIVE STUDY ON INTAKE SYSTEM FOR BELITANG PROPER AREA AND MUNCAK KABAU AREA

3.1 General

In the Feasibility Study on the Komering-I Irrigation Development Project made by JICA in 1981, the economic comparison on the integration of intake for the Belitang Proper Area into the intake system of the Komering-I project was made, because the large amount of sediment loads from the Komering river is deposited at the upper reaches of the Belitang Irrigation Canal, resulting in very less discharge in the headreach. In addition, stoplogs provided at BK-1 check cum turnout commanding 1,300 ha of elevated land bottleneck the flow capacity of the headreach. As the result of economic comparison, it was proposed to construct the headreach of the Komering-I project at its own capacity only inclusive of irrigation water to 1,300 ha of BK-1 commanding area.

The economic comparison on the integration of intake of the Muncak Kabau area into the Komering-I system was also made in the feasibility study. The result of study showed that water intake through its own intake structure to be constructed near Muncak Kabau would be economical, though certain O&M costs for desilting are required annually.

As mentioned briefly in the above feasibility study report, both economic comparisons mentioned above were made without considering the possibilities of micro-hydropower development. From the rough studies based on the available topographic maps and the proposed plan of Komering-I project, it is expected to generate about 800 kW at Kurungan Nyawa and about 600 kW at Muncak Kabau harnessing the head to be created between the proposed canal water level in the Komering-I system and the proposed intake water levels of the said development areas, if the integrated intake systems are applied to both Belitang Proper Area and Muncak Kabau area.

Moreover, both economic comparisons mentioned above were made for the provision of free intakes only without construction of diversion weirs on the Komering river in the case of individual intake from the Komering river. However, the study on the watershed management (ANNEX - IX) shows that the annual total sediment loads in the Komering river would amount to 4.6 x 106 m^3, which correspond to 1,068 m3/km2/year. After completion of the dams in the upper reaches of the Komering river, most of the sediment discharge will be checked by the dams, and there will be less supply of sediment loads to the downstream. This would cause the degradation of the Komering river bed in the downstream, and would result in the lowering of river water levels at Kurungan Nyawa and Muncak Kabau. These phenomena will adversely affect the free intake practices at those intake sites. Although a further study is required on the above subject, it is concluded that the construction of diversion weir is required for both Kurungan Nyawa and Muncak Kabau sites in order to keep the design intake water levels.

Taking into account the above alteration of the conditions for the economic comparison, very brief comparative studies are made as mentioned in the following sections. The schematic layout for the alternative plans is shown in Fig. VI-7.

3.2 Economic Comparison on Integration of Intake of the Belitang Proper Area

The irrigation water for the Belitang Proper Area of 20,600 ha is presently taken from BK-0 at Kurungan Nyawa. The BK-0 intake structure, however, does not function enough to serve the whole irrigation area. The water level in the headreach is regulated and raised to irrigate the elevated land of the upper part of the Belitang Proper Area by BK-1; a check structure with turnout locating at about 7 km downstream of BK-0 in order to divert the water to its command area. This raising of water level makes a hydraulic gradient mild in the headreach of the Belitang Irrigation Canal, resulting in the less intake in BK-0 and less flow capacity.

In addition, since there is no provision of a settling basin in the BK-0, a large amount of the sediment loads is deposited in the head-reach. It is estimated at about 30,000 m^3 per year at present. The maintenance will be needed by means of dredging continuously. Moreover, the existing intake structure is a free intake type without a diversion weir on the Komering river. The design intake water level will be lowered in conformity with the degradation of the river bed which will occur after the completion of reservoir in the upper reaches of the Komering river.

The above-mentioned unfavourable conditions in the Belitang Proper Area will be improved with the following countermeasures to be taken upon implementation of the Komering-I Project.

Case-1: <u>Water supply to the high elevated area from the Komering-I system</u>

- The water level in the headreach of the Belitang Irrigation Canal is raised at BK-1 to irrigate the elevated area of about 1,300 ha covered by BK-1 and this is one of the causes of the low intake capacity of BK-0 as mentioned previously. According to the results of the field investigation and hydraulic analysis of the headreach, the present Belitang Irrigation Canal can convey the water required of the whole Belitang Proper Area, if the hydraulic gradient of the headreach is improved by lowering of the water level at BK-1. Therefore, the following plan is conceived with respect of the irrigation system capacity of Komering-I Project and the improvement of the unfavourable hydraulic conditions of the Proper area:

  - The irrigation water for the elevated area about 1,300 ha commanded by BK-1 is supplied from the Komering-I system.
  - Regulating stoplogs provided at BK-1, which are the main cause to reduce the hydraulic gradient in the headreach, are removed.
  - Sediment problem in the headreach remains. Annual sediment loads are estimated to be 104,000 m^3 based on the design discharge of 25 m^3/sec.
  - Overflow-type diversion weir is constructed to maintain the design water level immediately downstream of the intake structure.

Case-2: <u>Diversion of the whole required water of the Proper area from the Komering-I system</u>

The North Main Canal of the Komering-I system crosses over the Belitang Irrigation Canal with an adequate water level to supply water to the Belitang Proper Area. The irrigation water for the Proper area can be diverted from the Komering-I system when the Perjaya headworks and headreach and North Main Canal of the Komering-I system are constructed at the capacity inclusive of the irrigation water to the Proper area. Consequently, the adequate irrigation water for the whole Proper area will be secured, and the expensive O&M costs for the desilting of the Belitang Irrigation Canal will become needless. Moreover, the micro-hydropower generation in the order of 800 kW can be conceived at the inlet point from the Komering-I system harnessing the water head difference of about 5 m between the Belitang Irrigation Canal and the Komering North Main Canal, and this benefit can be counted in the comparative study.

In order to determine the most economical plan to solve the hydraulic constraint of the Proper area, the economic comparison is made between the above two cases based on the following understandings.

(1) Since agricultural benefits in both cases are same, these benefits are disregarded in this comparison. Therefore, annual incremental benefit is deemed to be derived from hydropower generation only in Case-2.

(2) Difference of construction cost between two cases is deemed to be investment cost to get the annual incremental benefit mentioned above, i.e., hydropower benefit.

(3) Employing the above investment cost and benefit, B/C ratio is calculated. This B/C ratio indicates:

- B/C > 1: Case-2 is more economical.

- B/C = 1: Both cases have the same economic viability.

The calculated results are as follows:

(1) Cost (refer to Table VI-8):

(a) Difference of construction cost between two cases:

Case-2	US$8,218 x 10^3
Case-1	US$2,415 x 10^3
Difference	+US$5,803 x 10^3

(b) Capital recovery cost for item (a):
(i = 8%, 50 years for civil works and 30 years for mechanical works)

+US$502 x 10^3

(c) Difference of annual O&M costs between two cases:

Case-2	US$61 x 10^3
Case-1	US$128 x 10^3
Difference	-US$67 x 10^3

(d) Difference of annual equivalent costs:

(b) + (c): +US$435 x 10^3

(2) Annual incremental benefit derived from Case-2 (refer to Table VI-10):

+US$338 x 10^3

(3) Benefit/cost ratio: 0.78

The result of the economic comparison shows that the diversion method of the irrigation water required in the Proper area from the Komering-I system (Case-2) is less attractive than the direct diversion method of the irrigation water to the Proper area through the Kurungan Nyawa Intake (Case-1), even if the benefit of the micro-hydropower scheme is counted in the comparison. This result of economic comparison will further be justified, if the electric supply from the hydropower schemes contemplated in the upper reaches of the Komering river is considered for the rural electrification instead of the said micro-hydropower station, because the upper Komering hydropower schemes can be developed more economically than the micro-hydropower scheme as compared below:

	Annual Equivalent Cost (10^3US$)	Annual Energy Output (MWh)	Cost/kWh (US$/kWh)
Upper Komering Hydropower Scheme			
- Ranau Scheme	9,100	148,000	0.06
- Komering No.1 Scheme	13,910	438,000	0.03
- Komering No.2 Scheme	8,740	174,000	0.05
- Muaradua Scheme	5,240	68,000	0.08
Micro-hydropower Scheme			
Micro-hydropower Station	760	4,100	0.19

3.3 Economic Comparison on Integration of Intake of the Muncak Kabau Development Area

In the previous study, the intake structure for Muncak Kabau development area is contemplated on the right bank of the Komering river in the vicinity of the village Muncak Kabau and no diversion weir is planned to be constructed. However, an overflow-type diversion weir will be required immediately downstream of the proposed intake site by the same reason as mentioned in the preceding section.

In view of the relation of the water levels in the river and a headreach to be constructed the Muncak Kabau intake site will have no suitable locations for a settling basin to be able to eject the sediment materials gravitationally to the Komering river. The artificial removal of the loads is absolutely needed. To cope with the expected expensive dredging works, the diversion of water from the Komering-I system is conceived. In consideration of elevation of the irrigable area in the Muncak Kabau area and the water level of the Komering-I North Main Canal, the diversion of water to the Muncak Kabau area from the Komering-I system is easily made with provision of short length of a connecting channel. In this case, the micro-hydropower generation in the order of 600 kW can be conceived at the connecting point between the connecting channel and the Muncak Kabau Main Canal harnessing the water head of about 7 meters to be created between the two canals.

In determination of the intake system of the Muncak Kabau area, the economic comparison on integration of the Muncak Kabau intake into the Komering-I system is needed and made between the following two cases.

Case-1: Water intake through own intake near Muncak Kabau

The relating costs to the comparison are the construction costs of intake structure, diversion weir, settling basin and main canal concerned, and the annual cost for O&M of the related facilities and dredging.

Case-2: Diversion of water from Komering-I system

The comparative costs concerned are the allocated construction costs of the headworks, headreach and North Main Canal of the Komering-I irrigation system, the construction cost of the connecting channel and the annual cost for O&M for the related facilities. The costs of facilities required for the micro-hydropower generation and its benefit are also counted in the comparative study.

The economic comparison for the above two cases is made in the same manner as that of the Belitang Proper area case.

(1) Costs (refer to Table VI-9):

(a) Difference of construction cost between two cases:

Case-2	US$7,921 x 10^3
Case-1	US$3,780 x 10^3
Difference	+US$4,141 x 10^3

(b) Capital recovery cost for item (a):

+US$362 x 10^3

(c) Difference of annual O&M costs between two cases:

Case-2	US$56 x 10^3
Case-1	US$94 x 10^3
Difference	-US$38 x 10^3

(d) Difference of annual equivalent cost:

(b) + (c): +US$324 x 10^3

(2) Annual incremental benefit derived from Case-2 (refer to Table VI-10):

+US$277 x 10^3

(3) Benefit/cost ratio: 0.85

According to the above result, the diversion method of the irrigation water required in the Muncak Kabau area from the Komering-I system (Case-2) is less attractive as compared with the free intake method of the irrigation water directly from the Komering river (Case-1). Moreover, in this case also the rural electrification of the Muncak Kabau area will be possible with cheaper electric supply from the upper Komering hydropower schemes as compared with that of the micro-hydropower station (US$0.23/kWh). From these reasons, the direct diversion method of the irrigation water required in the Muncak Kabau area from the Komering river is further justified to be more attractive than the diversion method of the water from the Komering-I system.

4. CONSIDERATION OF THE FUTURE DEVELOPMENT OF LEMPUING AND TULANGBAWANG DEVELOPMENT AREAS

According to the geographical location of the Komering river and the irrigation areas of the selected projects, the irrigation water of the Lempuing and Tulangbawang development areas has to be served through the irrigation system of the Komering-I Project. The development of the Lempuing and Tulangbawang areas will follow the realization of the Komering-I Project according to their priority order.

In the Feasibility Study Report prepared in 1981, the economic comparison was made for the cases whether the joint facilities for the both areas and the Komering-I Project should be constructed with the increased capacities from the initial construction stage of the Komering-I Project, or extension of their capacities should be made in their own development stage. For the above cases, the economic comparison by means of internal rate of return (IRR) was made for the different length of time span from the start of the Komering-I Project works to the realization of the Lempuing and Tulangbawang areas.

In both cases of the Lempuing and the Tulangbawang areas, the IRR for the case of the joint construction was higher than that of the expansion works only within the time of three to four years after the start of the Komering-I Project works. This indicates that it is not economical to construct the joint facilities of the Komering-I Project with the increased capacities to meet the future development of the Lempuing and the Tulangbawang areas.

The expansion works of the joint portions to be implemented under the Komering-I Project are carried out in the respective development stages of the areas.

5. PLANNING AND DESIGN OF IRRIGATION AND DRAINAGE FACILITIES

5.1 General

Tho major feature of the project is to supply the optimum irrigation water to the Muncak Kabau, Lempuing and the Tulangbavang development areas. The facilities required for the projects include intake structures, irrigation canals and their relevant structures, drainage facilities and farm roads.

The basis for determining the facility requirements for each function is that enough project facilities be provided in the most effective and economical manner so that each function can be combined with the fully compatible with the other farming operations required at each stage of development. Based on the above requirements, the following planning and pleliminary design of project facilities for each area are prepared. The general features of the project facilities designed are summarized in Table VI-11 and the general layouts for the Muncak Kabau, Lempuing and Tulangbavang areas are shown in Fig. VI-8, VI-9 and VI-10 respectively.

5.2 Irrigation Canal System

5.2.1 Function and Requirement of Canal

Irrigation canal system in the project area includes main canals, secondary canals, and tertiary system. The layout planning of these canals is done after understanding their respective function and requirement mentioned below.

(1) Main Canal

In the project area, there are four main canals; Muncak Kabau East and West Main Canals, Lempuing Main Canal and Tulangbavang Main Canal. The main function of the canal is to deliver irrigation water from intake structure to development area in the shortest or in the most economical way. These canals are basically unlined and trapezoidal. The raised portion is lined with concrete.

The 38-km long Muncak Kabau East Main Canal is constructed to lead irrigation water of about 14 m^3/sec to the Muncak Kabau area from the intake structure constructed on the Komering river and branch off the 12-km long West Main Canal at its 5-km point. The Lempuing Main Canal which is extended from the end point of the Komering-I North Main Canal conveys irrigation water of about 17 m^3/sec for about 40 km. The Tulangbawang Main Canal is branched off at 18-km point of the Komering-I South Main Canal and deliver irrigation water of about 49 m^3/sec for about 90 km.

The irrigation diagram showing the design capacity of each main canal is shown in Fig. VI-11. Fig. VI-12 shows the irrigation diagram of the Komering-I system which include the irrigation water for the Lempuing and the Tulangbawang areas.

(3) Secondary canal

This canal is branched off from the main canal to distribute water up to the secondary unit area. The size of secondary unit area mostly varies from 500 to 2,000 ha which is divided into around 5 to 20 tertiary blocks. The canal is principally unlined, but the raised canal portion is lined with concrete.

(4) Tertiary system

The tertiary block includes one tertiary canal and 10-15 quaternary canals. The maximum size of tertiary block is 150 ha. Whereas, a quaternary canal covers 10-15 ha (for details, vide Section 5.5).

5.2.2 Layout Planning of Canal

The layout planning of canals is done through the following procedure.

(1) Layout planning on map

Before start of field survey, a layout planning of canals is made on the map. For this work, the maps on scale of 1/50,000 prepared by FAO in 1974 for the Muncak Kabau area and 1/50,000 prepared by Indonesian Government for the Lempuing and Tulangbawang areas are used. In the planning, the following matters are taken into consideration.

(a) Canal alignment should be straight and short as much as possible.

(b) The alignment should be planned so as not to pass through village areas and not to give damages to public facilities.

(c) Embankment portions should be minimized as much as possible.

(d) Canal construction cost should be minimized by selecting the proper alignment.

(e) Canal water level should be kept as high as possible for easy operation of canal system.

(f) The canal layout should be convenient for the grouping of future water users association.

(2) <u>Field survey</u>

(a) Based on the layout planning prepared on the map, the field reconnaissance is made along the alignments to know the micro-topography, hydrological conditions and soil conditions, and to collect farmers opinion toward the development plan.

(b) The following topographic survey are carried out for the layout planning and preliminary design:

- check levelling for existing benchmarks,
- route survey and cross section survey along the main canals, which are being carried out by the Government of Indonesia.

(c) Soil mechanical survey carried out in this stage includes:

- penetration tests at main structure sites,
- soil mechanical survey along the main canals and soil mechanical tests in laboratory,

(d) The construction material survey is made for their availabilities and prices.

(e) For the layout planning, agricultural, economical and sociological data are also collected.

5.2.3 Function and Configuration of Related Structures

A number of canal structures of various type is required in conjunction with the irrigation canals. The configurations of these structures are selected properly considering their functions, canal layout, operational program and social conditions in the project area.

(1) Intake structure

A intake structure will be constructed on the Komering river near Muncak Kabau village to divert irrigation water to the Muncak Kabau area. This intake structure is of free intake type, though a simple over-flow type diversion weir is constructed immediately downstream of the intake structure to keep the design intake water level of EL. 61,5 m even after the degradation of Komering river bed occurs. This intake structure will be equipped with a settling basin to deposit the sediment materials flowing in from the river. The sediment loads are artificially removed, because the difference of the water levels between the river and the canal is not enough for the natural flushing-out of the sediment. The general feature of the intake structure is shown in Fig. VI-13.

(2) Bifurcation structure

Bifurcation structures are constructed at the 5-km point of the Muncak Kabau East Main Canal to divert irrigation water to the West Main Canal. Another bifurcation structure will be constructed at the head of the Tulangbawang Main Canal, which will branch off at the 18-km point of the Komering-I South Main Canal. The structure is partitioned into two channels by concrete wall and these channels will lead irrigation water to the lower reaches. Each channel is provided with steel gates for controlling canal discharges.

(3) Check gate

In order to maintain the required water level at the site of diversion on off-taking even during periods of partial discharge, a check gate is provided where a number of turnouts is densely provided or where fairly large discharge is diverted. Over the project canals, two types of check gates are constructed depending on the topography along the canal. One type simply has a function as a check gate and the other type is of combined type with drop structure.

At the sites where farm road crossings are required from the viewpoint of canal and road layouts, concrete slabs are provided on the check gates.

(4) Turnout

Turnout is constructed to divert the required water from a parent canal to its branch canal. The free flow type of turnout is introduced. The rectangular box barrel or precast concrete pipe to cross the road or canal embankment is adopted depending on the discharge. The rectangular box barrel is applied for discharge more than 0.6 m^3/sec. All the turnouts are designed for full capacity at every water surface regulated by the check gate.

(5) Bridge and culvert

A bridge or culvert is constructed where a road crosses over the canal. These bridges and culverts are strong enough for the increase of heavy traffic after the project implementation. For selection of bridge or culvert, a comparative study of construction cost is made between them considering the cutting depth of canal and canal width, and has drawn the preliminary conclusion that the construction of bridge is more economical for the main canal with design capacity of 2 m^3/sec. The maximum span length is 10 m and a concrete T-beam type is applied.

(6) Spillway

A spillway is constructed in the canal system for the purpose of flushing off all the water in the canals or spilling out excess flow in case of emergency and clearing and repairing canals. This structure is provided in the mid-cource of respective main canal and at the end of secondary canal. All the spillways are equipped with slide gates (wasteway) and connected to the nearby drainage canals.

(7) Crossdrain

A crossdrain is constructed at the site where the irrigation canal runs across a depressed land or natural stream. As the crossing structure, a rectangular-shaped barrel or precast concrete pipe is laid under the irrigation canal. The former is used for the design discharge of more than 1.0 m^3/sec, and the latter is for less than 1.0 m^3/sec.

(8) Water measuring device

There is no doubt that the conventional use of water for agriculture is, to some extent, wasteful. There is considerable room for economy in water use, and harmful irrigation practices which give rise to waterlogging. For this accurate and reliable measurement is essential, as this can be accomplished by knowing with reasonable accuracy; the amount of water being diverted and delivered. Water measurement is also needed to establish charges to water users if required. In this context, the installation of following measuring devices is proposed for the respective canal system.

Place of installation	Measuring device
for intake structure	- Gauging staff
for bifurcation structure	- Broad crested weir type
for main canal	- Gauging staff at check gate - Broad crested weir type at check gate
for secondary canal	- Romijn gate at turnout (upto 1 m^3/sec) - Cipolletti weir at turnout
for tertiary canal	- Romijn gate at turnout - Cipolletti weir at turnout

5.3 Drainage Canal System

5.3.1 Function and Requirement of Drainage Canal

The drainage canals are classified by function as follows:

(a) Quaternary drain is provided to drain out excessive water in fields and to lower or control the subsurface water level.

(b) Tertiary drain is provided to drain out the excessive water and subsurface water collected by the quaternary drain to secondary drain or directly to river.

(c) Main and secondary drains transport water from quaternary drains and tertiary drains to outlets or disposal points.

The layout of the irrigation system and topography are the main factors determining the location of all the drainage canals.

(1) Quaternary and tertiary drain

Detailed description will be made in Section 5.5 hereof.

(2) Secondary drain

These drains are designed to collect water from quaternary drains and tertiary drains and to transport to main drains or rivers. Depressed areas or old stream beds are used for location of the secondary drains.

(3) Main drain

The location of main drain is dominated by natural streams and rivers crisscrossing in the development area. These natural streams and rivers are used as much as possible as the main drains.

5.3.2 Layout Planning of Drainage Canal

The layout planning of drainage canals is carried out through the following procedure.

(1) Establishment of basic concepts

First of all, the following basic concepts for planning the drainage system are confirmed.

(a) What extent should the area be protected against the floods from the river?

(b) Where should the main drainage canal or disposal points be located?

(c) How will the excessive water in the area be collected and transported to the disposal points?

(d) Is there any necessity of mechanical drain?

(e) What extent can the drainage benefit be expected after the project implementation?

(2) Field survey

(a) Field damage due to floods and mal-drainage is surveyed for its extent and magnitude.

(b) Present drainage mechanism is observed in the project area and in its vicinal areas.

(c) Reconnaissances along the Macak and Lempuing rivers are made to check the highest flood water level in the past and their present flow capacities.

(d) Sub-surface water level is observed by digging several pits in the representative sites.

(e) Rainfall data is calculated for the analysis of the intensity and duration of rainfall in the area and estimation of drainage requirements.

(f) Present land use in the area is surveyed for the use of analysis on drainage requirements.

(g) Soil characteristics in the area is surveyed on the reconnaissance basis.

(h) Present farming practices and socio- and agro-economic surveys are carried out in the project area and in its vicinal areas.

(3) Preliminary study of drainage canal layout

Based on the result of field survey mentioned above, preliminary layout of the drainage canal system is planned on the topographic map on a scale of 1/50,000 prepared by FAO in 1974 for the Muncak Kabau area and 1/50,000 prepared by the Government of Indonesia. In the planning, the following matters are fully taken into consideration.

(a) Drainage water requirements, drainage method, required canal elevations at key points and general layout of drainage system are first confirmed.

(b) Drainage alignment is planned along the lowest land and as straight as possible.

(c) The alignment is planned so as not to pass through village areas and not to give damages to public facilities.

(d) Raised portions of drain are minimized in order to keep canal water level below ground surface as much as possible.

(e) Alternative study is made to assure the suitable alignment. In this alternative study, canal slope, kind, type and configuration of related structures are incorporated.

(f) The canal alignment thus obtained is confirmed whether the alignment will satisfy the operational and social requirements or not.

5.3.3 Function and Configuration of Related Structures

The structures related to the drainage network are bridges, culverts, drops and drainage outlets.

The bridges and culverts are planned and designed with the same principles as mentioned in Section 5.2.3 for drainage culverts, two types are provided depending on their design capacities; i.e. rectangular box barrel type and precast concrete pipe type. The former is applied for the design capacity of more than 1.0 m^3/sec. The drops are of vertical type with rectangular cross section. The drainage outlets are provided at the end of drainage canals, which will flow directly into the rivers or streams, to prevent the river bed erosion and retrogressive erosion in the drainage canals.

5.4 Inspection Road

For the proper operation and maintenance of project facilities, well arranged inspection roads are of vital importance. Since these roads will be used as village roads and farm roads after the project implementation, the arrangement of the inspection roads should be made considering the existing and planned road networks.

(1) Main inspection road

The main inspection roads are required for inspection, operation and maintenance of the main canals. Considering the future increase of vehicles for the inspection and operation and heavy construction equipment to be required for the canal maintenance and repair, all the main inspection roads are so designed as to have an effective width of 7 meters and to be gravel-metalled. These roads are also used for the movement of agricultural products and equipment and for the day-to-day services between villages and from them to the highway and railway station.

(2) Secondary inspection road

The secondary inspection road is mainly provided alongside the secondary canals. All these roads have an effective width of 5 meters and are paved with laterite soil. These roads link the cultivable areas to population centers in the area and are used for the purpose of farm operation, particularly for harvesting.

(3) Tertiary inspection road

For the same purpose as that of the secondary farm roads, the tertiary farm roads are constructed along one side of all the tertiary canals. These roads have an effective width of 3 meters and is of earth without any metalling.

5.5 Tertiary Development

5.5.1 General

Tertiary development program aims at efficient water management by establishing the well organized tertiary system and through refined rotational irrigation program. For this subject, the Directorate of Irrigation of P.U. has prepared the report titled as "Guideline Manual for Planning of Tertiary Network". For the details of criteria and standards for the design and operational programming, this guideline manual is referred to.

5.5.2 Definition and Recommended Size of Irrigation Block

The tertiary development program is prepared for every tertiary block. This tertiary block is further divided into several subordinate blocks like sub-tertiary blocks and quaternary blocks. The definition and recommended size of each irrigation block is briefed as follows:

(1) Tertiary block

The tertiary block is covered by one tertiary canal. The distribution of irrigation water in the tertiary block is managed by farmers themselves. In some cases, however, it is difficult for the farmers to manage the distribution of water to vast lands and large number of farmers equally. The past experiences in Indonesia showed that the suitable size to be covered by one tertiary canal would be in the order of 50 ha. Considering the appropriate organization of water users' group in future, the maximum size of tertiary block is proposed to be 150 ha.

(2) Sub-tertiary block

In case that the tertiary block can not be formed within one village: in many cases, the boundary of tertiary block crosses the administrative boundaries of villages, a sub-tertiary block is formed in each village to simplify the organization of water users' group.

(3) Quaternary block

In order to distribute irrigation water equally and efficiently to all parts of the field through more intensive water control, it is advisable to sub-divide the tertiary block into several subordinate block; the quaternary blocks. The quaternary block is served by respective quaternary canal. The recommended size of one quaternary block is 10 to 15 ha. The rotational irrigation is practiced on the quaternary basis.

5.5.3 Irrigation Canal System

The tertiary system consists of tertiary canal, sub-tertiary canals and quaternary canals which respectively cover the tertiary block, sub-tertiary blocks and quaternary blocks as mentioned above in layout planning of these canals, the following respective function and design principle are taken into consideration.

(1) Tertiary canal

The tertiary canal delivers irrigation water from secondary irrigation canal or sometimes directly from main canal to the sub-tertiary canals and/or quaternary canals. The irrigation water should not be taken directly from the tertiary canal into fields. For the alignment of these canals in the area with steep topography; more than 1% of land slope, the canal should be in perpendicular to the contour line (perpendicular type).

(2) Sub-tertiary canal

The sub-tertiary canal leads irrigation water from the tertiary canal to the quaternary canals. In this case also, irrigation water should not be taken directly from this canal to fields. In principle, the alignment of this canal is made in the same manner as that of the tertiary canal.

(3) Quaternary canal

The quaternary canal is terminal system, Irrigation water to be carried by this canal flows in fields directly or through sub-quaternary canals (branch of quaternary canal). The end of quaternary canal is connected to nearby drainage canal so as to drain off excess water in the canal. Especially in steep-slope area, more than 1% of land slope, the canal should be aligned in parallel to the contour line (contour type). In order to avoid irrigation water from spilling-out from one paddy field to the next field, the width of one plot of quaternary sector should be limited to 200 m at maximum. Furthermore, in order to minimize the area to be occupied by the canal alongside the drainage canal should be avoided as much as possible. Instead, all the quaternary canals expect the canal to be constructed in the highest position in the respective area are so designed as to have dual functions; irrigation and drainage functions, where possible.

The typical layout of tertiary system is illustrated in Fig. VI-14.

5.5.4 Drainage Canal System

In the tertiary block, quaternary drains and tertiary drains are required to evacuate excess water from the block. In the layout planning of these drainage canals, the following respective function and design principle are taken into consideration.

(1) Quaternary drain

Quaternary drain is excavated to collect excess water in the quaternary block and drain off the water to the tertiary drain. In case the quaternary canal has dual functions, the quaternary drain is not excavated.

(2) Tertiary drain

Tertiary drain is provided to lead the excess water to be collected by the quaternary in the tertiary block to the secondary drain or directly to the river. In the typical layout, the tertiary drain is aligned alternately with the tertiary canal.

5.5.5 Farm Road Networks

For the purpose of canal inspection and farm operation, two types of road; tertiary inspection road and farm road, are required in the tertiary block. The respective function and design principle are mentioned below:

(1) Tertiary inspection road

A tertiary inspection road is required alongside the tertiary canal and the sub-tertiary canal. This road is used only for the inspection of canals and farm operation.

(2) Farm operation road

This road suitable for trucks and tractor is required throughout the tertiary block for the purpose of farm operation particularly for harvesting. This road is provided for the connection of tertiary inspection road to other roads. This is used only for farming operation.

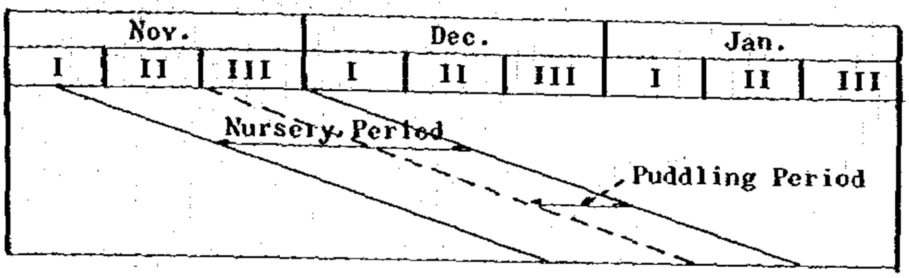
5.6 Land Reclamation

In conformity with the results of present land use classification (see ANNEX-V), the gross total areas to be reclaimed for the paddy field are 9,450 ha for the Muncak Kabau area, 9,700 ha for the Lempuing area and 49,250 ha for the Tulangbawang area respectively. Their distribution of the present land use is tabulated as follows:

Present Land Use	Area to be Reclaimed (ha)					
	Muncak Kabau		Lempuing		Tulangbawang	
	Gross	Net	Gross	Net	Gross	Net
1. (Paddy)	(2,850)	(2,300)	(4,900)	(4,500)	(310)	(280)
2. Tegal	940	840	1,020	910	5,250	4,720
3. Ladang	1,130	1,000	1,580	1,400	11,400	10,210
4. Forest	5,310	4,720	2,80C	2,490	27,900	25,060
5. Alang alang	510	450	2,900	2,580	4,700	4,230
6. Swale	1,210	1,080	800	,700	0	0
7. Others	350	310	600	520	0	0
Gross reclaimed area	9,450	8,400	9,700	8,600	49,250	44,220
Land clearing area (Ladang and forest)	6,440		4,380		39,300	
Land levelling area		8,400		8,600		44,220

The land clearing works for forest in the project area are carried out by the farmers themselves or by PTPT under the transmigration or resettlement programs of the Government of Indonesia. Therefore, the cutting work of trees is not included in the project works. Since the final levelling works are also carried out by the farmers themselves, the costs for these works are not included in the project cost.

Table VI-1 (1) PUDDLING AND NURSERY WATER REQUIREMENTS
(CROPPING PATTERN - I AND II, RAINY SEASON PADDY)



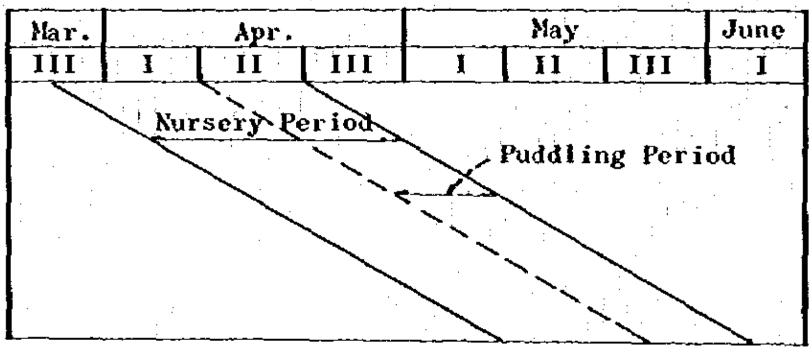
1. Puddling Water Requirement

Phase	Period (day)	Puddling Area	Puddling Water (mm)	Puddling Area
Nov. III	10	1/5	30	1/5
Dec. I	10	1/5	30	2/5
II	10	1/5	30	3/5
III	10	1/5	30	4/5
Jan. I	10	1/5	30	5/5
Total			150 mm	

2. Nursery Water Requirement

Phase	Period (day)	Puddling Water (mm)	Crop Index	Consumptive Use (mm)	Percolation (mm)	Total (mm)	Weighted Average (mm)
Nov. I	5	15	1/12	2	1	18	1
II	10	15	2/12	5	2	22	2
	15	15	3/12	7	3	25	
III	20	15	4/12	10	4	29	3
	25	15	5/12	11	4	30	
Dec. I	30	15	5/12	11	4	30	3
	35	15	5/12	11	4	30	
II	40	15	5/12	11	5	31	3
	45	15	5/12	11	5	31	
III	50	15	5/12	11	4	30	3
	55	-	5/12	11	4	15	
Jan. I	60	-	4/12	10	4	14	1
	65	-	3/12	7	3	10	
II	70	-	2/12	5	2	7	1
	75	-	1/12	2	1	3	
III	80	-	-	-	-	-	0
	85	-					
Total		150 mm		125 mm	50 mm	325 mm	17 mm

Table VI-1 (2) PUDDLING AND NURSERY WATER REQUIREMENTS
(CROPPING PATTERN - I, DRY SEASON PADDY)



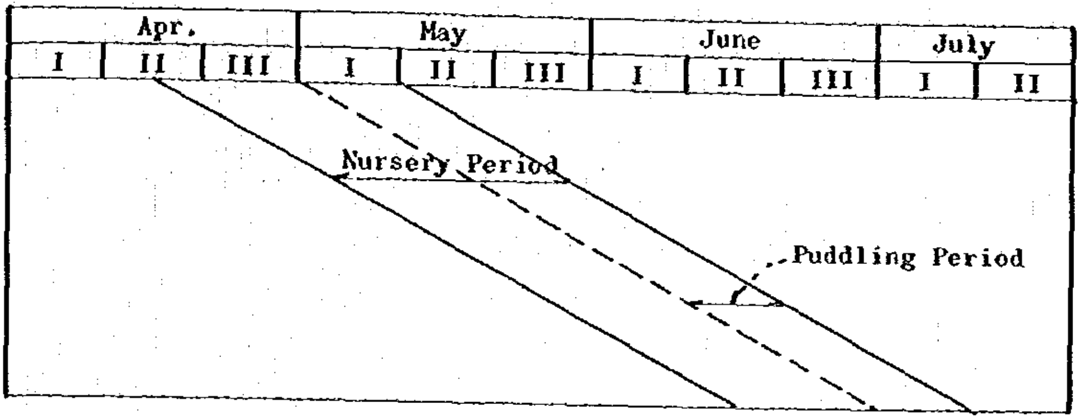
1. Puddling Water Requirement

Phase	Period (day)	Puddling Area	Puddling Water (mm)	Puddling Area
Apr. II	10	2/9	34	2/9
III	10	2/9	33	4/9
May I	10	2/9	33	6/9
II	10	2/9	33	8/9
III	10	1/9	17	9/9
Total			150 mm	

2. Nursery Water Requirement

Phase	Period (day)	Puddling Water (mm)	Crop Index	Consump-tive Use ((mm)	Perco lation (mm)	Total (mm)	Weighted Average (mm)
Mar. III	5	17	1/18	1	1	19	1
Apr. I	10	16	3/18	4	2	22	
	15	17	5/18	7	3	27	2
II	20	16	7/18	10	4	30	
	25	17	9/18	13	5	35	3
III	30	16	10/18	14	5	35	
	35	17	10/18	14	5	36	4
May I	40	17	10/18	14	5	36	
	45	17	10/18	13	5	25	4
II	50	-	9/18	13	5	18	
	55	-	7/18	10	4	14	2
III	60	-	5/18	7	2	10	
	65	-	3/18	4	2	6	1
	70	-	1/18	1	1	2	
June I							
Total		150 mm		125 mm	50 mm	325 mm	17 mm

Table VI-1 (3) PUDDLING AND NURSERY WATER REQUIREMENTS
(CROPPING PATTERN - II, DRY SEASON PADDY)



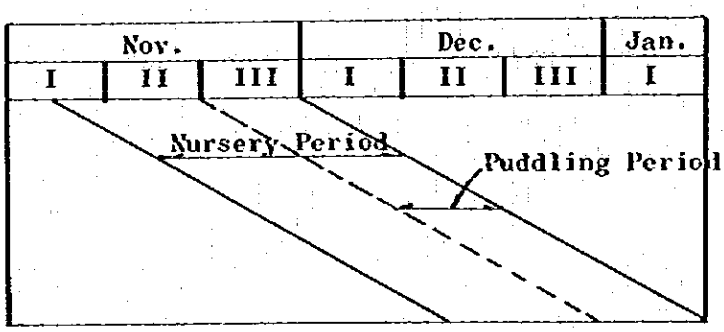
1. Puddling Water Requirement

Phase		Period (day)	Puddling Area	Puddling Water (mm)	Puddling Area
May	I	10	1/6	25	1/6
	II	10	1/6	25	2/6
	III	10	1/6	25	3/6
June	I	10	1/6	25	4/6
	II	10	1/6	25	5/6
	III	10	1/6	25	6/6
July	I	10	-	-	
Total				150 mm	

2. Nursery Water Requirement

Phase		Period (day)	Puddling Water (mm)	Crop Index	Consump-tive Use (mm)	Perco lation (mm)	Total (mm)	Weighted Average (mm)
Apr.	II	5	13	1/24	1	1	15	1
	III	10	12	3/24	3	1	16	2
		15	13	5/24	5	2	20	
May	I	20	12	7/24	7	3	22	2
		25	13	9/24	9	4	26	
	II	30	12	10/24	10	4	26	3
		35	13	10/24	11	4	28	
	III	40	12	10/24	11	4	27	3
		45	13	10/24	11	4	28	
June	I	50	12	10/24	11	4	27	3
		55	13	10/24	11	4	28	
	II	60	12	10/24	10	4	26	2
		65	-	9/24	9	4	13	
	III	70	-	7/24	7	3	10	1
		75	-	5/24	5	2	7	
July	I	80	-	3/24	3	1	4	0
		85	-	1/24	1	1	1	
Total			150 mm		125 mm	50 mm	325 mm	17 mm

Table VI-1 (4) PUDDLING AND NURSERY WATER REQUIREMENTS
(1.0 HA AREA OF KOMERING-I AREA, RAINY SEASON PADDY)



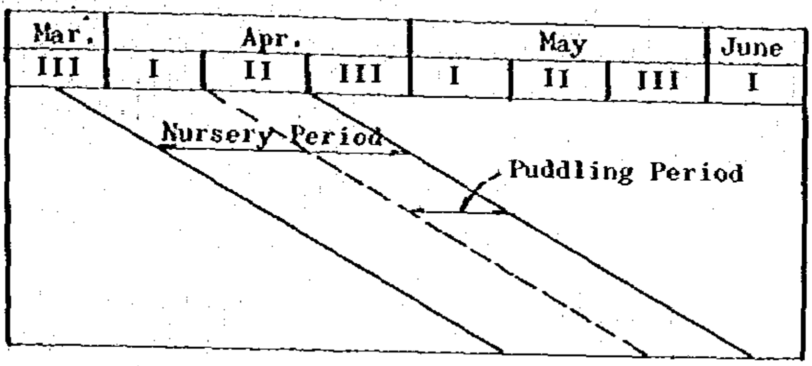
1. Puddling Water Requirement

Phase	Period (day)	Puddling Area	Puddling Water (mm)	Puddling Area
Nov. III	10	1/4	38	1/4
Dec. I	10	1/4	37	2/4
II	10	1/4	37	3/4
III	10	1/4	38	4/4
Jan. I	10	-	-	-
Total			150 mm	

2. Nursery Water Requirement

Phase	Period (day)	Puddling Water (mm)	Crop Index	Consump-tive Use (mm)	Perco lation (mm)	Total (mm)	Weighted Average (mm)
Nov. I	5	19	1/16	2	1	22	1
II	10	18	3/16	5	1	24	3
	15	19	5/16	8	2	29	
III	20	18	7/16	11	2	31	3
	25	19	9/16	14	2	35	
Dec. I	30	19	10/16	15	3	37	4
	35	19	10/16	15	3	37	
II	40	19	10/16	15	3	37	3
	45	-	9/16	14	2	16	
III	50	-	7/16	11	2	13	1
	55	-	5/16	8	2	10	
Jan. I	60	-	3/16	5	1	6	0
	65	-	1/16	2	1	3	
Total		150 mm		125 mm	25 mm	300 mm	15 mm

Table VI-1 (5) PUDDLING AND NURSERY WATER REQUIREMENTS
(1.0 HA AREA OF KOMERING-I AREA, DRY SEASON PADDY)



1. Puddling Water Requirement

Phase	Period	Puddling Area	Puddling Water	Puddling Area
	(day)		(mm)	
Apr. II	10	2/9	34	2/9
III	10	2/9	33	4/9
May I	10	2/9	33	6/9
II	10	2/9	33	8/9
III	10	1/9	17	9/9
June I	10	-	-	-
Total			150 mm	

2. Nursery Water Requirement

Phase	Period	Puddling Water	Crop Index	Consump-tive Use	Perco lation	Total	Weighted Average
	(day)	(mm)		(mm)	(mm)	(mm)	(mm)
Mar. III	5	17	1/18	1	1	19	1
Apr. I	10	16	3/18	4	1	21	2
	15	17	5/18	7	1	25	
II	20	16	7/18	8	2	26	3
	25	17	9/18	13	2	32	
III	30	16	10/18	15	3	34	4
	35	17	10/18	15	3	35	
May I	40	17	10/18	15	3	35	3
	45	17	10/18	14	2	33	
II	50	-	9/18	13	2	15	1
	55	-	7/18	8	2	10	
III	60	-	5/18	7	1	8	1
	65	-	3/18	4	1	5	
June I	70	-	1/18	1	1	2	-
Total		150 mm		125 mm	25 mm	300 mm	15 mm

Table VI-2 (1) UNIT IRRIGATION WATER REQUIREMENTS

A. Cropping Pattern - I (Rainy Season Paddy)

	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2
CROP INT.				0.08	0.25	0.42	0.58	0.75	0.92	1.00	1.00	0.92	0.75	0.58	0.42	0.25	0.08
KC VALUE				1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.	0.
KC VALUE				0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE				0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.
KC VALUE				0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.
KC VALUE				0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.
KC VALUE				0.	0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15
AVERAGE KC				1.12	1.16	1.20	1.23	1.25	1.27	1.29	1.29	1.29	1.28	1.26	1.23	1.18	1.15
EVAPO-TRANS				41.	41.	45.	40.	40.	44.	41.	41.	33.	44.	44.	48.	44.	44.
PERC. LOSS				46.	48.	54.	49.	50.	56.	55.	53.	42.	54.	56.	60.	52.	51.
PERC. LOSS				20.	20.	22.	20.	20.	22.	20.	20.	16.	20.	20.	22.	20.	20.
EFFECT.RAIN				40.	44.	43.	43.	38.	39.	27.	39.	32.	37.	45.	42.	45.	33.
SUB-TOTAL				2.	6.	14.	15.	24.	36.	46.	35.	24.	30.	18.	16.	7.	3.
NURSARY W.	1.	2.	3.	3.	3.	3.	1.	1.									
PUDDLING W.	0.	0.	30.	30.	30.	30.	30.	0.									
FARM REQ.	1.	2.	33.	35.	39.	47.	46.	25.	36.	46.	34.	24.	30.	13.	16.	7.	3.
IRR. REQ.	2.	4.	65.	69.	76.	92.	91.	49.	71.	90.	67.	43.	58.	35.	32.	13.	6.
UNIT W.REQ.	0.02	0.05	0.75	0.80	0.88	1.07	1.05	0.57	0.82	1.04	0.78	0.56	0.67	0.40	0.37	0.15	0.07

A. Cropping Pattern - I (Dry Season Paddy)

	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2
CROP INT.						0.10	0.30	0.50	0.70	0.90	1.00	1.00	0.90	0.70	0.50	0.30	0.10
KC VALUE						1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE						0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.	0.
KC VALUE						0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.
KC VALUE						0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.
KC VALUE						0.	0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15
AVERAGE KC						1.13	1.16	1.21	1.24	1.27	1.29	1.29	1.28	1.27	1.23	1.18	1.15
EVAPO-TRANS						44.	42.	42.	46.	39.	39.	39.	41.	41.	45.	45.	45.
CONSUMP.USE						50.	49.	51.	57.	49.	50.	50.	53.	52.	55.	53.	52.
PERC. LOSS						20.	20.	20.	22.	40.	40.	40.	40.	40.	44.	40.	40.
EFFECT.RAIN						21.	23.	25.	17.	11.	7.	11.	5.	6.	9.	7.	8.
SUB-TOTAL						5.	14.	23.	44.	70.	84.	80.	79.	60.	65.	26.	8.
NURSARY W.			1.	2.	3.	4.	4.	2.	1.								
PUDDLING W.			0.	0.	34.	33.	33.	33.	17.								
FARM REQ.			1.	2.	37.	42.	51.	58.	62.	70.	84.	80.	79.	60.	45.	26.	8.
IRR. REQ.			2.	4.	73.	82.	99.	114.	121.	138.	164.	156.	155.	117.	88.	51.	16.
UNIT W.REQ.			0.02	0.05	0.84	0.95	1.15	1.32	1.40	1.59	1.90	1.81	1.79	1.36	1.02	0.59	0.19

Table VI-2 (2) UNIT IRRIGATION WATER REQUIREMENTS

A. Cropping Pattern - I (Polovijo, Soybeans)

	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2	AUG. 3	SEP. 1	SEP. 2	SEP. 3	OCT. 1	OCT. 2	OCT. 3
CROP INT.		0.13	0.38	0.63	0.88	1.00	1.00	1.00	1.00	1.00	0.88	0.63	0.38	0.13	
KC VALUE		0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	0.	0.	
KC VALUE		0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	0.	
KC VALUE		0.	0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	
KC VALUE		0.	0.	0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	
AVERAGE KC		0.18	0.23	0.27	0.31	0.39	0.51	0.66	0.81	0.91	0.93	0.94	0.87	0.76	
EVAPO-TRANS		39.	39.	41.	41.	45.	45.	45.	50.	45.	45.	45.	46.	46.	
CONSMPT.USE		7.	9.	11.	15.	18.	25.	29.	40.	41.	42.	42.	40.	35.	
EFFECT.RAIN		2.	5.	4.	7.	9.	7.	10.	9.	9.	7.	6.	8.	7.	
SUB-TOTAL		5.	7.	4.	5.	9.	16.	20.	31.	32.	30.	23.	12.	3.	
FARM REQ.W.		1.	2.	6.	7.	12.	23.	29.	44.	46.	43.	32.	17.	5.	
IRR.W.REQ.		2.	4.	12.	14.	24.	45.	56.	86.	89.	85.	64.	34.	10.	
UNIT IRR.W.		0.02	0.05	0.14	0.17	0.28	0.52	0.65	1.00	1.03	0.98	0.74	0.39	0.11	

B. Cropping Pattern - II (Rainy Season Paddy)

	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2
CROP INT.				0.08	0.25	0.42	0.58	0.75	0.92	1.00	1.00	0.92	0.75	0.58	0.42	0.25	0.08
KC VALUE				1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.	0.
KC VALUE				0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE				0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.
KC VALUE				0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.
KC VALUE				0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.
KC VALUE				0.	0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15
AVERAGE KC				1.12	1.16	1.20	1.23	1.25	1.27	1.29	1.29	1.29	1.28	1.26	1.23	1.18	1.15
EVAPO-TRANS				41.	41.	45.	40.	40.	44.	41.	41.	33.	44.	44.	48.	44.	44.
PERC. LOSS				64.	48.	56.	49.	50.	56.	53.	53.	42.	56.	56.	60.	52.	51.
FERC. LOSS				24.	20.	22.	20.	20.	22.	20.	20.	16.	29.	20.	22.	20.	20.
EFFECT.RAIN				40.	44.	43.	43.	38.	39.	27.	39.	32.	37.	45.	42.	45.	33.
SUB-TOTAL				2.	6.	14.	15.	24.	36.	46.	34.	24.	30.	18.	16.	7.	3.
NURSARY W.	1.	2.	3.	3.	3.	3.	1.	1.									
PUDDLING W.	0.	0.	10.	30.	30.	30.	30.	0.									
FARM REQ.	1.	2.	33.	35.	39.	42.	46.	25.	36.	46.	34.	24.	30.	18.	16.	2.	3.
IRR. REQ.	2.	4.	55.	69.	76.	92.	91.	49.	71.	90.	67.	45.	58.	35.	32.	13.	6.
UNIT W.REQ.	0.02	0.05	0.25	0.80	0.88	1.07	1.05	0.57	0.82	1.04	0.78	0.56	0.67	0.40	0.37	0.15	0.07

Table VI-2 (3) UNIT IRRIGATION WATER REQUIREMENTS

B. Cropping Pattern - II (Dry Season Paddy)

	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2	AUG. 3	SEP. 1	SEP. 2
CROP INT.					0.08	0.25	0.42	0.58	0.75	0.92	1.00	0.92	0.75	0.58	0.42	0.25	0.08
KC VALUE					1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	0.	0.	0.	0.	0.
KC VALUE					0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	0.	0.	0.	0.
KC VALUE					0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	0.	0.	0.
KC VALUE					0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	0.	0.
KC VALUE					0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	0.
KC VALUE					0.	0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20
AVERAGE KC					1.12	1.16	1.20	1.23	1.25	1.27	1.29	1.30	1.31	1.31	1.30	1.27	1.20
EVAPO-TRANS					62.	46.	39.	39.	59.	41.	41.	45.	45.	45.	50.	45.	5.
CONSUMP,USE					67.	54.	47.	48.	49.	52.	53.	59.	59.	59.	64.	57.	5.
PERC. LOSS					20.	22.	40.	40.	40.	40.	40.	44.	40.	40.	44.	40.	4.
EFFECT,RAIN					17.	15.	12.	6.	11.	5.	7.	10.	9.	10.	7.	5.	0.
SUB-TOTAL					4.	15.	31.	47.	59.	80.	86.	85.	68.	52.	42.	23.	1.
NURSARY W.		1.	2.	2.	3.	3.	3.	2.	1.	0.							
PUDDLING W.		0.	0.	25.	25.	25.	25.	25.	25.	0.							
FARM REQ.		1.	2.	27.	32.	43.	57.	76.	85.	80.	86.	85.	68.	52.	42.	23.	1.
IRR. REQ.		2.	4.	53.	63.	85.	117.	146.	166.	156.	169.	167.	133.	102.	83.	45.	1.
UNIT W.REQ.		0.02	0.05	0.41	0.75	0.98	1.55	1.69	1.92	1.81	1.95	1.94	1.54	1.18	0.96	0.52	0.02

B. Cropping Pattern - II (Polovijo, Maize)

	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3
CROP INT.	0.13	0.38	0.63	0.88	1.00	1.00	1.00	1.00	1.00	1.00	0.88	0.63	0.38	0.13	
KC VALUE	0.45	0.49	0.58	0.72	0.93	1.06	1.08	1.06	1.01	0.94	0.85	0.	0.	0.	
KC VALUE	0.	0.45	0.49	0.58	0.72	0.93	1.06	1.08	1.06	1.01	0.94	0.85	0.	0.	
KC VALUE	0.	0.	0.45	0.49	0.58	0.72	0.93	1.06	1.08	1.06	1.01	0.94	0.85	0.	
KC VALUE	0.	0.	0.	0.45	0.49	0.58	0.72	0.93	1.06	1.08	1.06	1.01	0.94	0.85	
AVERAGE KC	0.45	0.48	0.52	0.58	0.68	0.82	0.95	1.03	1.05	1.02	0.95	0.95	0.91	0.85	
EVAPO-TRANS	41.	41.	33.	44.	44.	48.	44.	44.	44.	42.	42.	46.	39.	39.	
CONSUMP,USE	15.	20.	17.	25.	30.	40.	42.	45.	45.	43.	41.	44.	35.	33.	
EFFECT.RAIN	13.	19.	14.	21.	26.	30.	36.	33.	35.	27.	27.	20.	8.	4.	
SUB-TOTAL	1.	0.	2.	3.	4.	10.	5.	12.	11.	16.	12.	15.	10.	4.	
FARM REQ.W.	1.	0.	3.	5.	5.	14.	8.	18.	16.	23.	17.	21.	15.	5.	
IRR. W.REQ.	2.	1.	5.	10.	10.	27.	15.	35.	31.	44.	34.	41.	29.	10.	
UNIT.IRR.W.	0.02	0.01	0.06	0.11	0.12	0.31	0.18	0.40	0.36	0.51	0.39	0.48	0.33	0.12	

Table VI-2 (4) UNIT IRRIGATION WATER REQUIREMENTS

C. For 1.0 ha Area of Komering-I Area (Rainy Season Paddy)

	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3
CROP INT.				0.13	0.38	0.63	0.88	1.00	1.00	1.00	1.00	0.88	0.63	0.38	0.13
KC VALUE				1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.
KC VALUE				0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.
KC VALUE				0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.
KC VALUE				0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15
AVERAGE KC				1.12	1.16	1.20	1.23	1.27	1.31	1.33	1.30	1.26	1.23	1.18	1.15
EVAPO-TRANS				41.	41.	45.	40.	40.	44.	41.	41.	33.	44.	44.	48.
PERC. LOSS				46.	48.	54.	49.	51.	58.	54.	53.	41.	54.	52.	56.
PERC. LOSS				10.	10.	11.	10.	10.	11.	10.	10.	8.	10.	10.	11.
EFFECT.RAIN				35.	43.	41.	44.	39.	39.	29.	34.	27.	38.	41.	36.
SUB-TOTAL				3.	6.	15.	13.	22.	30.	36.	39.	19.	16.	8.	4.
NURSERY W.	1.	3.	3.	4.	3.	1.									
PUDDLING W.	0.	0.	38.	37.	37.	0.									
FARM REQ.	1.	3.	41.	44.	46.	16.	13.	22.	30.	36.	30.	19.	16.	8.	4.
IRR. REQ.	2.	6.	80.	85.	89.	32.	26.	44.	59.	70.	58.	39.	32.	15.	8.
UNIT W.REQ.	0.02	0.07	0.93	0.99	1.05	0.37	0.30	0.50	0.68	0.81	0.67	0.44	0.37	0.18	0.09

C. For 1.0 ha Area of Komering-I Area (Dry Season Paddy)

	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2
CROP INT.						0.10	0.30	0.50	0.70	0.90	1.00	1.00	0.90	0.70	0.50	0.30	0.10
KC VALUE						1.13	1.18	1.27	1.33	1.38	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE						0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.	0.
KC VALUE						0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.
KC VALUE						0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.
KC VALUE						0.	0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15
AVERAGE KC						1.13	1.16	1.21	1.24	1.27	1.29	1.29	1.28	1.27	1.23	1.18	1.15
EVAPO-TRANS						44.	42.	42.	46.	39.	39.	39.	41.	41.	45.	45.	45.
CONSUMP.USE						50.	49.	51.	57.	49.	50.	50.	53.	52.	55.	53.	52.
PERC. LOSS						10.	10.	10.	11.	20.	20.	20.	20.	20.	22.	20.	20.
EFFECT.RAIN						19.	23.	21.	16.	10.	6.	9.	4.	8.	9.	7.	7.
SUB-TOTAL						4.	11.	20.	36.	54.	64.	62.	62.	45.	34.	20.	6.
NURSERY W.			1.	2.	3.	4.	3.	1.	1.								
PUDDLING W.			0.	0.	34.	33.	33.	17.	0.								
FARM REQ.			1.	2.	37.	41.	47.	38.	37.	54.	64.	62.	62.	45.	34.	20.	6.
IRR. REQ.			2.	4.	73.	83.	92.	74.	73.	105.	126.	121.	121.	88.	67.	39.	13.
UNIT W.REQ.			0.02	0.05	0.84	0.93	1.06	0.85	0.85	1.22	1.45	1.40	1.40	1.02	0.77	0.45	0.15

Table VI-2 (5) UNIT IRRIGATION WATER REQUIREMENTS

C. For 1.0 ha Area of Komering-I Area (Polovijo, Peanuts)

	AUG. 1	AUG. 2	AUG. 3	SEP. 1	SEP. 2	SEP. 3	OCT. 1	OCT. 2	OCT. 3	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3
CROP INT.		0.17	0.50	0.83	1.00	1.00	1.00	1.00	1.00	1.00	0.83	0.50	0.17		
KC VALUE		0.33	0.43	0.65	0.85	0.97	0.98	0.96	0.86	0.73	0.55	0.	0.		
KC VALUE		0.	0.33	0.43	0.65	0.85	0.97	0.98	0.96	0.86	0.73	0.55	0.		
KC VALUE		0.	0.	0.33	0.43	0.65	0.85	0.97	0.98	0.96	0.86	0.73	0.55		
AVERAGE KC		0.33	0.40	0.50	0.64	0.82	0.93	0.96	0.93	0.86	0.75	0.67	0.55		
EVAPO-TRANS		45.	50.	45.	45.	45.	46.	46.	51.	44.	44.	44.	41.		
CONSMPT.USE		15.	20.	22.	29.	37.	43.	44.	47.	37.	35.	29.	23.		
EFFECT.RAIN		3.	5.	7.	8.	7.	9.	9.	12.	24.	21.	22.	15.		
SUB-TOTAL		7.	7.	15.	21.	30.	34.	35.	35.	13.	10.	4.	1.		
FARM REQ.W.		3.	10.	19.	30.	42.	49.	50.	50.	19.	14.	5.	2.		
IRR.W.REQ.		5.	20.	37.	59.	83.	95.	98.	97.	37.	27.	10.	4.		
UNIT IRR.W.		0.06	0.24	0.43	0.68	0.96	1.10	1.13	1.13	0.42	0.32	0.12	0.04		

D. For Lebak Area (Rainy Season Paddy)

	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2
CROP INT.				0.08	0.25	0.42	0.58	0.75	0.92	1.00	1.00	0.92	0.75	0.58	0.42	0.25	0.08
KC VALUE				1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.	0.
KC VALUE				0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE				0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.	0.
KC VALUE				0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.	0.
KC VALUE				0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15	0.
KC VALUE				0.	0.	0.	0.	0.	1.12	1.18	1.25	1.31	1.34	1.35	1.30	1.20	1.15
AVERAGE KC				1.12	1.16	1.20	1.23	1.25	1.27	1.29	1.29	1.29	1.28	1.26	1.23	1.18	1.15
EVAPO-TRANS				41.	41.	45.	40.	40.	44.	41.	41.	35.	44.	44.	48.	44.	44.
PERC. LOSS				46.	48.	54.	49.	50.	56.	53.	53.	42.	56.	56.	60.	52.	51.
PERC. LOSS				10.	10.	11.	10.	10.	11.	10.	10.	8.	10.	10.	11.	10.	10.
EFFECT.RAIN				35.	43.	41.	44.	38.	39.	29.	34.	28.	39.	43.	40.	41.	32.
SUB-TOTAL				7.	4.	10.	9.	16.	25.	34.	29.	21.	21.	13.	13.	5.	2.
NURSARY W.	1.	2.	3.	3.	5.	3.	1.	1.									
PUDDLING W.	0.	0.	30.	30.	30.	30.	30.	0.									
FARM REQ.	1.	2.	33.	35.	37.	43.	40.	17.	25.	34.	29.	21.	21.	13.	13.	5.	2.
IRR. REQ.	2.	4.	65.	68.	72.	85.	78.	34.	50.	67.	57.	40.	41.	25.	25.	10.	5.
UNIT W.REQ.	0.02	0.05	0.75	0.79	0.83	0.98	0.90	0.40	0.58	0.77	0.66	0.47	0.47	0.29	0.29	0.12	0.05

Table VI-2 (6) UNIT IRRIGATION WATER REQUIREMENTS

D. For Lebak Area (Dry Season Paddy)

	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2
CROP INT.						0.10	0.30	0.50	0.70	0.90	1.00	1.00	0.90	0.70	0.50	0.30	0.10
KC VALUE						1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.	0.	0.
KC VALUE						0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.	0.
KC VALUE						0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.	0.
KC VALUE						0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15	0.
KC VALUE						0.	0.	0.	0.	1.13	1.18	1.27	1.33	1.36	1.30	1.20	1.15
AVERAGE KC						1.13	1.16	1.21	1.24	1.27	1.29	1.29	1.28	1.27	1.23	1.18	1.15
EVAPO-TRANS						44.	42.	42.	46.	39.	39.	39.	41.	41.	45.	45.	45.
CONSUMP.USE						50.	49.	51.	57.	49.	50.	50.	53.	52.	55.	53.	52.
PERC. LOSS						10.	10.	10.	11.	20.	20.	20.	20.	20.	22.	20.	20.
EFFECT.RAIN						39.	23.	21.	16.	10.	6.	9.	4.	8.	9.	7.	7.
SUB-TOTAL						4.	11.	20.	36.	55.	64.	62.	62.	45.	34.	20.	6.
NURSERY W.			1.	2.	3.	4.	4.	2.	1.								
PUDDLING W.			0.	0.	34.	33.	33.	33.	17.								
FARM REQ.			1.	2.	37.	41.	48.	55.	56.	56.	64.	62.	62.	45.	34.	20.	6.
IRR. REQ.			2.	4.	73.	80.	96.	107.	107.	105.	124.	121.	121.	86.	67.	39.	13.
UNIT W.REQ.			0.02	0.05	0.84	0.93	1.09	1.24	1.23	1.22	1.45	1.40	1.40	1.02	0.77	0.45	0.15

D. For Lebak Area (Polowijo, Soybeans)

	JUNE 1	JUNE 2	JUNE 3	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2	AUG. 3	SEP. 1	SEP. 2	SEP. 3	OCT. 1	OCT. 2	OCT. 3
CROP INT.		0.13	0.35	0.63	0.88	1.00	1.00	1.00	1.00	1.00	0.88	0.63	0.38	0.13	
KC VALUE		0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	0.	0.	
KC VALUE		0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	0.	
KC VALUE		0.	0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	0.	
KC VALUE		0.	0.	0.	0.18	0.26	0.33	0.42	0.55	0.73	0.92	1.04	0.93	0.76	
AVERAGE KC		0.18	0.23	0.27	0.31	0.39	0.51	0.66	0.81	0.91	0.93	0.94	0.87	0.76	
EVAPO-TRANS		39.	39.	41.	41.	45.	45.	45.	50.	45.	45.	45.	46.	46.	
CONSUMPT.USE		7.	9.	11.	13.	18.	23.	29.	40.	41.	42.	42.	40.	35.	
EFFECT.RAIN		2.	5.	4.	7.	9.	7.	10.	9.	9.	7.	6.	5.	7.	
SUB-TOTAL		1.	2.	4.	5.	9.	16.	20.	31.	32.	30.	25.	12.	5.	
FARM REQ.W.		1.	2.	6.	7.	12.	23.	27.	44.	45.	43.	32.	17.	5.	
IRR.W.REQ.		2.	4.	12.	14.	26.	45.	56.	85.	89.	85.	64.	34.	10.	
UNIT IRR.W.		0.02	0.05	0.14	0.17	0.28	0.52	0.65	1.00	1.03	0.98	0.74	0.39	0.11	

Table VI - 3 SUMMARY OF UNIT IRRIGATION WATER REQUIREMENT

Description		Cropped Area (%)	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3
A. Cropping Pattern Type-I																				
- Rainy season paddy	(lit/sec/ha)	100	1.05	0.57	0.82	1.04	0.78	0.56	0.67	0.40	0.37	0.15	0.07	-	-	-	-	-	-	-
- Dry season paddy	(lit/sec/ha)	67	-	-	-	-	-	-	-	-	0.01	0.03	0.56	0.64	0.77	0.88	0.94	1.07	1.27	1.21
- Soybeans	(lit/sec/ha)	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.02
TOTAL	(lit/sec/ha)		1.05	0.57	0.82	1.04	0.78	0.56	0.67	0.40	0.38	0.18	0.63	0.64	0.77	0.88	0.94	1.07	1.28	1.23
B. Cropping Pattern Type-II																				
- Rainy season paddy		55	0.58	0.31	0.45	0.57	0.43	0.31	0.37	0.22	0.20	0.08	0.04	-	-	-	-	-	-	-
- Dry season paddy		36	-	-	-	-	-	-	-	-	-	-	0.01	0.02	0.22	0.26	0.35	0.49	0.61	0.69
- Maize		45	-	-	-	0.01	0.01	0.03	0.05	0.05	0.14	0.08	0.18	0.16	0.23	0.18	0.22	0.15	0.05	-
TOTAL	(lit/sec/ha)		0.58	0.31	0.45	0.58	0.44	0.34	0.42	0.27	0.34	0.16	0.23	0.18	0.45	0.44	0.57	0.64	0.66	0.69
C. for 1.0 ha area of Komering-I area	(lit/sec/ha)		0.30	0.50	0.68	0.81	0.67	0.44	0.37	0.18	0.11	0.05	0.84	0.93	1.06	0.85	0.85	1.22	1.45	1.40
D. for Lebak area	(lit/sec/ha)		0.90	0.40	0.58	0.77	0.66	0.47	0.47	0.29	0.30	0.15	0.61	0.62	0.73	0.83	0.82	0.82	0.98	0.96

Description		Cropped Area (%)	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2	AUG. 3	SEPT. 1	SEPT. 2	SEPT. 3	OCT. 1	OCT. 2	OCT. 3	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3
A. Cropping Pattern Type-I																				
- Rainy season paddy	(lit/sec/ha)	100	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.05	0.75	0.80	0.88	1.07
- Dry season paddy	(lit/sec/ha)	67	1.19	0.91	0.68	0.39	0.13	-	-	-	-	-	-	-	-	-	-	-	-	-
- Soybeans	(lit/sec/ha)	33	0.05	0.06	0.09	0.17	0.22	0.33	0.34	0.33	0.25	0.13	0.04	-	-	-	-	-	-	-
TOTAL	(lit/sec/ha)		1.24	0.97	0.77	0.56	0.35	0.33	0.23	0.33	0.25	0.13	0.04	-	0.02	0.05	0.75	0.80	0.88	1.07
B. Cropping Pattern Type-II																				
- Rainy season paddy		55	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.03	0.41	0.44	0.48	0.58
- Dry season paddy		36	0.66	0.71	0.71	0.56	0.43	0.35	0.19	0.01	-	-	-	-	-	-	-	-	-	-
- Maize		45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	(lit/sec/ha)		0.66	0.71	0.71	0.56	0.43	0.35	0.19	0.01	-	-	-	-	0.01	0.03	0.41	0.44	0.48	0.58
C. for 1.0 ha area of Komering-I area	(lit/sec/ha)		1.40	1.02	0.77	0.45	0.18	0.12	0.22	0.34	0.48	0.55	0.57	0.57	0.23	0.23	0.99	1.01	1.03	0.37
D. for Lebak area	(lit/sec/ha)		0.99	0.74	0.61	0.47	0.31	0.33	0.34	0.32	0.24	0.13	0.04	-	0.02	0.05	0.75	0.79	0.83	0.98

Table VI - 4 DESIGN DIVERSION REQUIREMENT

Description	Irrigable Area (ha)	JAN. 1	JAN. 2	JAN. 3	FEB. 1	FEB. 2	FEB. 3	MAR. 1	MAR. 2	MAR. 3	APR. 1	APR. 2	APR. 3	MAY 1	MAY 2	MAY 3	JUNE 1	JUNE 2	JUNE 3
A. Muncak Kabau area																			
- Cropping pattern-I area (m^3/sec)	10,700	11.2	6.1	8.8	11.1	8.3	6.0	7.2	4.3	4.1	1.9	6.7	6.8	8.2	9.4	10.1	11.4	13.7	13.2
B. Lempuing area																			
- Cropping pattern-I area (m^3/sec)	13,100	13.8	7.5	10.7	13.6	10.2	7.3	8.8	5.2	5.0	2.4	8.3	8.4	10.1	11.5	12.3	14.0	16.8	16.1
C. Tulangbawang area																			
- Cropping pattern-I area (m^3/sec)	31,300	32.9	17.8	25.7	32.6	24.4	17.5	21.0	12.5	11.9	5.6	19.7	20.0	24.1	27.5	29.4	33.5	40.1	38.5
- Cropping pattern-II area (m^3/sec)	13,200	7.7	4.1	5.9	7.7	5.8	4.5	5.5	3.6	4.5	2.1	3.0	2.4	5.9	5.8	7.5	8.4	8.7	9.1
		40.6	21.9	31.6	40.3	30.2	22.0	26.5	16.1	16.4	7.7	22.7	22.4	30.0	33.3	36.9	41.9	48.8	47.6
D. Design Diversion Discharge for Total Area at Perjaya Intake /1 (m^3/sec)	94,300	87.0	50.4	72.1	91.2	69.0	49.4	57.9	34.3	33.3	15.7	56.9	57.9	72.2	77.9	84.0	98.0	115.9	112.1

Description	Irrigable Area (ha)	JULY 1	JULY 2	JULY 3	AUG. 1	AUG. 2	AUG. 3	SEPT. 1	SEPT. 2	SEPT. 3	OCT. 1	OCT. 2	OCT. 3	NOV. 1	NOV. 2	NOV. 3	DEC. 1	DEC. 2	DEC. 3
A. Muncak Kabau area																			
- Cropping pattern-I area (m^3/sec)	10,700	13.3	10.4	8.2	6.0	3.7	3.5	3.6	3.5	2.7	1.4	0.4	-	0.2	0.5	8.0	8.6	9.4	11.4
B. Lempuing area																			
- Cropping pattern-I area (m^3/sec)	13,100	16.2	12.7	10.1	7.3	4.6	4.3	4.5	4.3	3.3	1.7	0.5	-	0.3	0.7	9.8	10.5	11.5	14.0
C. Tulangbawang area																			
- Cropping pattern-I area (m^3/sec)	31,300	38.8	30.4	24.1	17.5	11.0	10.3	10.6	10.3	7.8	4.1	1.3	-	0.6	1.6	23.5	25.0	27.5	33.5
- Cropping pattern-II area (m^3/sec)	13,200	8.7	9.4	9.4	7.4	5.7	4.6	2.5	0.1	-	-	-	-	0.1	0.4	5.4	5.8	6.3	7.7
		47.5	39.9	33.5	24.9	16.7	14.9	13.1	10.4	7.8	4.1	1.3	-	0.7	2.0	28.9	30.8	33.8	41.2
D. Design Diversion Discharge for Total Area at Perjaya Intake (m^3/sec)	94,300	112.4	89.9	72.9	52.4	32.9	29.7	29.3	27.3	22.9	14.8	8.4	5.5	3.5	6.3	69.5	73.7	80.2	89.1

/1: Including Komering-I area, Lempuing area and Tulangbawang area

Table VI-5 (1) WATER REQUIREMENTS FOR WATER BALANCE STUDY

YEAR	MONTH (HA)	STAGE-I KELITANG (27490.)	STAGE-I COMERING (35?00.)	STAGE-I LEBAK (25?00.)	STAGE-I TOTAL (45?00.)	STAGE-II MANCAK (10?00.)	STAGE-II LEBAK (15000.)	STAGE-II TOTAL (1?0000.)	STAGE-III LEMPUING (13100.)	STAGE-III LEBAK (1?000.)	STAGE-III TOTAL (153130.)	STAGE-IV TULANG1 (13240.)	STAGE-IV TULANG2 (31300.)	STAGE-IV TOTAL (177??.)
1963	JAN.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	FEB.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.3	0.	0.3
	MAR.	1.5	1.7	1.2	4.1	2.4	3.5	5.9	0.5	5.5	6.0	2.3	1.3	5.7
	APR.	19.0	26.2	17.4	62.5	7.3	4.1	77.9	9.5	5.5	92.9	3.3	20.6	116.5
	MAY	19.2	34.1	22.9	75.1	10.2	10.2	95.5	12.2	5.7	118.2	4.9	29.2	152.1
	JUNE	29.6	67.5	27.4	124.4	13.4	12.7	150.5	16.4	10.3	157.2	9.9	39.2	215.3
	JULY	15.4	29.1	17.7	63.2	4.5	8.2	79.9	15.4	7.0	97.2	5.7	26.7	155.9
	AUG.	3.0	11.1	9.4	23.6	3.7	4.4	31.7	4.5	3.7	39.9	4.1	15.0	54.3
	SEP.	9.4	16.4	10.5	36.3	4.0	4.9	45.2	4.9	4.1	52.2	1.3	11.7	65.2
	OCT.	9.5	5.4	1.2	16.9	2.7	3.8	19.3	9.8	0.7	12.9	0.	2.0	21.8
	NOV.	7.5	10.9	7.4	25.9	2.9	3.5	32.3	3.4	3.0	38.9	2.9	8.5	48.3
	DEC.	15.5	33.3	24.3	73.9	10.1	11.2	95.1	12.3	9.4	116.8	4.5	29.4	153.7
1964	JAN.	3.2	23.7	9.4	24.4	2.9	9.2	55.5	10.9	9.2	44.6	0.3	26.1	71.1
	FEB.	15.5	55.8	6.9	65.9	16.4	9.5	91.1	17.6	9.7	99.6	9.9	62.1	142.4
	MAR.	9.4	21.2	15.3	47.0	6.0	7.6	49.2	5.9	5.4	75.6	6.7	19.2	93.1
	APR.	17.3	27.4	18.2	64.6	7.4	8.4	89.5	9.1	7.1	94.7	6.7	24.8	125.2
	MAY	23.5	35.1	23.5	93.1	13.5	10.9	101.5	12.9	9.2	123.6	8.5	32.7	163.7
	JUNE	27.3	65.9	25.5	99.1	13.8	11.5	124.2	18.0	10.0	150.0	8.0	38.1	193.7
	JULY	13.2	25.1	14.4	52.7	7.4	6.7	65.3	9.1	5.6	81.5	9.7	29.8	112.1
	AUG.	2.2	7.4	6.2	15.8	2.5	2.9	21.1	3.0	2.4	24.5	5.4	7.2	37.0
	SEP.	5.3	7.7	5.5	18.4	2.1	2.5	23.1	2.6	2.2	27.8	0.7	6.1	34.4
	OCT.	2.3	1.4	3.3	4.5	3.1	2.1	4.7	3.1	3.1	5.8	0.	3.3	5.1
	NOV.	2.3	10.9	2.8	26.4	2.9	3.5	32.5	3.5	3.0	39.4	2.9	8.5	43.3
	DEC.	17.5	33.7	25.3	74.5	13.9	11.7	99.5	12.2	9.9	129.6	5.7	29.2	135.3
1965	JAN.	3.5	15.9	0.4	19.1	5.2	5.3	26.1	5.2	0.2	34.5	0.5	19.6	54.1
	FEB.	9.7	22.9	1.6	33.2	5.5	9.7	45.5	9.3	0.4	49.7	0.4	19.9	71.3
	MAR.	1.7	3.3	2.3	7.3	3.9	1.3	9.5	9.2	0.9	11.4	2.3	2.9	11.1
	APR.	17.7	33.3	17.4	68.2	4.3	5.5	85.1	15.2	7.2	102.5	5.3	24.6	132.3
	MAY	21.0	35.9	24.3	80.9	10.3	11.1	102.4	12.7	9.4	124.5	9.8	30.2	165.3
	JUNE	24.4	62.9	22.3	99.5	12.5	10.3	112.3	15.3	8.7	134.3	2.4	35.4	183.3
	JULY	15.3	26.3	15.6	56.8	2.6	7.2	71.6	9.3	6.1	87.1	8.5	22.3	117.0
	AUG.	3.3	11.4	10.3	24.7	5.9	4.4	35.2	4.8	3.9	43.9	6.2	11.5	57.7
	SEP.	9.4	16.4	10.5	36.3	4.0	4.9	45.2	4.9	4.1	52.2	1.3	11.7	65.2
	OCT.	7.9	4.3	1.2	13.2	3.4	0.5	14.1	3.5	0.4	14.9	0.	1.1	14.1
	NOV.	3.9	11.3	7.5	22.8	2.9	3.5	36.3	3.4	3.2	49.9	2.0	8.5	51.3
	DEC.	17.6	34.4	25.3	76.9	13.3	11.6	99.8	12.6	9.9	121.2	4.9	35.1	154.7
1966	JAN.	0.2	8.3	0.4	9.6	3.0	9.2	11.8	3.8	0.2	15.6	0.3	8.7	26.1
	FEB.	7.4	15.7	1.8	24.6	4.2	9.7	33.2	5.9	0.8	18.7	0.8	14.3	55.1
	MAR.	4.5	8.4	6.5	19.4	2.5	3.3	24.9	3.5	2.4	30.5	2.3	7.3	35.1
	APR.	19.3	29.3	17.7	62.9	7.0	4.2	75.1	5.8	6.9	93.7	6.5	23.5	121.7
	MAY	23.5	36.1	23.5	83.1	13.5	10.9	111.5	12.9	9.2	123.4	6.5	30.7	160.7
	JUNE	27.3	65.3	25.5	99.1	13.0	11.5	124.9	15.9	10.0	150.9	8.0	38.1	193.7
	JULY	11.9	26.5	15.9	57.1	2.7	7.3	72.2	9.5	6.2	87.9	8.7	22.4	117.7
	AUG.	2.5	10.4	9.8	21.9	3.5	4.2	29.5	4.3	3.5	37.5	6.1	10.4	54.1
	SEP.	9.4	14.4	10.5	35.3	4.0	4.9	45.2	4.9	4.1	52.2	1.3	11.7	65.2
	OCT.	2.3	1.4	0.3	4.5	3.1	0.1	4.7	0.1	0.1	5.0	0.	0.3	5.1
	NOV.	7.9	10.9	7.4	26.4	2.9	3.5	32.5	3.5	3.4	39.4	2.0	8.5	43.3
	DEC.	17.3	33.7	25.3	74.8	13.9	11.7	98.5	12.2	9.9	120.4	6.7	29.2	135.3
1967	JAN.	0.2	0.4	0.3	0.9	2.4	0.2	9.5	2.9	0.1	12.5	0.3	7.0	13.1
	FEB.	0.5	9.3	5.2	2.2	0.4	0.1	2.7	0.5	0.1	3.1	0.3	1.3	3.1
	MAR.	6.2	9.7	6.3	23.2	3.5	2.9	26.2	3.7	2.5	32.3	3.0	8.9	45.1
	APR.	17.5	24.4	15.5	58.4	0.5	7.4	72.4	4.6	4.5	87.1	3.5	19.1	105.1
	MAY	23.1	35.8	23.1	79.9	13.7	10.7	103.4	13.1	9.1	123.4	5.0	35.4	163.1
	JUNE	24.9	65.1	24.9	97.9	12.9	10.4	129.5	15.8	9.8	147.1	9.0	37.4	193.1
	JULY	14.3	25.3	15.5	56.4	7.3	4.9	68.3	9.5	5.9	83.7	8.1	21.5	113.1
	AUG.	5.3	11.4	10.3	26.7	3.9	4.4	35.2	4.5	3.9	41.9	6.2	11.5	55.7
	SEP.	8.3	13.4	9.9	31.5	3.5	4.6	49.0	6.0	3.9	60.4	1.3	11.9	65.7
	OCT.	10.3	6.5	9.7	19.0	3.7	0.0	23.6	0.9	0.7	22.3	0.	2.1	24.3
	NOV.	9.5	11.6	7.6	28.8	2.9	3.5	35.2	3.4	3.0	41.8	2.0	8.5	32.7
	DEC.	17.1	34.4	24.8	74.1	13.6	11.6	97.9	12.7	9.7	120.2	7.0	30.3	137.5
1968	JAN.	3.6	5.7	3.5	4.6	2.8	5.2	8.0	2.4	0.2	11.2	0.3	6.2	19.1
	FEB.	4.5	9.7	1.5	15.8	2.9	0.7	19.4	3.4	9.4	23.4	0.8	8.6	15.1
	MAR.	3.9	8.3	3.5	17.5	2.4	2.4	22.5	3.0	2.2	27.4	2.8	7.3	31.1
	APR.	15.3	25.9	17.0	63.6	5.7	7.9	75.0	4.2	6.7	89.8	3.7	19.5	113.1
	MAY	15.5	27.2	18.1	59.9	8.9	8.4	78.4	9.8	7.1	93.3	4.7	29.4	127.1
	JUNE	23.7	47.3	27.1	133.5	13.4	12.4	129.5	14.4	10.4	156.5	7.4	39.1	213.7
	JULY	7.3	12.3	7.1	26.7	3.5	5.3	33.5	6.3	2.8	49.4	4.1	18.3	57.1
	AUG.	1.3	4.4	3.4	9.8	3.5	4.8	12.2	1.8	1.3	35.3	3.5	6.3	23.1
	SEP.	5.3	9.2	5.0	19.5	2.3	2.8	26.8	2.3	2.4	29.8	1.3	6.7	37.1
	OCT.	7.8	3.5	3.8	11.1	3.2	9.3	11.8	3.3	0.2	12.1	0.	0.7	12.1
	NOV.	7.3	19.4	7.5	25.2	2.9	3.5	31.7	3.8	3.0	34.2	2.0	8.5	41.1
	DEC.	15.9	27.2	22.5	66.6	9.7	10.5	85.3	15.7	8.8	103.3	5.9	25.8	135.1

Table VI-5 (2) WATER REQUIREMENTS FOR WATER BALANCE STUDY

YEAR	MONTH	STAGE-I BELITANG (20600.)	STAGE-I KOMERING (54720.)	STAGE-I LEBAK (25200.)	STAGE-I TOTAL (85330.)	STAGE-II MUNCAK (19733.)	STAGE-II LEBAK (13000.)	STAGE-II TOTAL (109333.)	STAGE-III SEMPUING (13109.)	STAGE-III LEBAK (11099.)	STAGE-III TOTAL (133100.)	STAGE-IV TULANG1 (15230.)	STAGE-IV TULANG2 (51350.)	STAGE-IV TOTAL (177500.)
(HA)														
1969	JAN.	3.1	2.8	5.3	3.2	5.1	0.1	6.4	1.3	0.1	5.8	0.2	3.1	9.0
	FEB.	2.1	6.5	0.7	7.3	1.4	0.3	9.3	1.7	0.3	10.9	0.4	4.0	15.3
	MAR.	2.8	5.7	5.5	12.4	1.7	1.5	15.9	2.1	1.5	19.5	2.3	5.1	26.8
	APR.	19.9	27.9	10.9	46.7	2.5	3.5	53.0	9.2	7.4	99.4	3.8	29.9	125.3
	MAY	16.4	27.5	18.0	59.9	8.2	3.5	76.4	10.0	2.1	93.4	6.5	23.9	123.4
	JUNE	19.4	33.1	17.7	70.4	9.5	3.3	88.2	11.7	2.0	105.9	7.1	27.5	141.9
	JULY	17.3	30.5	18.8	66.6	8.9	3.7	84.2	10.9	2.4	102.5	8.3	25.9	136.7
	AUG.	1.7	5.2	7.1	17.1	2.8	3.3	23.2	3.4	2.8	27.4	5.7	9.2	43.3
	SEP.	1.5	3.3	2.6	7.4	1.0	1.2	9.6	1.2	1.0	11.9	0.7	2.9	15.5
	OCT.	13.4	6.6	9.7	19.5	9.7	9.5	21.0	0.8	0.7	22.5	0.	2.0	26.5
	NOV.	19.5	12.0	7.6	30.1	2.9	3.5	35.5	5.6	3.0	43.1	2.9	8.5	53.9
	DEC.	15.6	51.3	23.0	69.6	9.3	13.7	57.4	11.6	9.0	139.9	6.3	27.3	163.5
1970	JAN.	3.2	3.6	0.4	3.9	1.2	0.2	5.3	1.5	0.1	7.0	0.2	3.7	10.9
	FEB.	3.3	4.8	1.3	11.5	2.1	3.5	16.1	2.5	3.5	17.2	1.0	6.0	24.2
	MAR.	3.7	3.5	2.0	7.9	1.0	2.9	9.9	3.2	3.3	11.0	1.2	2.9	15.9
	APR.	17.8	23.8	14.3	57.9	6.3	7.6	78.7	7.7	6.4	85.8	1.5	13.3	135.4
	MAY	17.2	36.5	23.5	72.1	13.4	9.5	92.0	12.7	8.0	112.7	5.7	39.4	169.9
	JUNE	35.2	49.7	27.8	104.7	13.7	12.9	133.3	16.8	15.9	165.1	9.1	43.2	210.4
	JULY	16.2	27.9	15.2	58.4	9.1	7.3	73.5	9.9	8.9	87.4	9.0	23.6	123.9
	AUG.	2.7	13.5	9.0	22.2	3.5	4.2	27.9	4.3	3.6	37.8	5.8	13.4	53.9
	SEP.	3.1	12.7	9.3	30.1	3.5	4.3	37.9	4.3	3.6	45.9	1.3	18.4	57.5
	OCT.	14.4	7.3	1.9	24.2	0.7	5.9	25.3	9.9	0.7	27.4	0.	2.1	29.5
	NOV.	13.4	13.2	7.5	34.2	2.9	3.5	49.7	3.4	3.9	47.2	2.9	8.5	57.7
	DEC.	14.7	52.4	22.3	47.5	9.2	18.3	87.1	11.3	8.7	197.1	6.2	26.9	169.2
1971	JAN.	3.2	3.3	0.4	3.5	1.1	3.2	5.8	1.4	0.1	4.3	0.2	3.2	9.8
	FEB.	3.2	3.5	0.1	0.2	0.2	8.0	1.1	9.2	0.0	1.4	0.3	0.6	2.2
	MAR.	3.1	5.9	4.0	15.4	1.8	1.9	14.7	2.2	1.6	29.5	2.0	5.1	27.6
	APR.	15.7	25.9	17.5	57.1	6.9	8.1	77.2	8.5	4.9	92.6	2.5	20.3	115.3
	MAY	17.7	39.5	20.9	78.3	9.2	9.7	83.2	11.3	8.2	165.8	5.2	27.0	161.8
	JUNE	20.5	43.8	24.3	94.4	12.4	11.3	113.1	15.2	9.5	142.8	8.2	36.3	187.3
	JULY	13.3	26.7	14.5	55.0	5.0	6.7	69.7	9.8	5.7	85.1	9.0	23.3	117.5
	AUG.	1.9	4.4	3.6	9.0	1.5	1.7	12.2	1.3	1.6	15.5	4.4	6.6	26.3
	SEP.	3.3	11.5	9.7	26.7	5.5	4.0	14.1	4.1	3.4	41.5	1.3	9.7	52.5
	OCT.	2.5	1.5	9.5	4.7	9.2	0.2	5.2	9.2	9.2	5.6	0.	9.4	6.2
	NOV.	3.7	11.3	7.6	26.3	2.9	3.5	33.3	3.6	3.0	39.9	2.9	8.5	52.5
	DEC.	12.9	29.2	20.6	59.7	7.7	9.6	77.2	9.7	2.1	75.0	5.3	23.2	123.6
1972	JAN.	3.1	1.0	0.3	2.3	0.7	0.1	3.2	0.9	0.1	4.2	0.2	2.1	8.5
	FEB.	0.5	1.2	0.2	1.9	3.4	0.1	2.4	0.5	0.1	2.9	0.4	1.1	4.4
	MAR.	3.3	3.3	1.3	5.9	1.0	0.3	7.5	1.3	0.5	9.3	1.5	3.0	13.9
	APR.	19.4	24.8	17.9	64.1	7.1	8.3	77.6	5.5	7.0	95.4	1.6	20.9	117.9
	MAY	17.4	31.8	22.4	69.2	2.4	9.4	94.2	11.5	9.1	105.4	4.4	27.4	142.2
	JUNE	23.5	45.8	26.3	161.9	13.2	12.2	127.4	16.2	10.3	153.9	8.2	38.8	209.9
	JULY	17.3	39.3	19.1	87.2	9.0	8.7	85.1	11.0	7.5	103.6	9.6	26.3	139.5
	AUG.	2.7	11.1	9.5	23.5	3.7	4.4	31.6	4.8	3.7	39.9	4.1	10.9	56.9
	SEP.	8.6	7.9	5.3	19.4	2.9	2.4	24.3	2.5	2.1	29.5	1.0	5.9	35.4
	OCT.	13.7	7.5	1.9	23.1	9.7	9.9	24.7	9.9	6.7	26.4	0.	2.1	25.5
	NOV.	11.7	12.5	7.4	32.0	2.9	3.5	39.5	3.6	3.0	45.1	2.0	8.5	55.5
	DEC.	14.7	29.3	22.4	50.1	4.7	10.4	55.2	13.7	9.8	104.7	5.9	25.5	135.1
1973	JAN.	3.2	2.4	0.3	2.9	0.9	0.2	3.9	1.1	0.1	5.1	0.2	2.6	7.9
	FEB.	3.9	2.4	0.4	5.8	0.5	0.2	4.7	0.9	0.2	5.8	0.3	2.2	5.5
	MAR.	2.3	4.2	2.9	9.4	1.2	1.4	12.3	1.5	1.1	14.7	3.0	3.6	24.4
	APR.	18.4	25.1	17.1	48.8	6.7	2.9	75.2	8.2	0.7	93.1	2.9	19.5	112.5
	MAY	1.3	17.5	12.4	37.7	5.1	5.8	45.6	8.5	4.9	59.8	3.5	15.0	79.3
	JUNE	28.5	33.4	24.2	93.9	12.4	11.2	117.5	15.1	9.5	142.1	7.9	36.2	185.2
	JULY	13.9	24.4	15.3	53.8	2.2	7.1	48.1	4.8	4.9	82.8	8.9	28.9	112.8
	AUG.	0.3	2.4	2.2	5.7	0.9	1.4	7.4	1.1	0.9	6.5	3.3	2.4	15.3
	SEP.	4.1	3.9	4.1	14.9	1.4	1.9	17.4	1.0	1.4	29.9	0.9	4.5	24.3
	OCT.	3.3	2.3	0.9	4.4	0.4	0.4	7.2	0.4	0.4	5.0	0.	1.0	9.5
	NOV.	7.4	11.2	7.6	27.4	2.9	3.5	35.9	3.8	3.0	45.4	2.0	8.5	53.9
	DEC.	12.9	35.9	25.3	77.1	10.0	11.9	69.9	12.3	10.0	121.1	6.8	29.4	157.3
1974	JAN.	0.2	2.4	0.3	3.0	2.9	0.2	4.0	1.1	0.1	5.2	0.2	2.6	8.1
	FEB.	0.5	1.5	0.3	2.3	0.5	0.1	2.3	0.4	0.1	3.5	0.1	1.4	5.0
	MAR.	1.5	2.3	1.4	3.8	0.7	0.8	7.4	0.9	2.7	4.9	0.7	2.1	11.4
	APR.	15.9	25.0	17.3	42.2	4.9	8.0	77.2	8.5	8.8	92.5	3.7	22.2	118.4
	MAY	18.4	30.7	19.3	48.9	9.1	9.2	55.1	11.1	7.8	104.0	5.8	26.5	138.3
	JUNE	24.3	42.9	23.7	92.5	12.2	11.9	135.8	14.9	9.3	139.0	8.2	35.8	181.7
	JULY	9.2	14.7	9.2	37.3	5.7	4.3	47.3	7.0	3.8	57.9	7.0	16.7	81.7
	AUG.	1.3	5.3	4.3	11.0	1.3	2.1	14.9	2.2	1.8	19.9	4.4	5.3	25.7
	SEP.	1.6	3.1	2.3	7.2	0.9	1.1	9.3	1.2	1.0	11.4	0.5	2.8	14.7
	OCT.	4.6	2.3	0.4	7.4	0.2	0.3	5.1	0.3	0.2	8.0	0.	9.8	9.2
	NOV.	7.9	10.4	7.6	25.2	2.9	3.5	31.7	3.8	3.0	39.2	2.9	8.5	48.7
	DEC.	14.8	29.9	22.3	65.8	5.7	10.4	54.8	10.8	9.8	124.2	5.9	25.4	135.5

Table VI-5 (3) WATER REQUIREMENTS FOR WATER BALANCE STUDY

YEAR	MONTH (1-12)	STAGE-I BELITANG ([illegible])	STAGE-I KOMERING ([illegible])	STAGE-I LEBAK ([illegible])	STAGE-I TOTAL ([illegible])	STAGE-II PINEAK ([illegible])	STAGE-II LEBAK ([illegible])	STAGE-II TOTAL ([illegible])	STAGE-III LEMPUING ([illegible])	STAGE-III LEBAK ([illegible])	STAGE-III TOTAL ([illegible])	STAGE-IV TULANG1 ([illegible])	STAGE-IV TULANG2 ([illegible])	STAGE-IV TOTAL ([illegible])
1975	JAN.	3.1	1.7	0.3	2.1	3.5	0.1	2.9	0.5	0.1	3.7	0.2	1.2	[illegible]
	FEB.	0.7	1.9	0.5	3.3	0.6	0.2	4.1	0.7	0.2	5.0	0.3	1.7	[illegible]
	MAR.	1.5	2.4	1.4	5.5	1.7	0.7	7.3	0.8	0.6	9.4	1.1	2.0	[illegible]
	APR.	19.7	27.1	15.3	65.3	7.2	4.5	83.7	4.8	7.2	95.9	3.1	21.0	[illegible]
	MAY	15.5	32.5	21.7	72.7	7.4	13.1	72.2	11.4	4.5	112.3	4.5	27.4	[illegible]
	JUNE	28.5	55.1	25.7	132.4	15.5	12.3	128.2	16.9	10.2	155.3	8.5	49.5	[illegible]
	JULY	4.9	13.6	9.6	37.5	4.0	4.3	47.9	2.3	3.7	55.9	7.4	17.5	[illegible]
	AUG.	1.1	5.3	5.3	12.2	2.1	2.3	16.4	2.6	2.9	21.2	5.3	6.2	[illegible]
	SEP.	2.4	3.4	2.4	8.2	0.7	1.1	10.3	1.9	1.3	12.4	3.6	2.7	[illegible]
	OCT.	4.9	2.6	0.6	7.9	0.2	0.3	5.4	0.3	0.2	9.9	0.	0.7	[illegible]
	NOV.	7.7	13.3	7.6	26.1	2.9	3.5	32.6	3.6	3.3	39.2	2.0	9.5	[illegible]
	DEC.	15.5	31.3	23.5	73.7	9.2	11.0	31.0	11.3	9.3	111.6	6.2	24.9	[illegible]
1976	JAN.	0.2	1.7	0.3	2.4	0.7	0.2	3.2	0.8	0.1	4.2	0.2	2.0	[illegible]
	FEB.	0.5	3.1	0.9	5.5	0.9	0.4	4.5	1.2	0.3	4.3	0.4	2.8	[illegible]
	MAR.	1.9	3.0	2.3	6.5	0.9	0.9	4.5	1.3	0.5	10.4	0.9	2.5	[illegible]
	APR.	23.2	22.7	13.6	55.4	7.4	3.7	82.6	9.0	7.3	53.9	2.9	21.5	[illegible]
	MAY	23.3	35.5	24.2	52.3	10.4	11.2	104.2	15.0	7.5	124.7	0.3	35.1	[illegible]
	JUNE	33.3	59.2	25.2	107.7	13.9	13.1	134.7	17.0	11.1	102.7	8.9	45.7	[illegible]
	JULY	14.7	24.2	14.7	55.6	6.9	6.5	47.3	5.4	5.8	61.5	7.6	23.1	[illegible]
	AUG.	1.2	7.2	6.3	14.7	2.5	2.9	23.2	3.3	2.5	25.7	5.4	7.4	[illegible]
	SEP.	5.7	19.5	3.3	26.4	3.1	3.7	31.2	3.8	3.2	39.1	3.1	0.0	[illegible]
	OCT.	5.4	2.2	3.8	6.4	0.3	0.4	7.5	0.4	0.5	7.8	0.	0.9	[illegible]
	NOV.	7.4	13.7	7.5	25.7	2.9	3.5	32.2	3.5	3.0	39.7	2.9	8.5	[illegible]
	DEC.	15.7	31.2	22.7	69.5	9.4	19.4	67.5	11.5	9.0	119.3	4.3	27.4	[illegible]
1977	JAN.	0.2	1.8	0.3	2.3	0.6	0.1	3.1	0.8	0.1	4.0	0.2	1.9	[illegible]
	FEB.	0.0	0.3	0.1	0.5	0.1	0.0	0.6	0.1	0.0	0.5	0.3	0.3	[illegible]
	MAR.	1.7	2.9	1.7	6.5	0.8	0.9	3.2	1.0	0.9	19.9	0.4	2.4	[illegible]
	APR.	17.5	23.8	15.4	57.6	5.3	7.6	21.5	7.7	4.4	55.4	1.2	15.4	[illegible]
	MAY	14.5	26.0	17.5	57.8	7.2	9.2	23.6	9.4	4.9	53.0	6.2	22.5	[illegible]
	JUNE	21.9	33.4	20.3	81.6	11.5	9.4	102.5	14.5	9.3	124.8	5.5	33.7	[illegible]
	JULY	15.3	25.1	15.2	55.6	7.1	7.1	49.3	9.7	4.9	24.3	8.4	20.9	[illegible]
	AUG.	1.5	7.1	6.3	14.7	2.5	2.9	23.1	3.1	2.5	25.4	5.7	7.3	[illegible]
	SEP.	6.7	19.8	7.9	25.6	3.0	3.7	32.9	3.7	3.1	39.1	3.3	8.0	[illegible]
	OCT.	15.3	7.4	1.7	23.5	9.7	0.9	25.1	9.9	0.1	26.7	0.	2.3	[illegible]
	NOV.	12.5	12.7	7.6	32.7	2.9	3.5	39.2	3.6	3.3	45.7	2.3	5.5	[illegible]
	DEC.	13.6	27.5	21.4	62.6	5.3	9.9	29.3	10.2	8.4	69.4	5.4	26.3	[illegible]
1973	JAN.	0.7	1.5	0.2	1.6	0.4	0.1	1.9	0.5	0.1	2.4	0.1	1.2	[illegible]
	FEB.	0.2	1.5	0.1	1.5	0.5	0.1	2.4	0.4	0.3	3.1	0.2	1.5	[illegible]
	MAR.	1.6	2.4	1.7	5.9	0.7	0.5	7.5	0.9	0.7	9.0	1.5	2.1	[illegible]
	APR.	19.4	27.1	18.3	65.0	7.2	8.5	80.7	9.8	7.2	96.7	1.5	21.1	[illegible]
	MAY	17.6	31.6	22.8	74.3	9.2	9.7	55.9	11.5	8.2	104.6	7.5	27.0	[illegible]
	JUNE	13.3	28.9	14.7	63.7	8.1	7.7	70.7	9.9	6.5	76.2	7.0	23.7	[illegible]
	JULY	10.2	18.9	9.4	39.4	5.5	5.4	48.3	4.4	3.7	58.8	5.5	16.5	[illegible]
	AUG.	0.4	2.9	2.5	5.9	1.9	1.2	9.1	1.3	1.0	10.4	4.5	3.9	[illegible]
	SEP.	2.7	4.0	2.7	9.6	1.0	1.3	11.9	1.3	1.1	14.3	0.5	3.1	[illegible]
	OCT.	0.1	0.1	-0.0	0.2	-0.0	-0.0	0.2	-0.0	-0.0	0.2	0.	-0.0	[illegible]
	NOV.	5.3	11.4	7.4	27.6	2.9	3.5	35.4	3.6	3.4	49.9	2.0	8.5	[illegible]
	DEC.	14.6	29.2	22.3	66.1	9.8	10.3	55.2	19.5	8.7	104.7	5.9	25.5	[illegible]
1979	JAN.	0.1	1.4	0.3	1.8	0.5	0.1	2.4	0.6	0.1	3.2	0.2	0.5	[illegible]
	FEB.	0.5	1.3	0.3	1.8	0.3	0.1	2.3	0.4	0.1	2.8	0.4	0.9	[illegible]
	MAR.	2.1	3.3	2.5	8.1	1.0	1.2	10.3	1.2	1.0	12.5	1.7	3.4	[illegible]
	APR.	13.5	25.3	12.3	61.7	6.5	9.9	76.5	8.3	6.4	91.6	1.6	19.9	[illegible]
	MAY	23.9	36.1	23.9	77.1	9.5	10.7	97.4	12.0	9.0	115.7	4.0	28.7	[illegible]
	JUNE	22.3	49.4	19.9	91.9	11.7	9.5	132.9	14.3	7.8	125.0	7.4	34.3	[illegible]
	JULY	14.2	24.4	14.7	53.3	7.1	6.4	67.5	9.7	5.3	82.8	4.3	20.9	[illegible]
	AUG.	2.5	9.6	7.1	18.4	2.8	3.3	24.1	3.5	2.8	33.3	4.3	8.4	[illegible]
	SEP.	3.2	5.1	3.5	12.1	1.5	1.8	15.3	1.5	1.5	18.5	0.7	4.2	[illegible]
	OCT.	4.2	1.5	0.1	6.9	0.5	0.0	6.1	0.0	0.5	6.2	0.	0.1	[illegible]
	NOV.	9.5	11.4	7.6	28.8	2.9	3.5	35.2	3.5	3.3	41.9	2.4	8.5	[illegible]
	DEC.	12.5	25.9	29.4	58.7	7.8	9.5	70.9	9.6	8.4	93.6	5.3	22.9	[illegible]
1980	JAN.	0.8	1.4	0.3	1.9	0.5	0.1	2.4	0.6	0.1	3.3	0.2	1.5	5.1
	FEB.	0.9	1.8	0.5	3.2	0.5	0.3	4.1	0.7	0.2	5.0	0.5	1.4	7.1
	MAR.	1.7	2.7	1.9	8.4	0.8	0.7	8.9	0.9	0.8	9.7	1.5	2.2	13.7
	APR.	15.9	25.5	17.2	61.4	4.7	8.8	76.1	9.3	4.7	91.1	1.4	19.7	112.7
	MAY	13.5	24.2	16.7	56.0	7.2	7.7	69.9	8.8	6.4	86.2	7.2	28.9	112.4
	JUNE	22.5	59.1	21.4	83.7	15.7	9.7	145.1	14.3	8.2	127.4	4.2	34.1	117.3
	JULY	5.7	12.5	7.8	27.1	3.7	5.5	36.3	4.5	3.8	41.8	4.4	10.7	34.9
	AUG.	1.5	6.0	5.2	12.7	2.5	2.4	17.1	2.5	2.0	21.7	4.2	5.9	31.1
	SEP.	5.4	7.5	4.3	17.2	1.8	2.2	21.2	2.2	1.9	23.3	0.6	3.3	31.2
	OCT.	0.1	0.1	-0.0	0.2	-0.0	-0.0	0.2	-0.0	-0.0	0.2	0.	-0.0	0.2
	NOV.	1.3	0.5	0.	1.8	0.	0.	1.8	0.	0.	1.8	0.	0.	1.8
	DEC.	0.0	0.0	0.	0.1	0.	0.	0.1	0.	0.	0.1	0.	0.	[illegible]

Table VI-6 (1) REQUIRED DISCHARGE OF KOMERING RIVER

Year	Month	Irrigation Water Requirement: Komering-I Lempuing Interchanging	Irrigation Water Requirement: Proper	Irrigation Water Requirement: Muncak Kabau	Irrigation Water Requirement: Lebak	Return Flow: Komering-I Lempuing Proper	Return Flow: Lebak	Return Flow: Muncak Kabau	Maintenance Flow: Lebak Intake	Maintenance Flow: Muncak Kabau Intake	Maintenance Flow: Perjaya Intake	Required Discharge at Perjaya: Stage IV	Required Discharge at Perjaya: Stage III	Required Discharge at Perjaya: Stage II
		Q_I	Q_P	Q_M	Q_L	Q_p	Q_l	Q_m	Q_4	Q_3	Q_2	Q_1	Q_1	Q_1
1953	JAN.	0.	0.	0.	0.	120.	16.	19.	25.	25.	25.	25.	6.	6.
	FEB.	0.	0.	0.	0.	28.	11.	15.	25.	25.	25.	25.	12.	12.
	MAR.	4.	1.	9.	2.	65.	9.	10.	25.	25.	27.	33.	21.	20.
	APR.	58.	19.	7.	32.	65.	12.	11.	25.	47.	75.	131.	107.	92.
	MAY	82.	19.	10.	41.	29.	10.	5.	25.	61.	95.	172.	154.	135.
	JUNE	112.	30.	13.	51.	36.	12.	8.	25.	70.	113.	225.	177.	150.
	JULY	73.	15.	8.	33.	31.	10.	5.	25.	52.	77.	150.	117.	93.
	AUG.	33.	3.	4.	18.	18.	8.	4.	25.	39.	46.	78.	61.	53.
	SEP.	32.	9.	4.	19.	9.	6.	1.	25.	43.	57.	87.	76.	67.
	OCT.	5.	9.	1.	3.	17.	2.	2.	25.	26.	36.	46.	42.	41.
	NOV.	25.	7.	3.	16.	39.	7.	7.	25.	32.	43.	57.	57.	55.
	DEC.	82.	17.	10.	45.	26.	10.	4.	25.	65.	92.	176.	137.	118.
1954	JAN.	61.	0.	9.	1.	52.	7.	9.	25.	25.	34.	95.	61.	69.
	FEB.	105.	19.	16.	3.	56.	6.	9.	25.	25.	58.	164.	115.	97.
	MAR.	53.	9.	7.	30.	46.	11.	7.	25.	48.	64.	117.	96.	79.
	APR.	65.	19.	7.	34.	53.	11.	7.	25.	51.	78.	143.	114.	98.
	MAY	88.	20.	11.	46.	46.	12.	8.	25.	61.	92.	178.	141.	119.
	JUNE	108.	23.	15.	47.	35.	12.	6.	25.	66.	107.	215.	169.	143.
	JULY	45.	13.	7.	27.	26.	9.	4.	25.	47.	68.	133.	102.	87.
	AUG.	23.	2.	2.	11.	19.	7.	4.	25.	32.	37.	69.	49.	42.
	SEP.	17.	5.	2.	10.	17.	6.	5.	25.	32.	49.	57.	59.	45.
	OCT.	2.	3.	0.	1.	22.	9.	12.	25.	25.	28.	30.	18.	18.
	NOV.	25.	8.	5.	16.	89.	12.	15.	25.	26.	37.	42.	54.	44.
	DEC.	82.	15.	10.	47.	75.	17.	12.	25.	49.	88.	169.	134.	111.
1955	JAN.	46.	1.	7.	1.	27.	4.	5.	25.	25.	32.	79.	54.	46.
	FEB.	55.	10.	7.	3.	35.	5.	6.	25.	25.	42.	92.	69.	62.
	MAR.	10.	2.	1.	4.	19.	4.	3.	25.	26.	29.	39.	33.	31.
	APR.	70.	20.	8.	36.	49.	8.	5.	25.	54.	82.	152.	122.	105.
	MAY	59.	25.	11.	45.	26.	9.	4.	25.	65.	97.	186.	145.	123.
	JUNE	102.	25.	12.	43.	49.	13.	9.	25.	58.	96.	196.	153.	129.
	JULY	46.	15.	4.	29.	25.	9.	5.	25.	49.	72.	139.	105.	92.
	AUG.	34.	3.	4.	19.	18.	5.	4.	25.	49.	67.	81.	63.	55.
	SEP.	32.	9.	6.	19.	9.	6.	1.	25.	43.	57.	89.	76.	67.
	OCT.	4.	5.	0.	2.	51.	6.	8.	25.	25.	33.	39.	32.	34.
	NOV.	25.	9.	5.	16.	59.	7.	7.	25.	32.	46.	70.	59.	53.
	DEC.	86.	18.	10.	46.	45.	13.	8.	25.	83.	91.	175.	135.	116.
1956	JAN.	21.	0.	3.	1.	42.	7.	8.	25.	25.	28.	49.	33.	29.
	FEB.	36.	7.	5.	3.	46.	6.	7.	25.	25.	37.	74.	55.	48.
	MAR.	21.	4.	2.	12.	41.	4.	6.	25.	31.	35.	59.	49.	44.
	APR.	62.	19.	7.	33.	53.	11.	7.	25.	51.	76.	138.	111.	95.
	MAY	88.	24.	11.	46.	45.	12.	8.	25.	61.	92.	178.	141.	119.
	JUNE	109.	25.	13.	47.	35.	12.	6.	25.	68.	107.	215.	167.	143.
	JULY	47.	15.	8.	29.	25.	9.	5.	25.	50.	72.	149.	105.	93.
	AUG.	36.	2.	4.	17.	18.	7.	4.	25.	38.	46.	75.	59.	51.
	SEP.	32.	9.	4.	19.	9.	6.	1.	25.	45.	57.	89.	76.	67.
	OCT.	2.	5.	0.	1.	72.	9.	12.	25.	25.	28.	30.	18.	15.
	NOV.	25.	8.	3.	16.	53.	12.	13.	25.	26.	37.	42.	51.	44.
	DEC.	82.	15.	10.	47.	75.	17.	12.	25.	69.	88.	169.	134.	111.
1957	JAN.	17.	0.	2.	1.	43.	6.	7.	25.	25.	28.	44.	30.	27.
	FEB.	6.	3.	0.	0.	43.	7.	7.	25.	25.	28.	30.	21.	21.
	MAR.	25.	4.	5.	12.	27.	5.	5.	25.	32.	33.	66.	33.	47.
	APR.	55.	17.	7.	31.	57.	9.	5.	25.	51.	75.	139.	107.	93.
	MAY	84.	23.	13.	43.	55.	11.	8.	25.	62.	92.	178.	142.	120.
	JUNE	105.	27.	13.	45.	56.	12.	8.	25.	65.	105.	213.	166.	141.
	JULY	46.	14.	7.	25.	51.	13.	8.	25.	47.	69.	133.	103.	88.
	AUG.	36.	3.	4.	19.	19.	5.	4.	25.	43.	47.	81.	65.	55.
	SEP.	30.	4.	4.	18.	18.	4.	1.	25.	42.	56.	84.	72.	63.
	OCT.	9.	11.	1.	6.	33.	4.	5.	25.	25.	37.	48.	42.	41.
	NOV.	26.	10.	3.	15.	57.	9.	9.	25.	30.	42.	68.	57.	51.
	DEC.	86.	17.	10.	46.	39.	11.	7.	25.	84.	91.	176.	138.	116.
1958	JAN.	15.	0.	2.	1.	32.	5.	5.	25.	25.	27.	42.	32.	29.
	FEB.	23.	5.	3.	3.	22.	4.	4.	25.	25.	33.	55.	45.	41.
	MAR.	20.	4.	2.	10.	42.	10.	10.	25.	26.	32.	52.	43.	39.
	APR.	56.	18.	7.	32.	42.	11.	8.	25.	49.	73.	127.	107.	92.
	MAY	67.	15.	5.	34.	29.	7.	5.	25.	55.	76.	163.	115.	95.
	JUNE	110.	29.	13.	50.	65.	16.	11.	25.	66.	107.	247.	171.	144.
	JULY	33.	7.	4.	13.	31.	8.	5.	25.	33.	46.	77.	49.	53.
	AUG.	14.	1.	1.	8.	31.	5.	4.	25.	25.	28.	42.	36.	31.
	SEP.	19.	5.	2.	11.	15.	6.	2.	25.	34.	41.	69.	52.	47.
	OCT.	4.	7.	0.	1.	39.	5.	4.	25.	25.	32.	37.	39.	31.
	NOV.	25.	7.	3.	14.	151.	21.	25.	25.	25.	35.	83.	39.	32.
	DEC.	71.	15.	9.	42.	65.	15.	10.	25.	57.	83.	152.	123.	101.

Table VI-6 (2) REQUIRED DISCHARGE OF KOMERING RIVER

Year	Month	Irrigation Water Requirement: Komering-I Lempuing Pulangdawang	Irrigation Water Requirement: Proper	Irrigation Water Requirement: Muncak Kabau	Irrigation Water Requirement: Lebak	Return Flow: Komering-I Lempuing Proper	Return Flow: Lebak	Return Flow: Muncak Kabau	Maintenance Flow: Lebak Intake	Maintenance Flow: Muncak Kabau Intake	Maintenance Flow: Perjaya Intake	Required Discharge at Perjaya: Stage IV	Required Discharge at Perjaya: Stage III	Required Discharge at Perjaya: Stage II
		Q_g	Q_K	Q_M	Q_L	Q_g	Q_f	Q_m	Q_4	Q_3	Q_2	Q_1	Q_1	Q_1
1969	JAN.	7.	9.	1.	1.	76.	10.	11.	25.	25.	26.	34.	20.	18.
	FEB.	11.	2.	1.	1.	27.	5.	6.	25.	25.	28.	39.	32.	30.
	MAR.	15.	5.	2.	2.	31.	6.	5.	25.	27.	32.	47.	40.	34.
	APR.	63.	29.	7.	35.	33.	11.	7.	25.	53.	80.	165.	117.	101.
	MAY	47.	16.	8.	35.	43.	13.	10.	25.	49.	71.	138.	159.	91.
	JUNE	80.	19.	10.	35.	36.	10.	6.	25.	52.	81.	161.	126.	107.
	JULY	76.	17.	9.	35.	28.	10.	5.	25.	55.	81.	157.	122.	106.
	AUG.	25.	2.	3.	13.	18.	7.	6.	25.	55.	37.	65.	51.	45.
	SEP.	8.	1.	1.	5.	46.	6.	7.	25.	25.	27.	36.	29.	27.
	OCT.	9.	11.	1.	3.	19.	2.	2.	25.	26.	39.	47.	45.	44.
	NOV.	26.	10.	3.	14.	47.	10.	11.	25.	28.	44.	67.	57.	52.
	DEC.	76.	15.	9.	43.	70.	15.	12.	25.	56.	51.	157.	123.	103.
1970	JAN.	9.	3.	1.	1.	32.	5.	6.	25.	25.	26.	35.	26.	24.
	FEB.	16.	3.	2.	2.	27.	5.	5.	25.	25.	39.	47.	39.	35.
	MAR.	9.	2.	1.	4.	22.	4.	4.	25.	25.	28.	36.	32.	39.
	APR.	51.	18.	6.	33.	138.	17.	15.	25.	40.	64.	116.	98.	82.
	MAY	83.	17.	10.	38.	39.	11.	7.	25.	58.	83.	188.	132.	110.
	JUNE	115.	33.	14.	52.	35.	12.	6.	25.	71.	155.	229.	183.	152.
	JULY	70.	14.	8.	23.	28.	9.	5.	25.	48.	70.	149.	107.	91.
	AUG.	31.	3.	4.	17.	22.	9.	4.	25.	37.	44.	75.	58.	51.
	SEP.	29.	8.	6.	17.	19.	4.	1.	25.	41.	52.	81.	69.	61.
	OCT.	19.	14.	1.	4.	7.	1.	9.	25.	28.	43.	54.	52.	51.
	NOV.	27.	13.	3.	14.	16.	3.	2.	25.	37.	53.	89.	70.	63.
	DEC.	75.	15.	9.	41.	39.	11.	7.	25.	69.	84.	159.	125.	165.
1971	JAN.	5.	0.	0.	1.	27.	5.	5.	25.	25.	26.	34.	27.	25.
	FEB.	2.	0.	0.	0.	27.	5.	4.	25.	25.	25.	27.	22.	22.
	MAR.	15.	3.	2.	3.	44.	8.	7.	25.	28.	31.	66.	39.	35.
	APR.	57.	19.	7.	33.	65.	12.	9.	25.	49.	74.	132.	109.	93.
	MAY	75.	18.	9.	39.	45.	12.	8.	25.	58.	83.	159.	126.	108.
	JUNE	103.	27.	12.	45.	35.	12.	7.	25.	64.	102.	260.	169.	137.
	JULY	69.	14.	8.	27.	28.	9.	6.	25.	64.	68.	137.	105.	87.
	AUG.	35.	1.	0.	7.	39.	5.	7.	25.	25.	28.	63.	34.	39.
	SEP.	26.	7.	3.	18.	12.	4.	2.	25.	39.	69.	74.	65.	57.
	OCT.	2.	3.	0.	1.	56.	7.	9.	25.	25.	28.	39.	22.	21.
	NOV.	25.	8.	3.	14.	55.	10.	11.	25.	28.	39.	64.	56.	47.
	DEC.	54.	13.	5.	38.	111.	20.	18.	25.	46.	60.	131.	102.	85.
1972	JAN.	5.	0.	1.	1.	52.	8.	8.	25.	25.	24.	31.	21.	20.
	FEB.	3.	9.	0.	9.	51.	8.	8.	25.	25.	24.	29.	20.	19.
	MAR.	9.	1.	1.	2.	76.	19.	12.	25.	25.	27.	36.	22.	20.
	APR.	58.	19.	7.	33.	49.	12.	10.	25.	49.	75.	133.	111.	95.
	MAY	77.	17.	9.	35.	31.	10.	6.	25.	58.	85.	182.	128.	118.
	JUNE	110.	29.	13.	49.	35.	12.	6.	25.	68.	118.	220.	173.	146.
	JULY	78.	17.	9.	36.	26.	10.	5.	25.	56.	82.	188.	124.	155.
	AUG.	33.	3.	4.	18.	18.	5.	4.	25.	39.	68.	78.	61.	53.
	SEP.	17.	4.	2.	10.	18.	3.	2.	25.	32.	41.	58.	51.	47.
	OCT.	11.	14.	1.	4.	8.	1.	1.	25.	28.	42.	53.	51.	49.
	NOV.	27.	12.	3.	14.	33.	5.	5.	25.	34.	49.	74.	65.	59.
	DEC.	71.	15.	9.	42.	33.	11.	5.	25.	41.	85.	158.	124.	105.
1973	JAN.	6.	0.	1.	1.	21.	4.	3.	25.	25.	26.	32.	27.	25.
	FEB.	6.	1.	1.	1.	43.	8.	10.	25.	25.	27.	37.	29.	39.
	MAR.	12.	2.	1.	5.	17.	4.	3.	25.	28.	31.	44.	37.	34.
	APR.	56.	18.	7.	32.	32.	7.	3.	25.	53.	79.	134.	112.	97.
	MAY	62.	8.	5.	23.	79.	15.	15.	25.	35.	43.	99.	71.	69.
	JUNE	102.	26.	12.	45.	51.	14.	9.	25.	61.	189.	202.	158.	134.
	JULY	63.	14.	7.	23.	25.	9.	4.	25.	49.	78.	133.	103.	89.
	AUG.	10.	1.	1.	4.	47.	9.	4.	25.	25.	27.	36.	26.	23.
	SEP.	13.	4.	2.	2.	46.	4.	4.	25.	28.	32.	45.	49.	31.
	OCT.	4.	3.	0.	2.	48.	9.	11.	25.	25.	29.	32.	22.	21.
	NOV.	25.	9.	3.	14.	42.	7.	7.	25.	32.	45.	69.	58.	52.
	DEC.	82.	18.	10.	47.	26.	18.	12.	25.	40.	85.	170.	136.	112.
1974	JAN.	6.	0.	1.	1.	18.	4.	3.	25.	25.	26.	32.	27.	24.
	FEB.	4.	1.	0.	0.	8.	2.	2.	25.	25.	26.	30.	22.	26.
	MAR.	6.	2.	1.	3.	35.	7.	4.	25.	25.	27.	33.	28.	26.
	APR.	53.	19.	7.	32.	63.	11.	9.	25.	49.	74.	133.	107.	96.
	MAY	74.	16.	9.	37.	39.	11.	7.	25.	55.	89.	154.	122.	103.
	JUNE	102.	26.	12.	44.	35.	12.	4.	25.	63.	165.	201.	159.	135.
	JULY	59.	9.	4.	17.	31.	5.	8.	25.	56.	51.	101.	77.	68.
	AUG.	17.	1.	2.	8.	30.	9.	7.	25.	24.	29.	47.	37.	33.
	SEP.	8.	2.	1.	5.	29.	4.	5.	25.	25.	24.	35.	32.	39.
	OCT.	3.	5.	0.	1.	51.	7.	8.	25.	25.	33.	33.	25.	25.
	NOV.	25.	7.	3.	14.	95.	13.	15.	25.	25.	35.	48.	49.	42.
	DEC.	71.	15.	9.	41.	49.	13.	8.	25.	59.	82.	153.	121.	102.

Table VI-6 (3) REQUIRED DISCHARGE OF KOMERING RIVER

Year	Month	Irrigation Water Requirement: Komering-I Lempuing Telangbaring	Irrigation Water Requirement: Proper	Irrigation Water Requirement: Muncak Kabau	Irrigation Water Requirement: Lebak	Return Flow: Komering-I Lempuing Proper	Return Flow: Lebak	Return Flow: Muncak Kabau	Maintenance Flow: Lebak Intake	Maintenance Flow: Muncak Kabau Intake	Maintenance Flow: Perjaya Intake	Required Discharge at Perjaya: Stage IV	Required Discharge at Perjaya: Stage III	Required Discharge at Perjaya: Stage II
		Q_c	Q_x	Q_x	Q_L	Q_g	Q_l	Q_m	Q_4	Q_3	Q_2	Q_1	Q_1	Q_1
1975	JAN.	6.	0.	1.	1.	33.	6.	5.	25.	25.	26.	36.	23.	23.
	FEB.	5.	1.	1.	1.	20.	6.	5.	25.	25.	26.	31.	27.	26.
	MAR.	6.	1.	1.	3.	45.	7.	7.	25.	25.	27.	36.	26.	25.
	APR.	69.	20.	7.	34.	35.	8.	6.	25.	55.	82.	142.	118.	102.
	MAY	79.	19.	9.	40.	53.	13.	9.	25.	57.	86.	183.	129.	109.
	JUNE	116.	25.	16.	49.	39.	12.	7.	25.	66.	108.	222.	175.	166.
	JULY	52.	9.	4.	17.	39.	5.	6.	25.	36.	51.	103.	78.	67.
	AUG.	20.	1.	2.	9.	29.	8.	6.	25.	29.	32.	52.	40.	38.
	SEP.	8.	2.	1.	-5.	27.	6.	6.	25.	25.	29.	36.	33.	31.
	OCT.	6.	5.	0.	1.	34.	11.	13.	25.	25.	30.	34.	21.	20.
	NOV.	25.	5.	5.	16.	76.	11.	12.	25.	27.	37.	62.	52.	45.
	DEC.	75.	16.	9.	44.	73.	18.	12.	25.	57.	83.	158.	125.	104.
1976	JAN.	5.	9.	1.	1.	23.	6.	4.	25.	25.	26.	39.	25.	24.
	FEB.	4.	2.	1.	2.	19.	6.	3.	25.	25.	27.	35.	30.	29.
	MAR.	7.	2.	1.	6.	45.	8.	7.	25.	25.	28.	35.	28.	26.
	APR.	61.	21.	7.	35.	45.	10.	6.	25.	53.	51.	142.	118.	103.
	MAY	90.	21.	11.	45.	28.	10.	5.	25.	65.	97.	187.	167.	124.
	JUNE	156.	39.	16.	52.	38.	13.	6.	25.	71.	145.	251.	181.	153.
	JULY	83.	15.	7.	27.	33.	10.	6.	25.	47.	68.	129.	101.	87.
	AUG.	23.	9.	3.	12.	19.	7.	6.	25.	33.	37.	60.	47.	41.
	SEP.	24.	6.	3.	15.	25.	5.	4.	25.	35.	45.	69.	59.	52.
	OCT.	3.	3.	0.	2.	47.	8.	8.	25.	25.	29.	32.	25.	24.
	NOV.	25.	7.	3.	16.	45.	8.	8.	25.	31.	41.	66.	56.	49.
	DEC.	76.	18.	9.	43.	49.	12.	4.	25.	60.	85.	161.	127.	107.
1977	JAN.	5.	3.	1.	3.	21.	4.	3.	25.	25.	26.	30.	26.	25.
	FEB.	1.	9.	0.	0.	36.	6.	4.	25.	25.	25.	26.	20.	20.
	MAR.	7.	2.	1.	6.	47.	8.	7.	25.	25.	28.	36.	28.	26.
	APR.	51.	18.	4.	39.	92.	15.	13.	25.	43.	46.	117.	98.	86.
	MAY	46.	16.	9.	33.	29.	9.	5.	25.	52.	76.	133.	110.	93.
	JUNE	93.	22.	12.	38.	50.	13.	9.	25.	53.	87.	180.	160.	118.
	JULY	83.	15.	7.	28.	25.	9.	6.	25.	49.	71.	134.	105.	90.
	AUG.	23.	1.	3.	12.	28.	7.	4.	25.	33.	38.	60.	47.	41.
	SEP.	25.	7.	3.	15.	35.	7.	5.	25.	36.	46.	69.	59.	52.
	OCT.	11.	16.	1.	4.	32.	1.	1.	25.	28.	42.	53.	51.	49.
	NOV.	27.	12.	3.	16.	23.	4.	6.	25.	35.	51.	78.	67.	69.
	DEC.	68.	16.	8.	40.	92.	18.	15.	25.	59.	72.	149.	110.	91.
1978	JAN.	3.	0.	0.	0.	35.	6.	5.	25.	25.	25.	28.	22.	21.
	FEB.	4.	9.	9.	0.	67.	9.	11.	25.	25.	28.	30.	17.	16.
	MAR.	7.	2.	9.	3.	51.	9.	8.	25.	25.	27.	34.	26.	24.
	APR.	59.	20.	7.	34.	58.	11.	8.	25.	51.	78.	137.	116.	95.
	MAY	37.	18.	9.	30.	29.	9.	5.	25.	59.	85.	163.	122.	139.
	JUNE	70.	15.	8.	31.	49.	15.	7.	25.	49.	75.	145.	116.	98.
	JULY	47.	10.	6.	17.	43.	10.	8.	25.	35.	51.	98.	76.	65.
	AUG.	12.	9.	1.	9.	31.	7.	6.	25.	25.	26.	38.	39.	27.
	SEP.	9.	3.	1.	5.	42.	4.	7.	25.	25.	29.	35.	33.	30.
	OCT.	3.	0.	-3.	-3.	28.	9.	12.	25.	25.	25.	25.	13.	13.
	NOV.	25.	9.	3.	16.	81.	12.	13.	25.	24.	37.	62.	52.	45.
	DEC.	72.	15.	9.	41.	71.	15.	11.	25.	55.	75.	150.	118.	99.
1979	JAN.	6.	9.	1.	1.	32.	8.	8.	25.	25.	26.	29.	28.	28.
	FEB.	3.	0.	9.	1.	29.	5.	5.	25.	25.	28.	28.	23.	23.
	MAR.	9.	2.	1.	5.	37.	7.	8.	25.	25.	28.	35.	32.	30.
	APR.	55.	19.	7.	32.	50.	10.	8.	25.	51.	76.	132.	110.	95.
	MAY	81.	28.	10.	43.	39.	11.	7.	25.	61.	91.	172.	137.	116.
	JUNE	96.	22.	12.	37.	37.	11.	7.	25.	55.	59.	185.	143.	125.
	JULY	65.	16.	7.	27.	38.	9.	5.	25.	47.	68.	131.	102.	87.
	AUG.	25.	2.	3.	13.	27.	8.	5.	25.	35.	39.	64.	50.	44.
	SEP.	12.	3.	1.	7.	31.	5.	6.	25.	26.	36.	63.	38.	35.
	OCT.	2.	4.	0.	0.	35.	5.	6.	25.	25.	29.	31.	25.	25.
	NOV.	26.	13.	3.	15.	65.	10.	15.	25.	29.	69.	87.	56.	50.
	DEC.	86.	13.	9.	38.	76.	18.	12.	25.	51.	71.	135.	107.	89.
1980	JAN.	6.	0.	1.	1.	25.	6.	6.	25.	25.	28.	29.	25.	26.
	FEB.	5.	1.	1.	1.	16.	3.	2.	25.	25.	26.	31.	29.	27.
	MAR.	8.	2.	1.	6.	26.	5.	6.	25.	25.	27.	35.	34.	29.
	APR.	55.	18.	7.	32.	66.	9.	5.	25.	52.	27.	132.	111.	98.
	MAY	81.	33.	7.	35.	23.	9.	6.	25.	52.	22.	134.	105.	90.
	JUNE	95.	23.	12.	39.	37.	16.	10.	25.	54.	88.	183.	143.	120.
	JULY	32.	7.	6.	16.	37.	13.	7.	25.	32.	43.	75.	69.	52.
	AUG.	10.	7.	2.	19.	28.	9.	5.	25.	24.	33.	51.	61.	37.
	SEP.	15.	5.	2.	9.	23.	4.	5.	25.	19.	38.	53.	47.	43.
	OCT.	9.	9.	-3.	-3.	23.	9.	12.	25.	25.	25.	25.	13.	13.
	NOV.	1.	1.	3.	0.	24.	15.	13.	25.	25.	28.	27.	16.	16.
	DEC.	0.	0.	9.	9.	102.	16.	18.	25.	25.	25.	25.	9.	9.

Table VI-7 CALCULATION OF DESIGN DRAINAGE DISCHARGE FOR MAIN DRAIN

Rational method: $Q = 0.2778 \times f \times r_t \times A$

Where, Q = stream runoff (m^3/sec)

f = runoff coefficient (0.5)

r_t = hourly rainfall (mm/hour); $\frac{r24}{24} \cdot (\frac{24}{Tc})^{\frac{2}{3}}$

r_{24} = 24 hours rainfall (mm/day)

= 129 mm/day (return period: 10 years)

Tc = Lag time (hr); L/W

$W = 72 \left(\frac{h}{L}\right)^{0.6}$

h = height difference between upper-most point and computation point of stream

L = stream distance (km)

A = catchment area (km^2)

Station	L (km)	A (km^2)	h (m)	W (km/hr)	Tc (hr)	r_t (mm/hr)	Q (m^3/sec)
Belitang Main Drain							
BS-0	2.5	11.5	–	–	–	–	9 /1
BS-1	10.9	31.8	–	–	–	–	24 /1
BS-2	15.1	43.3	–	–	–	–	32 /1
BS-3	18.7	52.6	–	–	–	–	39 /1
BS-4	25.9	120.9	19.2	0.95	27.2	4.9	83
BS-5	27.7	145.9	20.9	0.96	28.7	4.8	97
BS-6	31.9	165.7	23.0	0.94	34.0	4.3	98
BS-7	43.9	205.5	29.6	0.90	48.7	3.4	96
BS-8	51.1	243.7	33.4	0.88	57.8	3.0	101
BS-9	61.9	261.2	37.5	0.84	73.3	2.6	93 (101) /2
BS-10	81.1	328.7	47.8	0.83	97.6	2.1	96 (101) /2
BS-11	97.9	361.0	53.4	0.79	123.4	1.8	90 (101) /2

(to be continued)

Station	L (km)	A (km²)	h (m)	W (km/hr)	Tc (hr)	r_t (mm/hr)	Q (m^3/sec)
Macak Main Drain							
MS-0	4.0	10.8	-	-	-	-	8 /1
MS-1	13.6	58.3	-	-	-	-	44 /1
MS-2	22.6	86.3	-	-	-	-	65 /1
MS-3	34.6	179.1	27.8	1.00	34.6	4.2	105
MS-4	50.2	255.6	34.9	0.92	54.7	3.1	110
MS-5	67.0	328.1	43.2	0.88	76.4	2.5	113
MS-6	76.0	373.6	46.1	0.85	89.9	2.2	116
MS-7	88.0	406.9	51.5	0.83	106.4	2.0	113 (116)/2
Lempuing Main Drain							
LS-0	0	1,191.0	54.0	0.79	124.8	1.8	296
LS-1	5.0	1,216.0	55.5	0.78	132.8	1.7	290 (296)/2
LS-2	10.0	1,223.5	57.0	0.77	140.9	1.7	280 (296)/2
LS-3	15.0	1,242.5	58.5	0.76	149.1	1.6	274 (296)/2
LS-4	20.0	1,287.5	60.0	0.76	157.3	1.5	274 (296)/2
LS-5	25.0	1,298.5	61.5	0.75	165.5	1.5	267 (296)/2
LS-6	27.0	1,309.5	63.0	0.75	167.4	1.5	268 (296)/2

/1: These figures are computed by:

Q = Area x 7.5 ℓ/sec/ha

/2: Design discharge at each station.

Table VI - 8 ECONOMIC COMPARISON ON INTEGRATION OF INTAKE OF BELITANG PROPER AREA

(Unit: US$)

A. Cost Estimates

Case - 1: Diversion from Kurungan Nyawa existing intake

1.	Construction Cost of Related Facilities	2,415,000
(1)	Aqueduct on Komering-I North Main Canal for crossing of the Belitang Irrigation Canal	315,000
(2)	Diversion weir	2,100,000
2.	Annual O & M Cost	127,500
(1)	O & M cost of related facilities /1	12,100
(2)	Dredging of the Belitang Irrigation Canal	115,400

Case - 2: Diversion from Komering-I Canal System

1.	Construction Cost of Related Facilities		8,218,000
(1)	Diversion structure on Komering-I North Main Canal for Belitang Irrigation Canal		169,000
(2)	Closing and crossing structure of Belitang Irrigation Canal		49,000
(3)	Allocated cost of Komering-I canal system		3,670,000
(i)	Headworks	(2,470,000)	
(ii)	Headreach	(1,100,000)	
(iii)	North main canal	(100,000)	
(4)	Construction of micro hydropower station		4,330,000
(i)	Civil works	(440,000)	
(ii)	Generating equipment & Mechanical works	(2,490,000)	
(iii)	Transmission line	(1,400,000)	

(to be continued)

2. Annual O & M Cost		60,500
(1) O & M cost of related facilities /1		19,400
(2) O & M cost of facilities for hydropower		41,100

B. Annual Equivalent Cost

Case - 1

(1) Incremental capital recovery cost of related facilities /2		197,400
(2) Annual O & M cost		127,500
	Total	324,900

Case - 2

(1) Incremental capital recovery cost of related facilities /2		699,300
(2) Annual O & M cost		60,500
	Total	759,800

C. Annual Benefit from Micro Hydropower /3

(1) Capacity value	247,800
(2) Energy value	90,200
(3) Annual benefit	338,000

/1 : Annual O & M cost for civil works; 0.5% of direct construction cost, for equipment & mechanical works; 1%

/2 : Capital recovery factor for civil works; 0.08174 (50 years, i=8%) for generating equipment and mechanical works; 0.08883 (30 years, i=8%)

/3 : Refer to Table VI - 10.

Table VI - 9 ECONOMIC COMPARISON ON INTEGRATION OF INTAKE OF MUNCAK KABAU AREA

(Unit: US$)

A. Cost Estimate		
Case - 1: Diversion from Muncak Kabau Proposed Intake Site		
1. Construction Cost of Related Facilities		3,780,000
(1) Diversion weir		2,650,000
(2) Intake structure and settling basin		965,000
(3) Headreach		165,000
2. Annual O & M Cost		93,800
(1) O & M cost of related structure /1		18,900
(2) Dredging of setting basin		74,900
Case - 2: Diversion from Komering-I Canal System		
1. Construction Cost of Related Facilities		7,921,000
(1) Connecting channel from Komering-I North Main Canal		1,964,000
(2) Allocated cost of Komering-I canal system		2,231,000
(i) Headworks	(1,570,000)	
(ii) Headreach	(560,000)	
(iii) North Main Canal	(101,000)	
(3) Construction of micro hydropower station		3,726,000
(i) Civil works	(396,000)	
(ii) Generating equipment & Mechanical works	(2,160,000)	
(iii) Transmission line	(1,170,000)	

(to be continued)

2. Annual O & M Cost			56,300
(1) O & M cost of related facilities /1			21,000
(2) O & M cost of facilities for hydropower			35,300
(i) Civil works	(2,000)		
(ii) Mechanical & electrical facilities	(33,300)		

B. Annual Equivalent Cost

Case - 1

(1) Incremental capital recovery cost of related facilities /2		309,000
(2) Annual O & M cost		93,800
	Total	402,800

Case - 2

(1) Incremental capital recovery cost of related facilities /2		671,100
(2) Annual O & M cost		56,300
	Total	727,400

C. Annual Benefit from Micro Hydropower /3

(1) Capacity value	208,000
(2) Energy value	69,300
(3) Annual benefit	277,300

/1 : Annual O & M cost for civil works; 0.5% of direct construction cost, for equipment and mechanical works; 1%

/2 : Capital recovery factor for civil works; 0.08174 (50 years, i=8%) for generating equipment and mechanical works; 0.08883 (30 years, i=8%)

/3 : Refer to Table VI - 10.

Table VI - 10 ANTICIPATED BENEFIT FROM MICRO HYDROPOWER GENERATION

	Belitang Proper	Muncak Kabau
1. Generating Output and Energy		
(a) Effective head	5 m	7 m
(b) Available discharge	20 m^3/sec	11 m^3/sec
(c) Generating outputs	780 kW	600 kW
(d) Load factor	0.6	0.6
(e) Energy	4,100 MWh/year	3,150 MWh/year
2. Capacity Value (kW value)		
(a) Alternative cost of diesel engine-generator plants	858,000 US$	720,000 US$
(b) Annual cost of plants /1	76,200 US$	64,000 US$
(c) Annual O & M cost /2	171,700 US$	144,000 US$
(d) Annual capacity value	247,800 US$	208,000 US$
3. Energy Value (kWh value)		
(a) Fuel cost	0.072 US$/ℓ	
(b) Fuel consumption	0.3 ℓ/kWh	
(c) Fuel cost per kWh	0.022 US$/kWh	
(d) Annual energy value	90,200 US$	69,300 US$
4. Annual Anticipated Benefit 2-(d) + 3-(d)	338,000 US$	277,300 US$

/1 : Capital recovery factor (30 years) at interest 8%, 0.08883

/2 : 20% of the alternative cost

Table VI-11 GENERAL FEATURES OF IRRIGATION FACILITIES

I. Joint Facilities on Full Development Stage for Komering-I, Muncak Kabau, Lempuing and Tulangbawang areas

1. Dam and reservoir

		Ranau Dam	Komering No.1 Dam	Muaradua Dam
(1)	Catchment area (km^2)	508	1,056	2,866
(2)	Annual mean discharge (m^3/sec)	18.5	46.9	139.3
(3)	Reservoir			
	- HWL (EL, m)	542.3	420	140
	- LWL (EL, m)	540.7	395	132.5
	- Gross storage capacity (10^6 m^3)	200	175	320
	- Effective storage capacity (10^6 m^3)	200	120	150
(4)	Dam			
	- Type	Concrete gravity	Rockfill	Earthfill
	- Height (m)	15	85	30
	- Crest length (m)	84	380	600
	- Dam volume (10^3 m^3)	Con. 8	2,000	1,300

2. Perjaya headworks and headreach

(1) Weir

- Crest elevation : EL. 79.30 m
- Length of fixed weir portion : 171 m
- Size of gate (B x H) : 17.5m x 5.4m, 2 sets

(2) Intake structure

- Design intake capacity : 115.9 m^3/sec
- Size of gate (B x H) : 7.0m x 4.0m x 8 sets

(to be continued)

(3) Driving channel		
- Type of canal	:	trapezoidal, concrete lining
- Base width	:	17 m
- Length	:	1.6 km
(4) Settling basin		
- Type of desilting	:	gravitationally flushing-out
- Size of basin (Width x Length)	:	40 m x 35 m
- No. of basin	:	5 nos.
- No. of gate	:	5 x 12 sets
(5) Headreach		
- Type of canal	:	trapezoidal, unlined
- Base width	:	56 m
- Length	:	8 km
- Bifurcation structure	:	1 no.
3. Komering-I north main canal (BP-EP)		
- Type of canal	:	trapozoidal, unlined
- Length	:	50 km
- Related structure	:	97 nos.
4. Komering-I south main canal (BP-TO.11)		
- Type of canal	:	trapezoidal, unlined
- Length	:	18 km
- Related structure	:	18 nos.
- Bifurcation structure	:	1 no.

(to be continued)

II. Irrigation and Drainage Facilities in Each Development Area

1. Komering-I area/1

(1) Net irrigation area : 36,700 ha

(2) Maximum diversion water requirements: 50.3 m^3/sec

(3) Perjaya headworks and headreach

(a) Weir

(b) Intake

- Design intake capacity : 50.3 m^3/sec
- Size of gate (B x H) : 7m x 4m x 4 sets

(c) Driving channel

- Type of canal : trapezoidal, concrete lining
- Base width : 6.0 m
- Length : 1.6 km

(d) Settling basin

- Type of basin : gravitationally flushing-out
- Size of basin (width x length): 40 m x 35 m
- No. of basin : 2 nos.
- No. of gate : 2 x 12 sets

(e) Headreach

- Type of canal : trapezoidal, unlined
- Base width : 24 m
- Length : 8 km
- Bifurcation structure : 1 no.

(4) North main canal

- Length : 50 km
- Related structure : 97 nos.

(5) South main canal

- Length of canal : 71 km
- Related structure : 98 nos.

/1: The Feasibility Study of this area was made by JICA in 1981.

(to be continued)

(6) Pisang main canal

- Length of canal : 13 km
- Related structure : 21 nos.

(7) Secondary canal

- Total length : 237 km
- Related structure : 774 nos.

(8) Tertiary canal

- Total length : 880 km

(9) Drainage canal

- Total length : 1,440 km

(10) Land reclamation

- Land clearing area : 16,330 ha
- Land levelling area : 23,380 ha

2. Muncak Kabau area

(1) Net irrigation area : 10,700 ha

(2) Maximum diversion water requirements: 13.7 m^3/sec

(3) Intake facilities

- Type : Free intake with overflow-type diversion weir
- Design intake capacity : 13.7 m^3/sec
- Intake water level : EL. 61.5 m
- Size of gate (B x H) : 2.0 m x 2.0 m x 4 sets
- Location of setting basin : Immediately downstream of intake structure
- Size of settling basin (Width x Length) : 24 m x 30 m
- Size of gate of settling basin (B x H) : 2.0 m x 2.0 m x 4 nos.

(to be continued)

(4)	East main canal	
	- Design discharge at the head	: 13.7 m^3/sec
	- Length of canal	: 37 km
	- Related structure	: 46 nos.
(5)	West main canal	
	- Design discharge at the head	: 5.1 m^3/sec
	- Length of canal	: 11 km
	- Related structure	: 11 nos.
(6)	Secondary canal	
	- Total length	: 90 km
	- Related structure	: 323 nos.
(7)	Tertiary canal	
	- Total length	: 268 km
(8)	Drainage canal	
	- Total length	: 380 km
(9)	Flood protection dike	
	- Length	: 13 km
(10)	Land reclamation	
	- Land clearing area	: 6,440 ha
	- Land levelling area	: 8,400 ha

3. Lempuing area

(1)	Net irrigation area	: 13,100 ha
(2)	Maximum diversion water requirements	: 16.8 m^3/sec
(3)	Main canal	
	- Length of canal	: 41 km
	- Related structure	: 79 nos.
(4)	Secondary canal	
	- Total length	: 110 km
	- Related structure	: 408 nos.

(to be continued)

(5) Tertiary canal

- Total length : 315 km

(6) Drainage canal

- Total length : 460 km

(7) Flood protection dike

- Length : 11 km

(8) Land reclamation

- Land clearing area : 4,380 ha
- Land levelling area : 8,600 ha

4. Tulangbavang area

(1) Net irrigation area : 44,500 ha

(2) Maximum diversion water requirements: 48.8 m^3/sec

(3) Main canal

- Length of canal : 91 km
- Related structure : 176 nos.

(4) Secondary canal

- Total length : 447 km
- Related structure : 1,910 nos.

(5) Tertiary canal

- Total length : 1,335 km

(6) Drainage canal

- Total length : 1,760 km

(7) Land reclamation

- Land clearing area : 39,300 ha
- Land levelling area : 44,220 ha

Fig. VI-1 CROP COEFFICIENT CURVE FOR PADDY

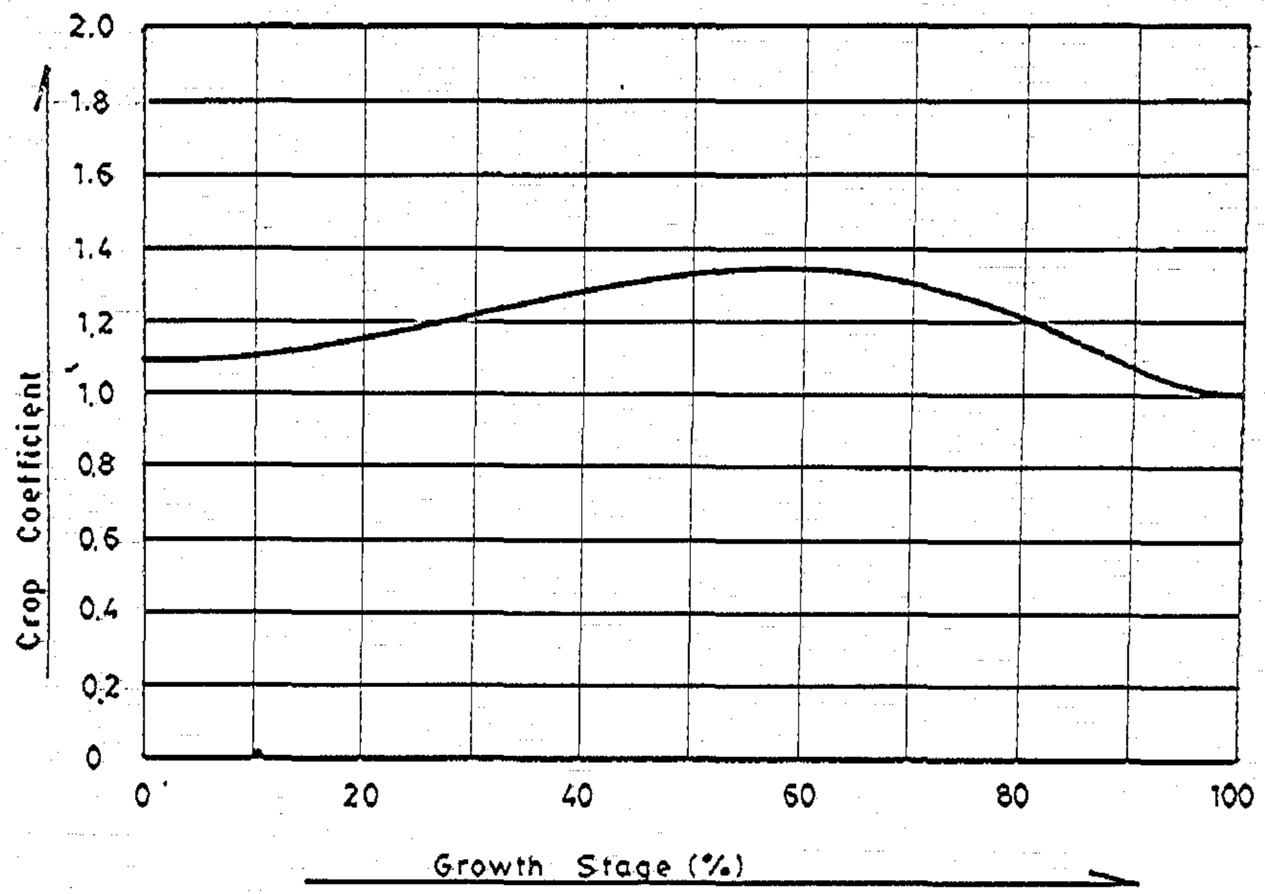


Fig. VI - 2 CROP COEFFICIENT CURVE FOR MAIZE

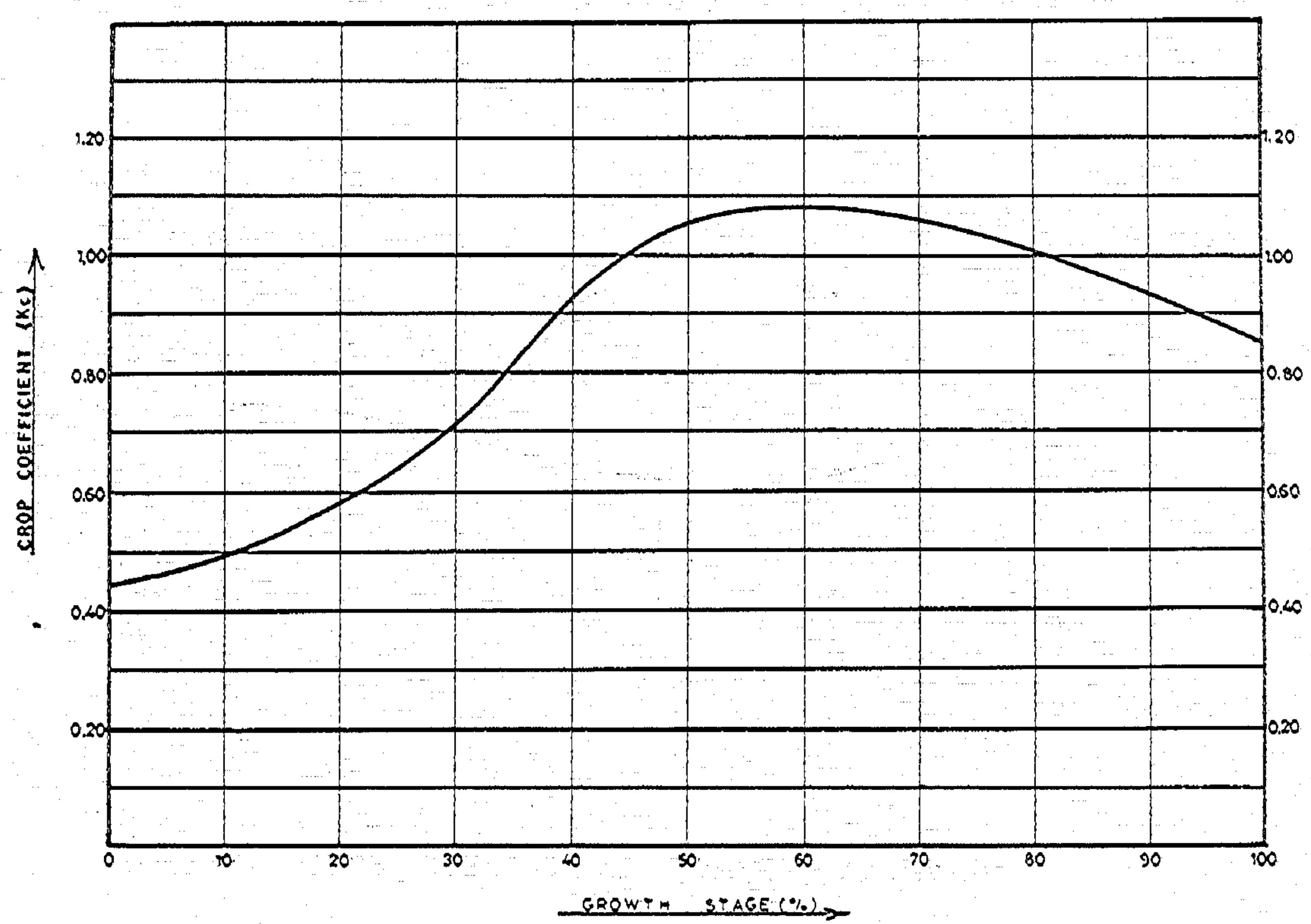


Fig. VI - 3 CROP COEFFICIENT CURVE FOR PEANUTS

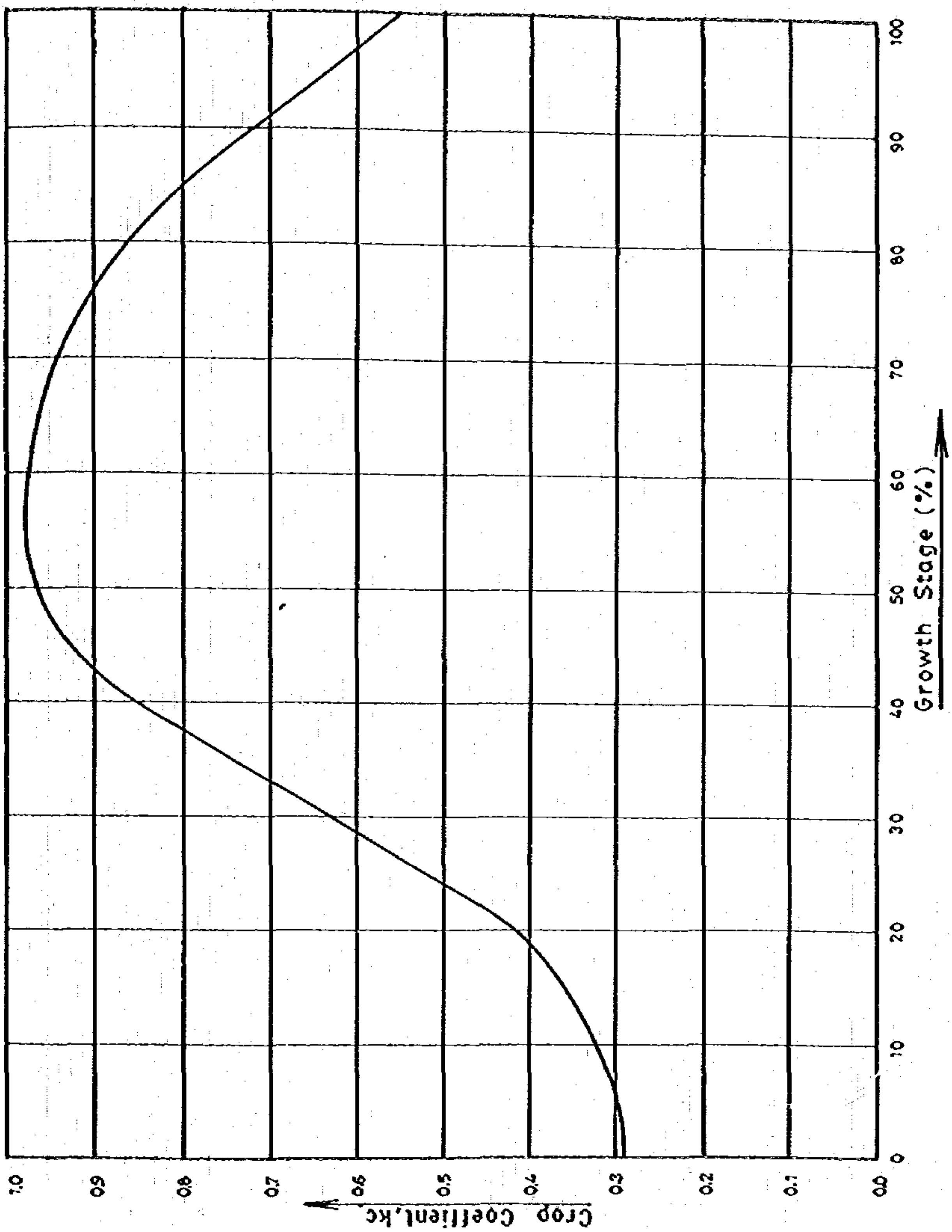


Fig. VI-4 CROP COEFFICIENT CURVE FOR SOYBEANS

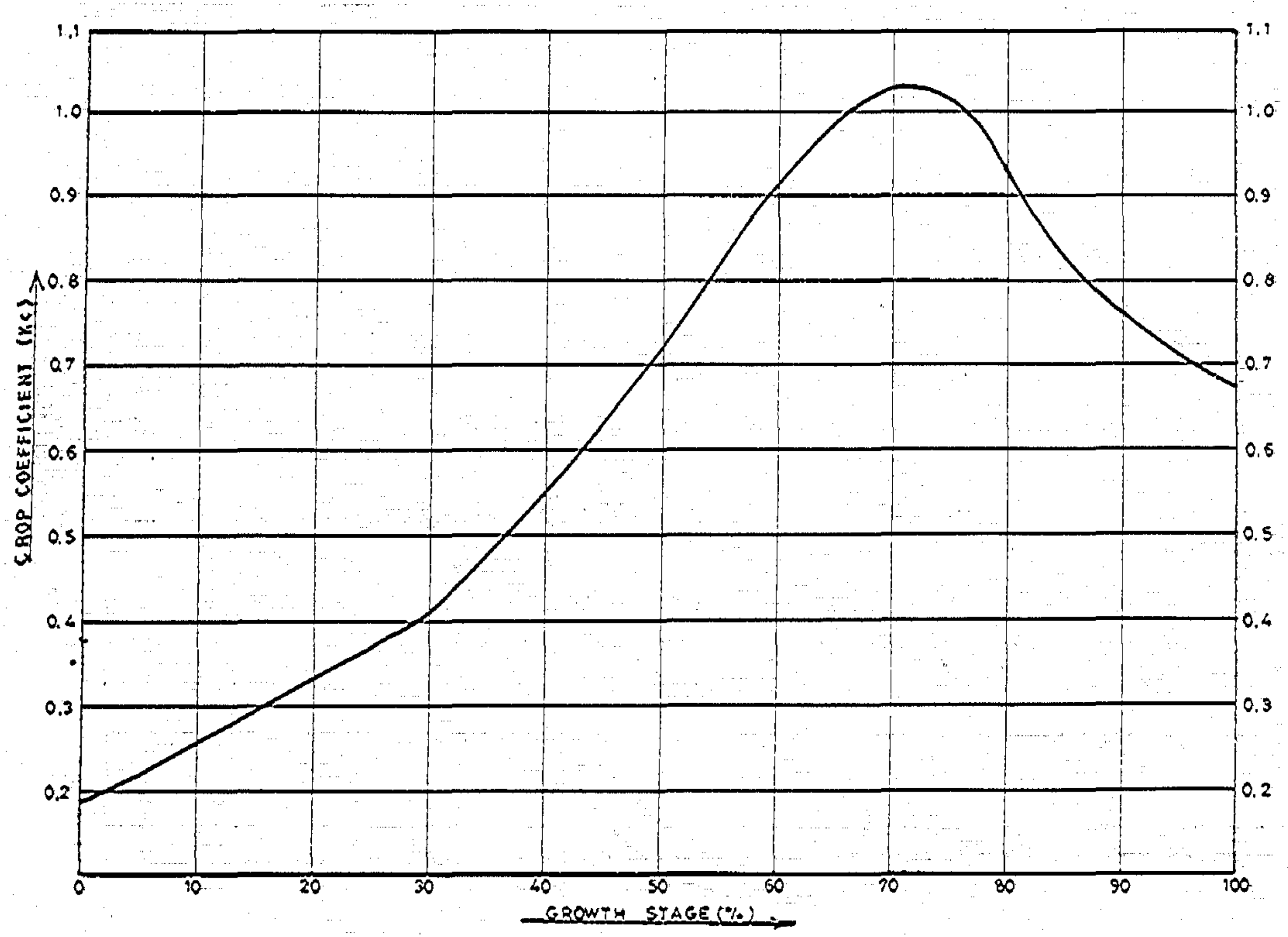


Fig. VI-5 LOCATION MAP OF LEBAK DEVELOPMENT AREA

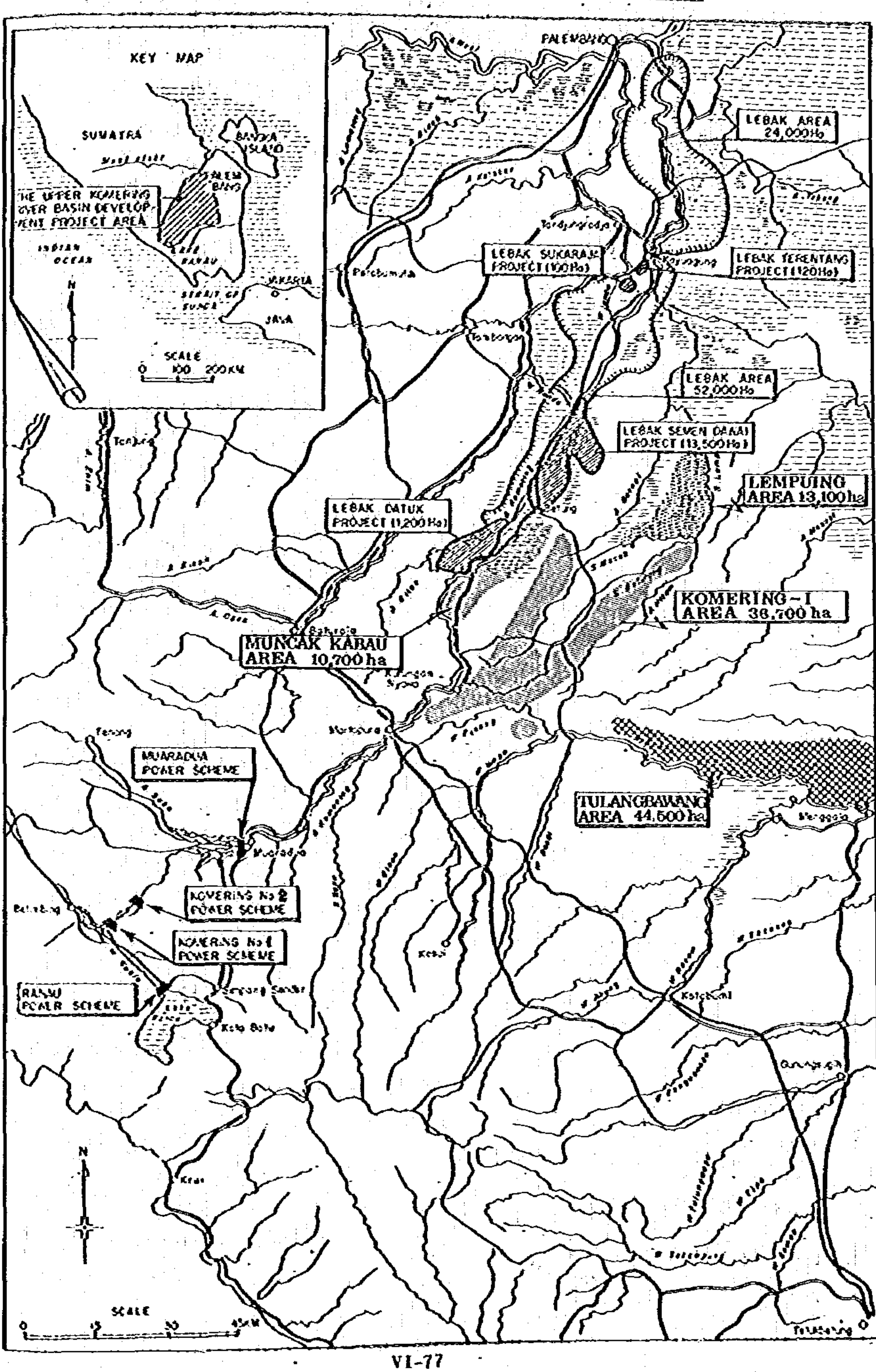


Fig. VI-6 SCHEMATIC FLOW CHART FOR WATER BALANCE STUDY

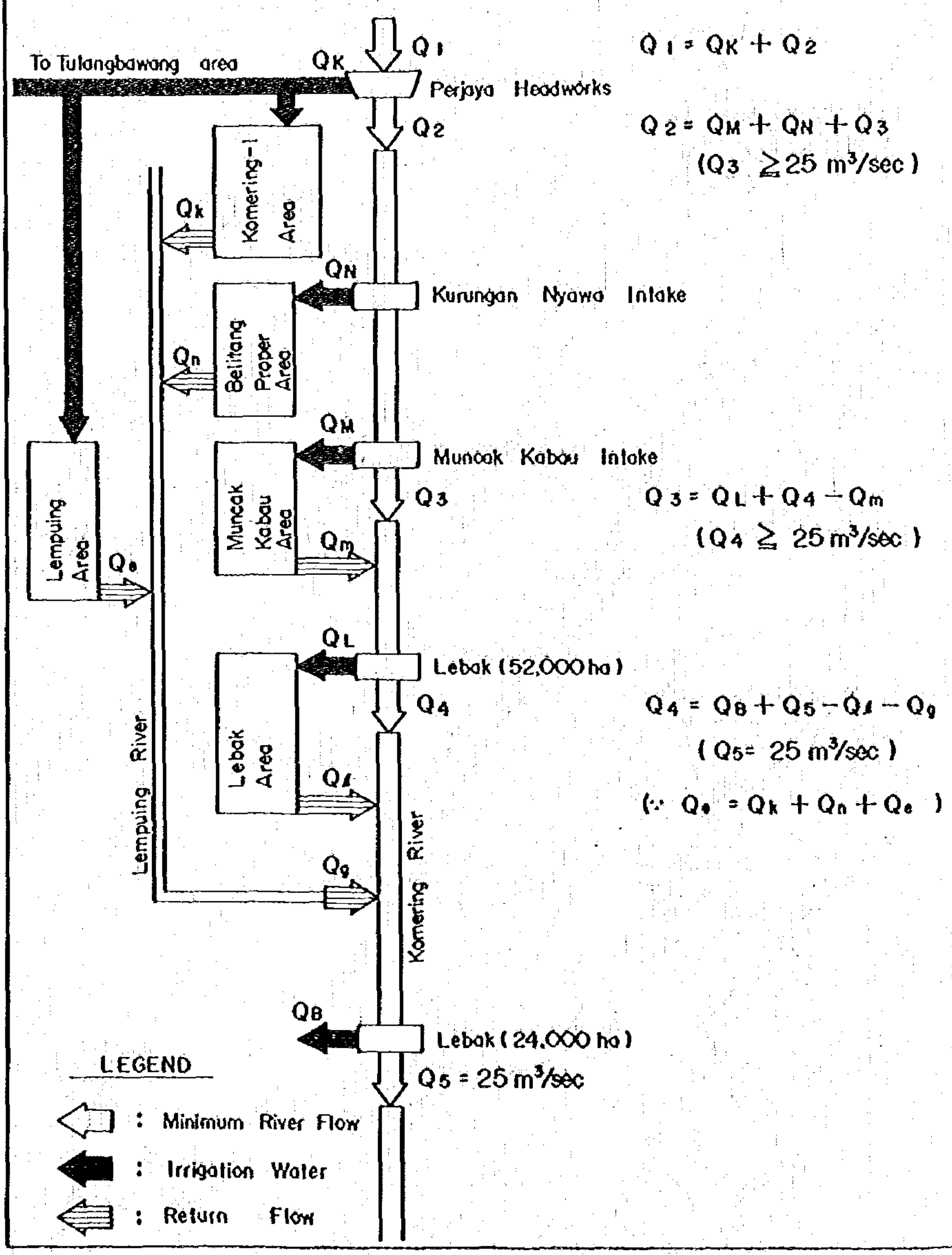
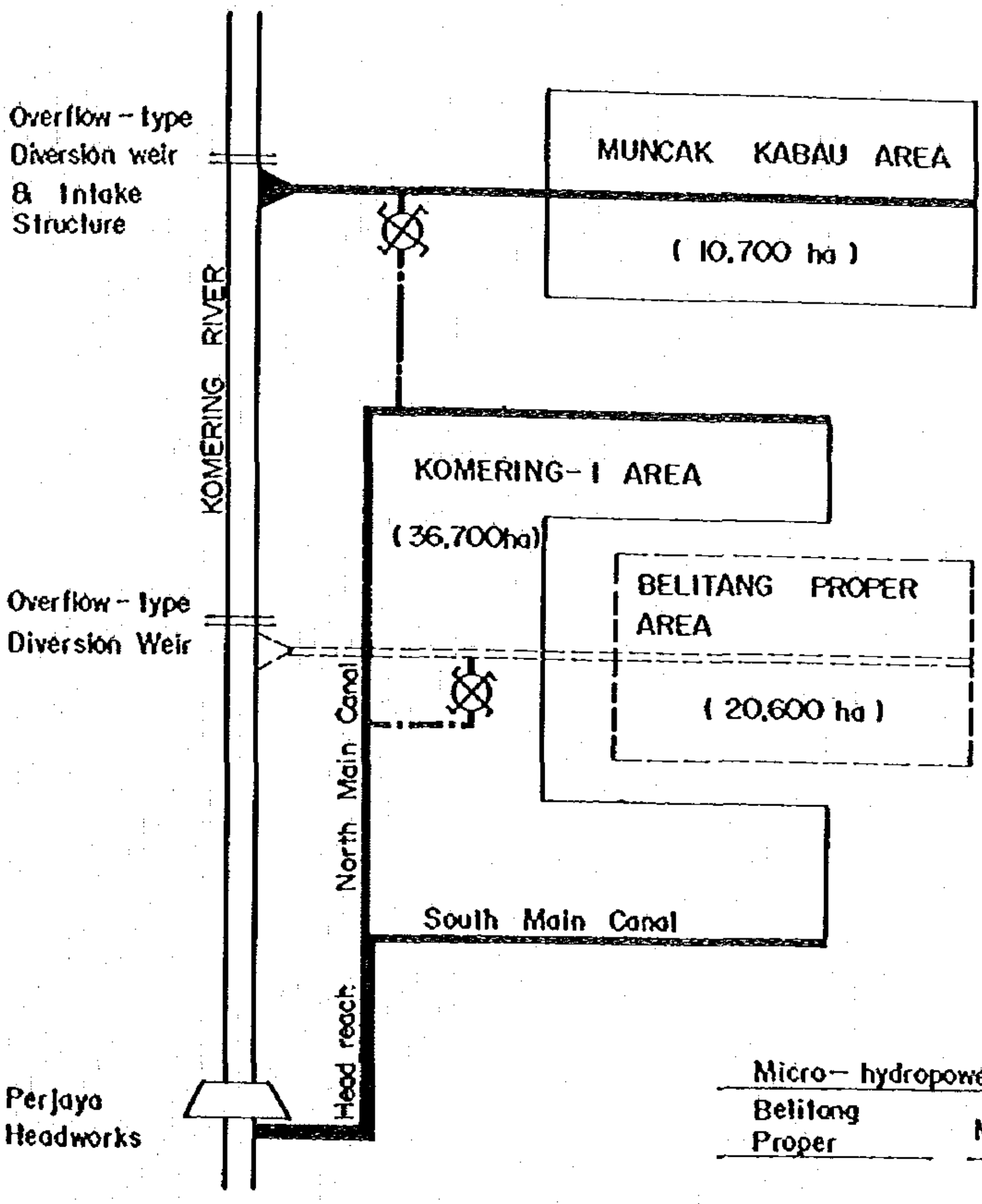


Fig. VI-7 SCHEMATIC LAYOUT FOR ALTERNATIVE STUDY ON INTAKE SYSTEM OF BELITANG PROPER AREA AND MUNCAK KABAU AREA

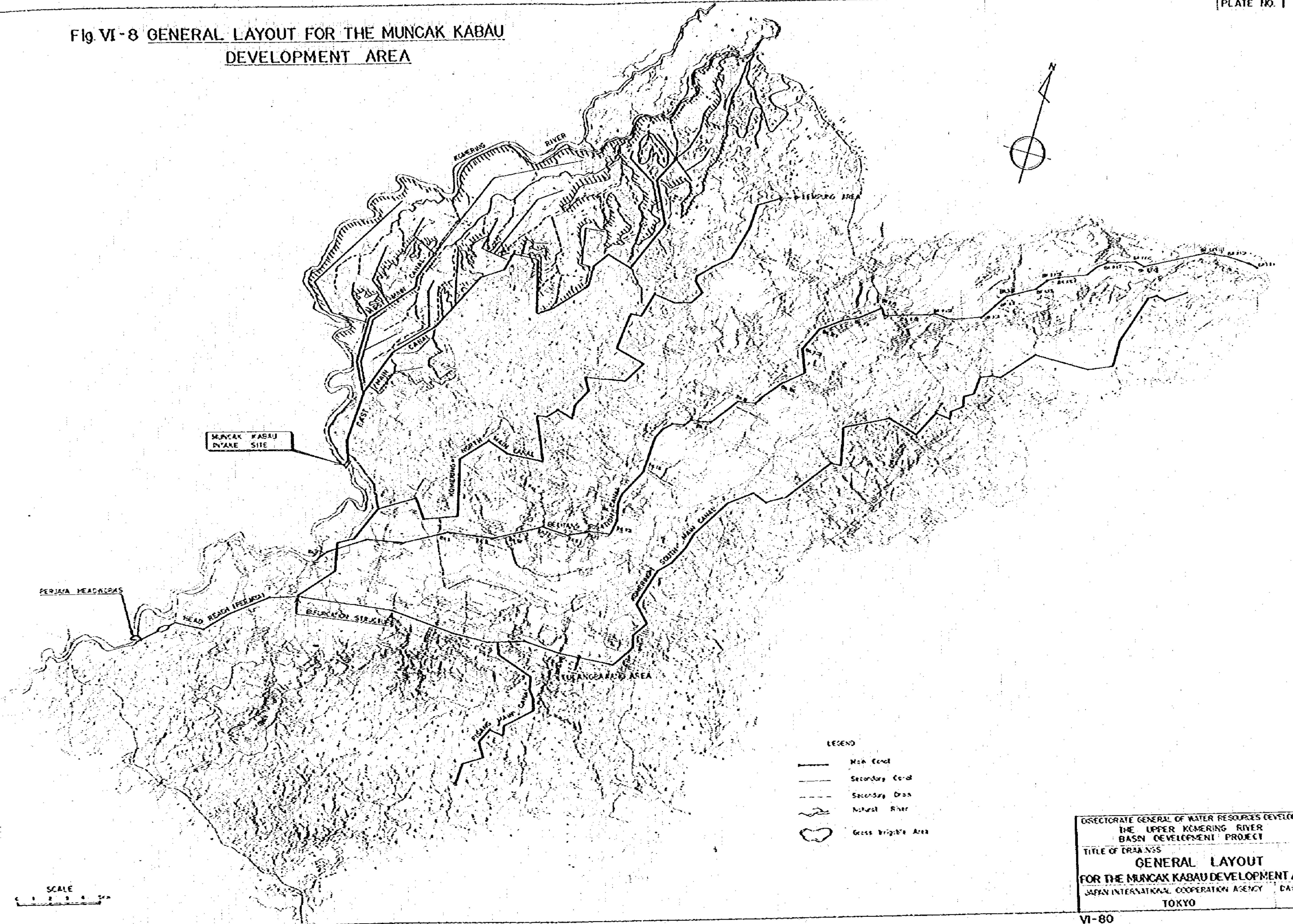


	Micro- hydropower Station	
	Belitang Proper	Muncak Kabau
1. Effective head	5 m	7 m
2. Available discharge	20 m^3/sec	11 m^3/sec
3. Generating Outputs	780 KW	600 KW
4. Annual Energy	4,100 MWh	3,150 MWh

LEGEND

- ▬▬ : Proposed Canal System
- ═══ : Existing Canal System
- ─·─ : Alternative Canal System

Fig. VI-8 GENERAL LAYOUT FOR THE MUNCAK KABAU DEVELOPMENT AREA

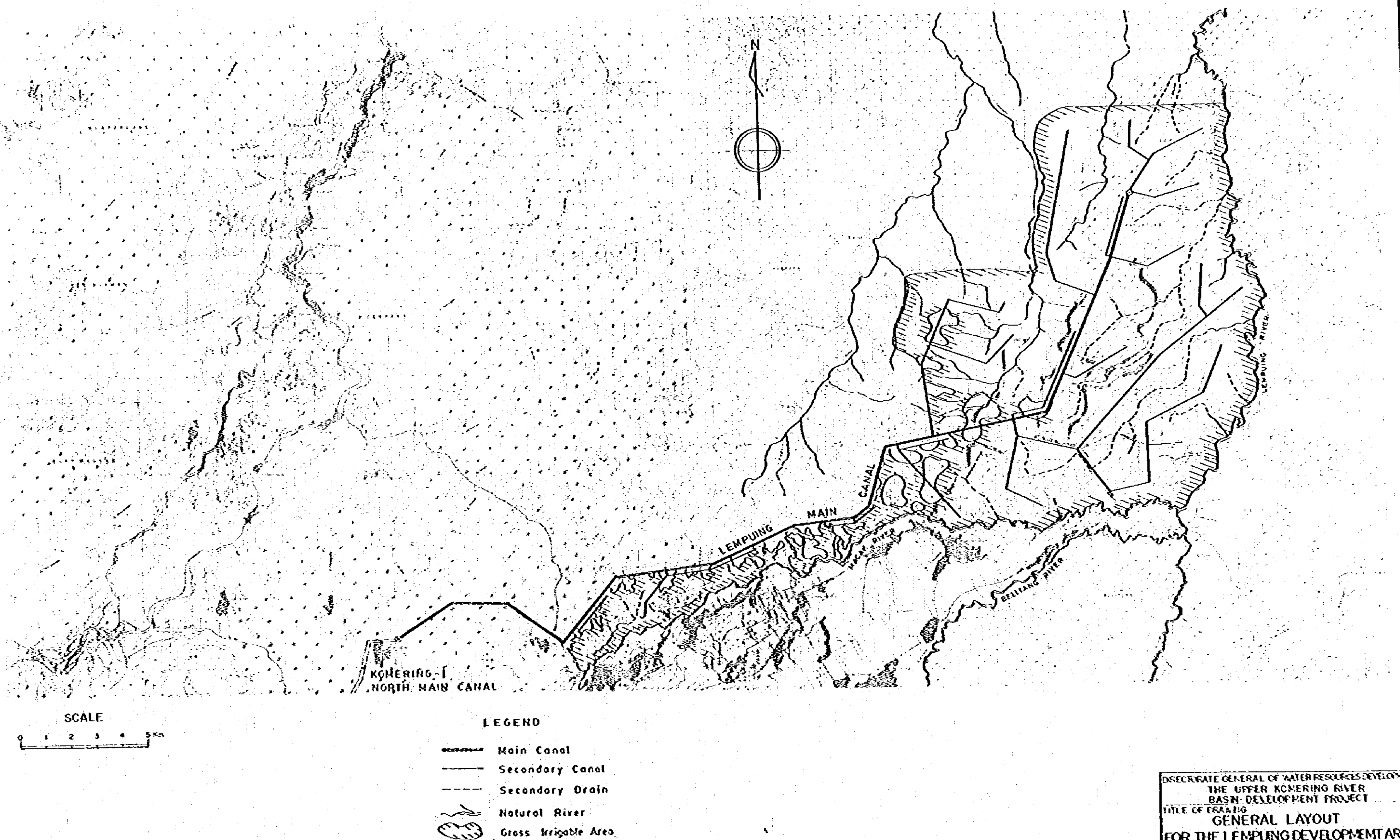


DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
THE UPPER KOMERING RIVER BASIN DEVELOPMENT PROJECT

TITLE OF DRAWINGS
GENERAL LAYOUT
FOR THE MUNCAK KABAU DEVELOPMENT AREA

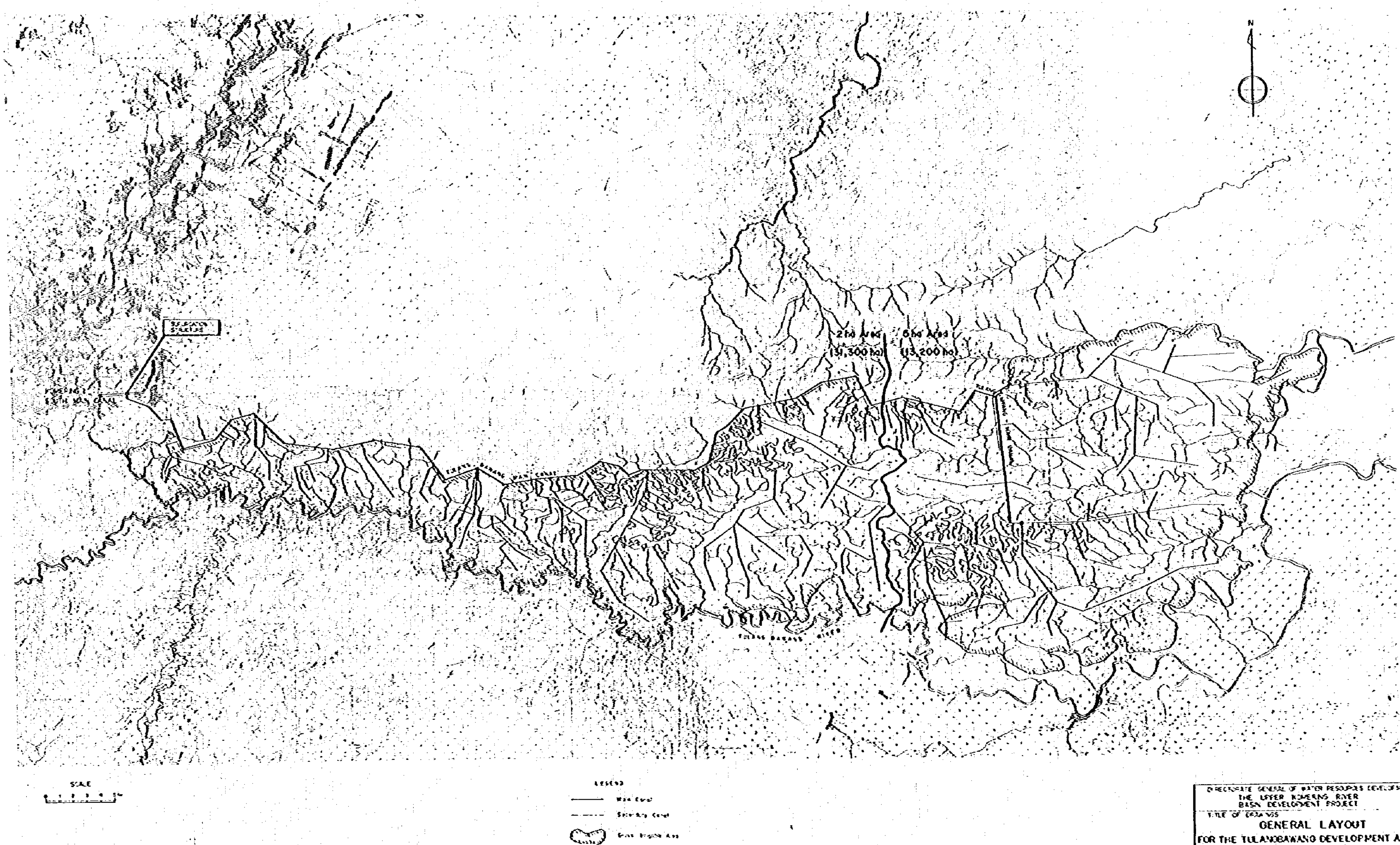
JAPAN INTERNATIONAL COOPERATION AGENCY | DWG NO
TOKYO

Fig. VI-9 GENERAL LAYOUT FOR THE LEMPUING DEVELOPMENT AREA



DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
THE UPPER KOMERING RIVER BASIN DEVELOPMENT PROJECT
TITLE OF DRAWING
GENERAL LAYOUT FOR THE LEMPUING DEVELOPMENT AREA
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO | DWG NO

Fig VI-10 GENERAL LAYOUT FOR THE TULANBAWANG DEVELOPMENT AREA



DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
THE UPPER KOMERING RIVER
BASIN DEVELOPMENT PROJECT

TITLE OF DRAWINGS

GENERAL LAYOUT
FOR THE TULANGBAWANG DEVELOPMENT AREA

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG NO

Fig. VI-11 IRRIGATION DIAGRAM FOR THE DEVELOPMENT AREAS

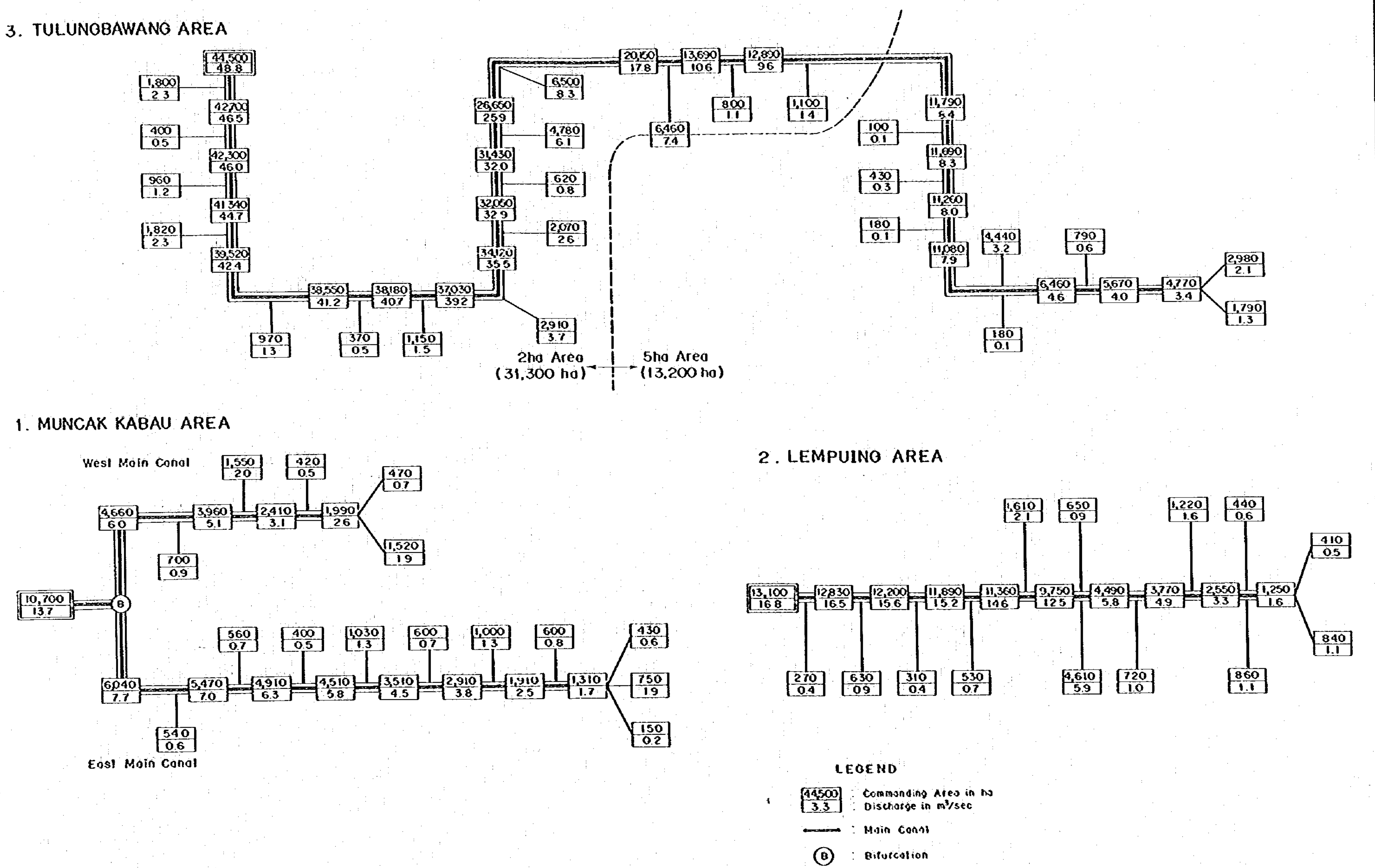
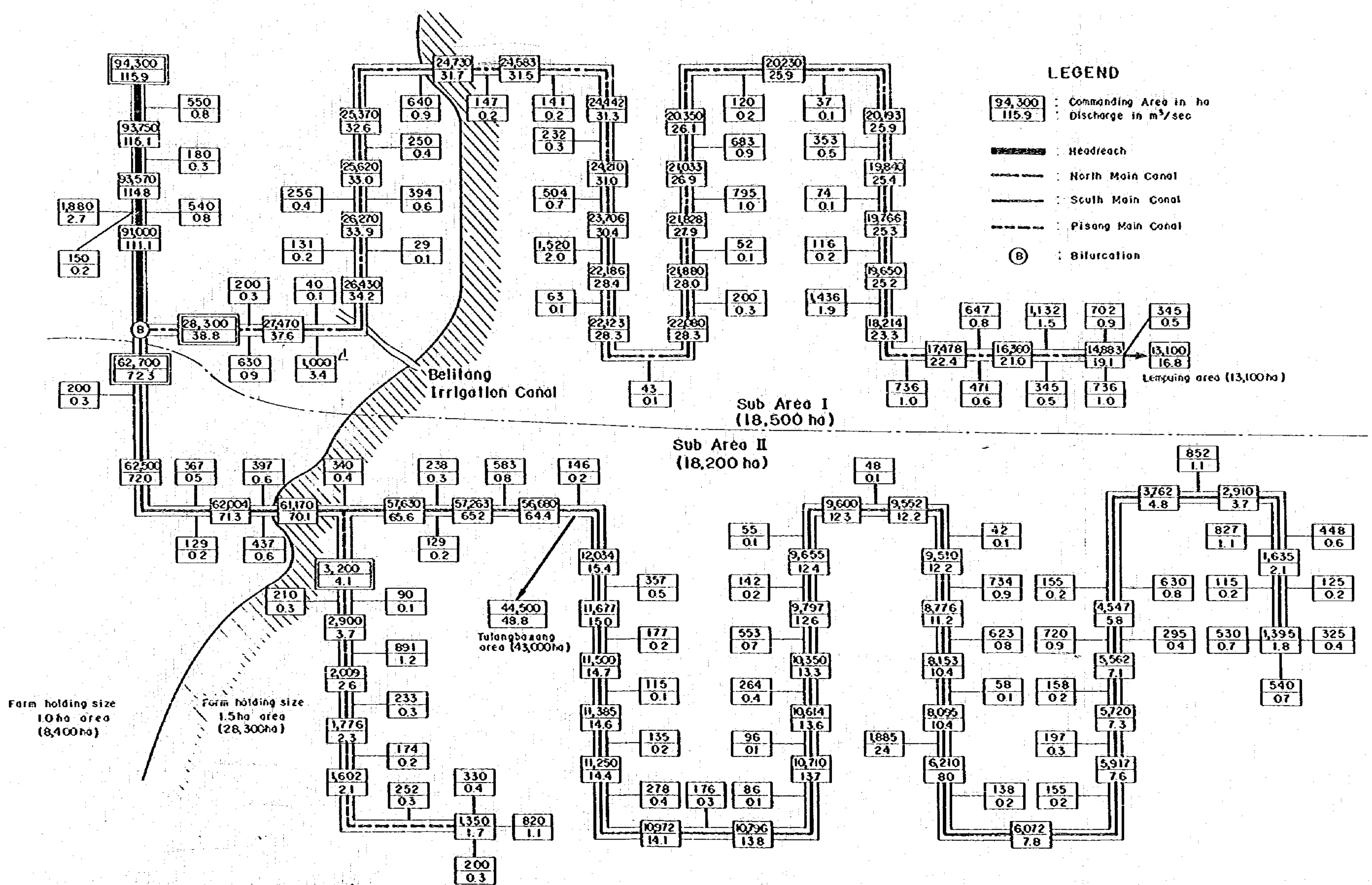


Fig. VI-12 IRRIGATION DIAGRAM FOR THE KOMERING-I AREA



Note ; /1 : Including the water requirement of 1.9 m³/sec for BK-1 area (1,300 ha) in Belitang Proper area.

Fig. VI-13 GENERAL FEATURE OF INTAKE STRUCTURE FOR THE MUNCAK KABAU AREA

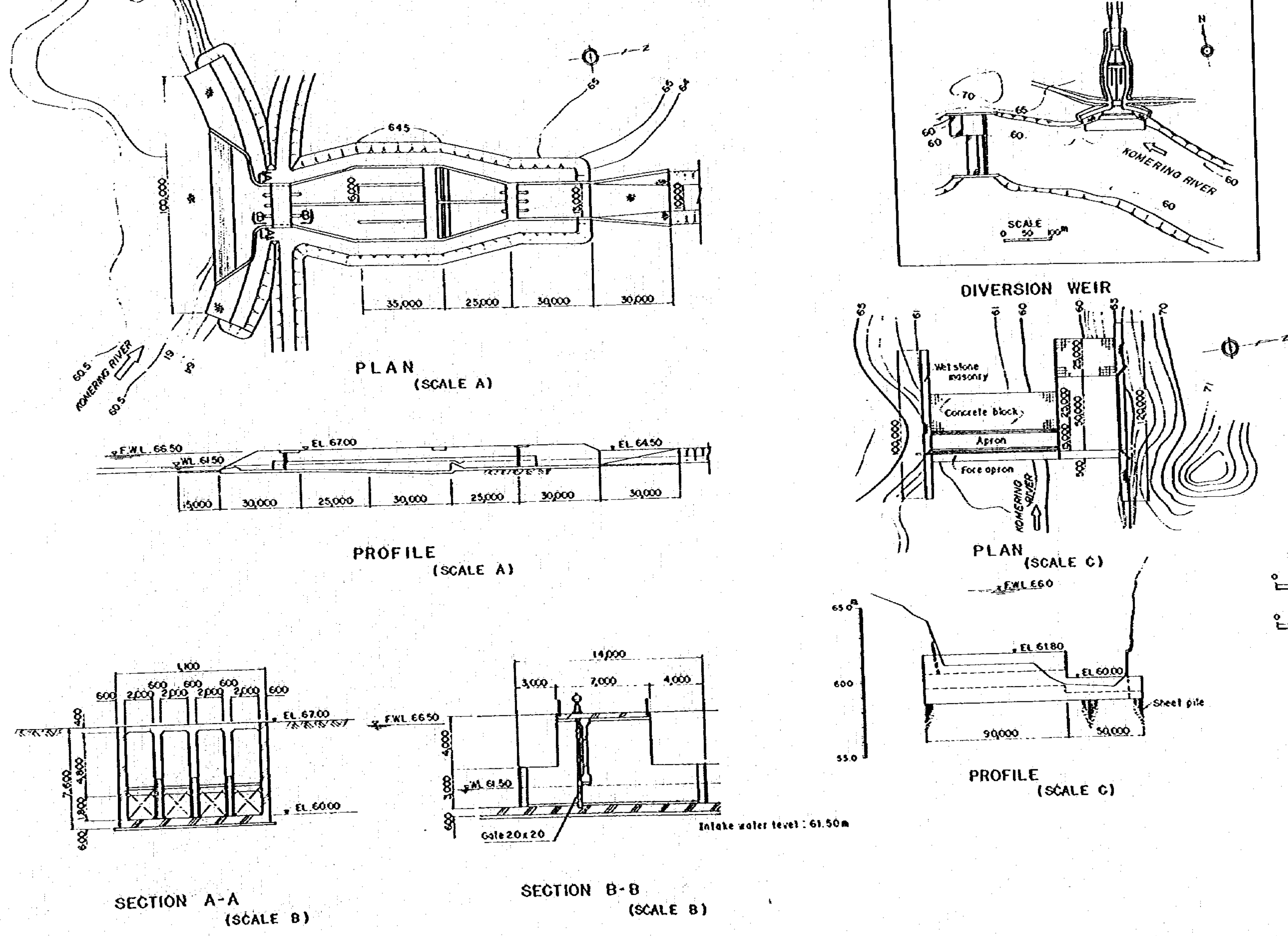
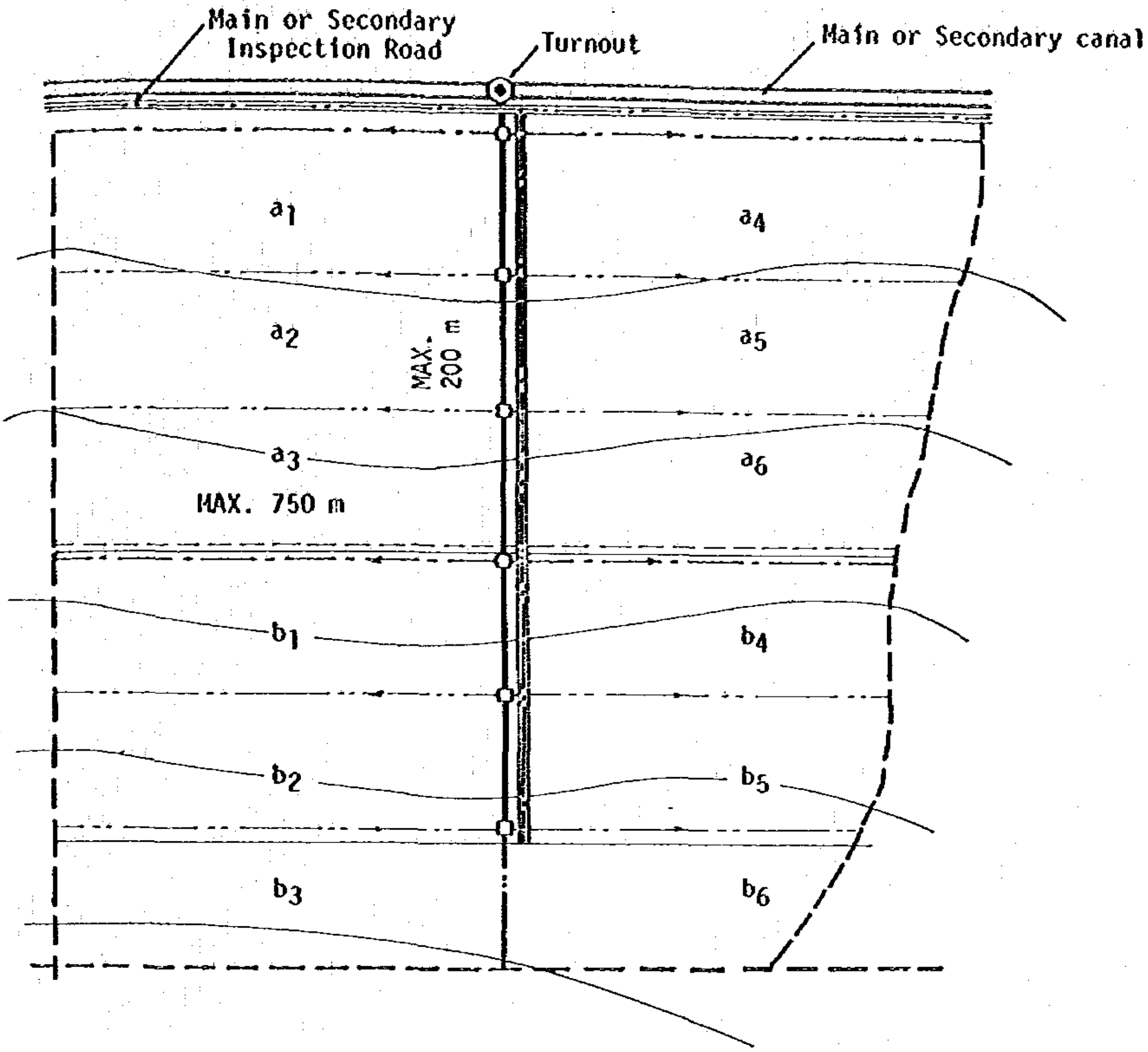
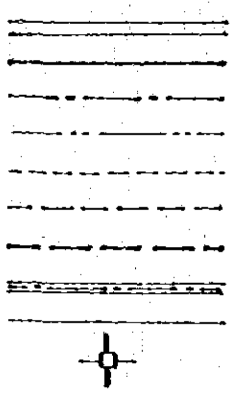


Fig. VI - 14 TYPICAL LAYOUT OF TERTIARY SYSTEM



LEGEND



:Main or Secondary Irrigation Canal

:Tertiary Canal

:Quaternary Canal

:Quaternary Canal (and field drain)

:Field Drain

:Collector Drain

:Secondary Drain

:Inspection Road

:Farm Road

:Division Box on Tertiary Canal

ANNEX VII

POWER DEMAND AND SUPPLY

[illegible]

[illegible]

ANNEX - VII

POWER DEMAND AND SUPPLY

1. GENERAL

According to the Comprehensive Study Report (hereafter abbreviated as the C.S. Report), there has been conceived a development of four hydroelectric schemes on the Selambung River, named from upstream, the Ranau, Komering No. 1, Komering No. 2 and Muaradua. Total head of 420 m between the Lake Ranau at EL.542.0 m and the Muaradua dam site and the runoff of 4,100 million m^3 per annum would be harnessed to produce 1,004 GWh per annum through installation of 251 MW in the total.

The services this time in the power sector have been to up-date the power market survey and review the existing hydropower development schemes on the basis of findings obtained from analysis of all available data including those collected newly through such field survey as reconnaissance, preliminary geologic exploration at the strategic areas, elevation checking survey along the Selabung and topo-survey at all the dam and power station sites.

As a result of present power market survey, the followings are outlined, though it has been still at the preliminary stage:

(a) Total existing installation in the surrounding areas of the project including the South Sumatra, Lampung, Bengkulu and Jambi provinces is 296 MW out of which 110 MW is operated by the PLN and 186 MW is run privately.

(b) Power demand will reach a level of 442 MW in peak load and 2,327 GWh per annum in energy output in total by the year 1990.

(c) PLN has a plan in the said areas to build one unit of 20 MW gas turbine, four units of thermal generator (230 MW in total) and to construct five hydroplants (145.9 MW in total) by the year 1990.

In such circumstance of the power market in the surrounding area, the power to be generated at any one of four stations under study is considered to be absorbed into the market.

The findings from the reconnaissance, ground survey and elevation checking survey have revealed some modification in the scale of the power schemes as follows:

Item	Ranau	Komering No.1	Komering No.2	Muaradua	Total
Installed Capacity (MW)	83.7 (48.3)	108.0 (81.9)	35.7 (52.2)	23.8 (34.2)	251.2 (216.6)
Annual Energy Product (GWh)	151 (129)	474 (470)	230 (236)	149 (245)	1,004 (1,170)

Note: ( ) shows those in the C.S. Report

2. POWER MARKET SURVEY

2.1 General

During the survey period, the data and information on power market and supply such as position of Resion IV in the social and industrial development, prospected movement of population, target of living standard and overall plan of power development are collected mainly from the PLN Resion IV Office, PLN Provincial Offices and other offices concerned. Processing of the data and information thus collected was made subsequently.

The extent of possible market of the Komering hydropower has included the whole areas of South Sumatra, Lampung, Bengkulu and Jambi Provinces where the public power supply is made by PLN Region IV (named Wilayah IV Perusahaan Umum Listrik Negara). Fig. VII-1 shows the organization structure of the said management.

Table VII-1 shows an inventory of hydropower schemes listed up in and around the market area so far contemplated. The total potentials are estimated at more than 788 MW in the installed capacity and 3,670 GWh in the annual production. Among them four hydropower schemes incorporated in the Upper Komering Basin Development would share a significant part of as much as 251 MW in the installation and 1,004 GWh in the annual production in total.

The present installation by the PLN in the area is about 110 MW in the total capacity as shown in Table VII-2, while those by the private sectors such as the Pertamina, Pusri and many small factories are at about 187 MW as shown in Table VII-3 and -4.

2.2 Power Statistics

2.2.1 Outline of Power System

In Palembang, the biggest city in the area, PLN operates the 70 kV power system including four power plants of steam and gas turbine and diesel engine generators, for which total installed capacity is 71,032 kW. The present power transmission system is shown on Fig. VII-2.