

#### h) Main water sources

The directories and files of the village inventory subsystem and the data description are shown in Table 5.15. The data file structures and coding instruction for the village inventory subsystem are presented in Table 5.16.

### 5.2.3 Operation and Maintenance

The followings should be done only by the Database Manager or persons authorized by the Database Manager:

- 1) Append new data
- 2) Correct the existing data

The database system should be accurate as far as possible and be updated at any time. Continuous efforts to correct and update various data are indispensable for good maintenance of the database system. A database manager should be appointed and necessary fund should be secured for maintenance of the database system. Otherwise, the database will be soon outdated.

Expected users of the database will be:

- 1) Staff of the Water Supply Section of the NIHE
- 2) Provincial and district water engineers
- 3) Groundwater hydrologists of Ministries and foreign corporation agencies
- 3) Planning and design engineers of Ministries and foreign corporation agencies

Users of the database are allowed of the following operation:

- 1) Output the files (hard copy)
- 2) Copy the files to floppy disks

As above-mentioned, all users are considered to have some knowledge on computers and software applications, e.g. Lotus 1-2-3, EXCEL.

**Table 5.1 Directories and Files In the Meteorological Sub-system**

Directory	Sub-directory	File	Description
CLIMATE		CSTATION.WK4	Location of climatological and rainfall stations
CLIMATE		CLIMATE.wk4	Climatological data A at Pakxe in 1994 B at KM 42 in 1994 C at Pakxong in 1994 D at Nikhom 34 in 1994 E at Pakxe in 1993 F at KM 42 in 1993 G at Pakxong in 1993 H at Nikhom 34 in 1993 I at Pakxe in 1992 J at KM 42 in 1992 K at Pakxong in 1992 L at Nikhom 34 in 1992 M at Pakxe in 1991 N at KM 42 in 1991 O at Pakxong in 1991 P at Nikhom 34 in 1991 Q at Pakxe in 1990 R at Pakxe in 1989 S at Pakxe in 1988 T at Pakxe in 1987 U at Pakxe in 1986 V at Pakxe in 1985 W at Pakxe in 1984 X at Pakxe in 1983 Y at Pakxe in 1982 Z at Pakxe in 1981 AA at Pakxe in 1980
RAINFALL	ANNUAL	ANNURAIN.WK4	Annual precipitation in 1960 to 1994
RAINFALL	DAILY	DAILY94.WK4	Daily precipitation data in 1994 A at Khongxedon B at Pakxe C at Pakxong D at Saravan E at Moulapamok F at Khong G at Selaham H at Phonethong I at Pathomphone J at Soukhouma K at KM 42 L at Champasak M at Nong Hine N at Laongam O at Nikhom 34 P at Bachiang Q at Keng Sim R at Mouang Pheng S at Mouang Mai T at Khom Chiam U at Phibun Mangsaban V at Buntarik W at Ban Nong Mek
RAINFALL	DAILY	DAILY93.WK4	Daily precipitation data in 1993
RAINFALL	DAILY	DAILY92.WK4	Daily precipitation data in 1992
RAINFALL	DAILY	DAILY91.WK4	Daily precipitation data in 1991
RAINFALL	DAILY	DAILY90.WK4	Daily precipitation data in 1990
RAINFALL	DAILY	DAILY89.WK4	Daily precipitation data in 1989
RAINFALL	DAILY	DAILY88.WK4	Daily precipitation data in 1988
RAINFALL	DAILY	DAILY87.WK4	Daily precipitation data in 1987
RAINFALL	MONTHLY	MONRAIN.WK4	Monthly precipitation in 1960 to 1994

**Table 5.2 Data File Structure(Climatological and Rainfall Stations)**

Column Name	Data type	Description
IDNUMBER	NUMBER (3)	Station ID
NAME	CHAR (20)	Station name
LONGITUDEDEG	NUMBER (3)	Longitude (degree)
LONGITUDEMIN	NUMBER (5,2)	Longitude (minute)
LATITUDEDEG	NUMBER (3)	Latitude (degree)
LATITUDEMIN	NUMBER (5,2)	Latitude (minute)
ALTITUDE	NUMBER (6,2)	Altitude (m)
PROVINCE	CHAR (20)	Province name
DISTRICT	CHAR (20)	District name
TYPE	NUMBER (16)	Type of station
OPENEDYEAR	NUMBER (4)	Opened year
YEARS	NUMBER (4)	Observation years

**Table 5.3 Data File Structure(Climatological data)**

Column Name	Data type	Description
JAN	NUMBER (4,1)	Monthly value
FEB	NUMBER (4,1)	Monthly value
MAR	NUMBER (4,1)	Monthly value
APR	NUMBER (4,1)	Monthly value
MAY	NUMBER (4,1)	Monthly value
JUN	NUMBER (4,1)	Monthly value
JUL	NUMBER (4,1)	Monthly value
AUG	NUMBER (4,1)	Monthly value
SEP	NUMBER (4,1)	Monthly value
OCT	NUMBER (4,1)	Monthly value
NOV	NUMBER (4,1)	Monthly value
DEC	NUMBER (4,1)	Monthly value
ANNUAL	NUMBER (4,1)	Annual value

**Table 5.4 Data File Structure (Daily Rainfall data)**

Column Name	Data type	Description
DAY	NUMBER(2)	Observed day
JAN	NUMBER (5,1)	January (1/10mm)
FEB	NUMBER (5,1)	February (1/10mm)
MAR	NUMBER (5,1)	March (1/10mm)
APR	NUMBER (5,1)	April (1/10mm)
MAY	NUMBER (5,1)	May (1/10mm)
JUN	NUMBER (5,1)	June (1/10mm)
JUL	NUMBER (5,1)	July (1/10mm)
AUG	NUMBER (5,1)	August (1/10mm)
SEP	NUMBER (5,1)	September (1/10mm)
OCT	NUMBER (5,1)	October (1/10mm)
NOV	NUMBER (5,1)	November (1/10mm)
DEC	NUMBER (5,1)	December (1/10mm)

**Table 5.5 Data File Structure (Monthly Rainfall Data)**

Column Name	Data type	Description
JAN	NUMBER (5,1)	January (1/10mm)
FEB	NUMBER (5,1)	February (1/10mm)
MAR	NUMBER (5,1)	March (1/10mm)
APR	NUMBER (5,1)	April (1/10mm)
MAY	NUMBER (5,1)	May (1/10mm)
JUN	NUMBER (5,1)	June (1/10mm)
JUL	NUMBER (5,1)	July (1/10mm)
AUG	NUMBER (5,1)	August (1/10mm)
SEP	NUMBER (5,1)	September (1/10mm)
OCT	NUMBER (5,1)	October (1/10mm)
NOV	NUMBER (5,1)	November (1/10mm)
DEC	NUMBER (5,1)	December (1/10mm)
TOTAL	NUMBER (5,1)	Annual total (1/10mm)

**Table 5.6 Directories and Files in the Hydrological Sub-system**

Directory	Sub-directory	File	Description	
RIVER		RIVERSTA.WK4	Location of gauge stations	
RIVER	HOUAY	CHAMP135.WK4	Gauge height data at Ban Lak 35 A in 1994 B in 1993 C in 1992 D in 1991 E in 1990 F in 1989 G in 1988	
RIVER	HOUAY	CHAMPINA.WK4	Gauge height data of Houay Champi at Ban Nake in 1994	
RIVER	HOUAY	KHAMOUAN.WK4	Gauge height data of Houay Khamouan at Ban Nake in 1994	
RIVER	HOUAY	PHALING.WK4	Gauge height data of Houay Phaling at Ban Chik in 1994	
RIVER	MEKONG	DISCHARGE	PAKSE.WK4	Discharge data of the Mekong River at Pakxe A in 1990 B in 1989
RIVER	MEKONG	DISCHARGE	CHONNOY.WK4	Gauge height data of the Mekong River at Ban Chonnoy in 1989
RIVER	MEKONG	DISCHARGE	PAKSE.WK4	Gauge height data of the Mekong River at Pakxe A in 1990 B in 1989
RIVER	SQW		SQW-N01.WK4	Surface water quality data in the rainy season of 1994
RIVER	XEDON	DISCHARGE	KHONGXE.WK4	Discharge data of the Xe Don River at Khongxedon A in 1990 B in 1989
RIVER	XEDON	DISCHARGE	SARAVAN.WK4	Discharge data of the Xe Don River at Saravan A in 1990 B in 1989
RIVER	XEDON	DISCHARGE	SOUVANNA.WK4	Discharge data of the Xe Don River at Souvanna Khilli A in 1990 B in 1989

**Table 5.7 Data File Structure (River Gauging Stations)**

Column Name	Data type	Description
STATION	CHAR (20)	River gauging station
RIVER	CHAR (20)	River name
TYPE	CHAR (3)	Station type
PROVINCE	CHAR (20)	Province name
DISTRICT	CHAR (20)	District name
LONDEG	NUMBER (3)	Longitude (degree)
LONMIN	NUMBER (5,2)	Longitude (minute)
LATDEG	NUMBER (3)	Latitude (degree)
LATMIN	NUMBER (5,2)	Latitude (minute)
ALTITUDE	NUMBER (6,2)	Altitude (m)
AREA	NUMBER (6)	Catchment area (km2)
INSTALL	DATE	Date of installation
GAUGE	CHAR (25)	Record of staff gauge
DISCHARGE	CHAR (20)	Record of discharge
LOCATION	CHAR (50)	Location and access description
REMARKS	CHAR (30)	Zero of gauge elevation

**Table 5.8 Data File Structure (Daily River Gauging Data)**

Column Name	Data type	Description
DAY	NUMBER (2)	Observed day
JAN	NUMBER (5,2)	January (m)
FEB	NUMBER (5,2)	February (m)
MAR	NUMBER (5,2)	March (m)
APR	NUMBER (5,2)	April (m)
MAY	NUMBER (5,2)	May (m)
JUN	NUMBER (5,2)	June (m)
JUL	NUMBER (5,2)	July (m)
AUG	NUMBER (5,2)	August (m)
SEP	NUMBER (5,2)	September (m)
OCT	NUMBER (5,2)	October (m)
NOV	NUMBER (5,2)	November (m)
DEC	NUMBER (5,2)	December (m)

**Table 5.9 Data File Structure (Daily River Discharge Data)**

Column Name	Data type	Description
DAY	NUMBER (2)	Observed day
JAN	NUMBER (5)	January (m3/s)
FEB	NUMBER (5)	February (m3/s)
MAR	NUMBER (5)	March (m3/s)
APR	NUMBER (5)	April (m3/s)
MAY	NUMBER (5)	May (m3/s)
JUN	NUMBER (5)	June (m3/s)
JUL	NUMBER (5)	July (m3/s)
AUG	NUMBER (5)	August (m3/s)
SEP	NUMBER (5)	September (m3/s)
OCT	NUMBER (5)	October (m3/s)
NOV	NUMBER (5)	November (m3/s)
DEC	NUMBER (5)	December (m3/s)

**Table 6.10 Directories and Files in the Well Inventory Sub-system**

Directory	Sub-directory	File	Description
WELL	LEVEL	LPHAS1.WK4	Groundwater leveling data in the rainy season of 1994
WELL	LEVEL	LPHAS2-1.WK4	Groundwater leveling data in the dry season of 1994
WELL	LEVEL	LPHAS2-2.WK4	Groundwater leveling data in the dry season of 1995
WELL	WELLINVE	CHAMPASA.WK4	Well inventory of Champasak Province
		SARAVAN.WK4	Well inventory of Saravan Province

**Table 5.11 Data File Structure(Well Inventory Data)**

Column Name	Data type	Description
DISTRICT	CHAR (20)	District name
VILLAGE	CHAR (20)	Village name
TOTAL DEPTH	NUMBER (3)	Total depth (m)
COMPLETION	DATE	Completion date
PUMP	CHAR (25)	Type of pump
REMARKS	CHAR (25)	Working of pump

**Table 5.12 Data File Structure(Groundwater Leveling Data)**

Column Name	Data type	Description
VILLAGE	CHAR (20)	Village name
DISTRICT	CHAR (20)	District name
DATE	DATE	Observed date
GEOLOGY	CHAR (20)	Geology
ALTITUDE	NUMBER(6,2)	Altitude (m)
DIAMETER	NUMBER(5,2)	Diameter of well
TOTALDEPTH	NUMBER(5,1)	Total depth (m)
TOP/GROUND	NUMBER(5,2)	Well top to ground surface (m)
TOP/WATER	NUMBER(5,2)	Well top to water level (m)
WATERLEVEL	NUMBER(5,2)	Elevation of water level (m)
EC	NUMBER (6)	Electric conductivity (micro S/cm)
PH	NUMBER (6)	Potential of hydrogen
TMP	NUMBER (6)	Temperature (degree)
TYPEWELL	CHAR (15)	Type of well
PUMP/RING	CHAR (15)	Type of handpump or ring

**Table 5.13 Directories and Files In the Water Quality Sub-system**

Directory	Sub-directory	File	Description	
WATERQUA	NON-BIO	CHADATA	OPHAS1.WK4	Non-biological water quality data in the rainy season of 1994 A All data B Surface water quality data C Groundwater data
WATERQUA	NON-BIO	CHADATA	OPHAS2-1.WK4	Non-biological water quality data in the dry season of 1994
WATERQUA	NON-BIO	CHADATA	OPHAS2-2.WK4	Non-biological water quality data in the dry season of 1995
WATERQUA	NON-BIO	LOCATION	LPHAS2-1.WK4	Location of non-biological analysis in the dry season of 1994
WATERQUA	NON-BIO	LOCATION	LPHAS2-2.WK4	Location of non-biological analysis in the dry season of 1995
WATERQUA	BIOCHEM		BPHAS2-1.WK4	Biological water quality data in the dry season of 1994
WATERQUA	BIOCHEM		BPHAS2-2.WK4	Biological water quality data in the dry season of 1995



**Table 5.14 Data File Structure(Water Quality Data)**

Column Name	Data type	Description
VILLAGE	CHAR(20)	Village
WATER	CHAR (20)	Sampled well
PH	NUMBER (6)	Potential of hydrogen
TMP	NUMBER (6)	Temperature (degree)
EC	NUMBER (6)	Electric conductivity (micro S/cm)
CA	NUMBER (6)	Calcium (mg/1)
MG	NUMBER (6)	Magnesium (mg/1)
NA	NUMBER (6)	Sodium (mg/1)
K	NUMBER (6)	Potassium (mg/1)
FE	NUMBER (6)	Iron (mg/1)
MN	NUMBER (6)	Manganese (mg/1)
CU	NUMBER (6)	Copper (mg/1)
ZN	NUMBER (6)	Zinc (mg/1)
PB	NUMBER (6)	Lead (mg/1)
CL	NUMBER (6)	Chloride (mg/1)
CL	NUMBER (6)	Chloride (mg/1)
HCO3	NUMBER (6)	Hydrogen carbonate
NO3	NUMBER (6)	Nitrite (mg/1)
NO2	NUMBER (6)	Nitrate (mg/1)
F	NUMBER (6)	Fluoride (mg/1)
PO4	NUMBER (6)	Phosphate (mg/1)
NH4	NUMBER (6)	Ammonia (mg/1)
I	NUMBER (6)	Iodine (mg/1)
HARDNESS	NUMBER (6)	Total hardness (mg/1)
SIO2	NUMBER (6)	Silica (mg/1)
TDS	NUMBER (6)	Total dissolved solid (mg/1)
IONBALANCE	NUMBER (6,3)	Ion balance
SDATE	DATE	Sampled date
RDATE	DATE	Reported date

**Table 5.15 Directories and Files in the Village Inventory Sub-system**

Directory	Sub-directory	File	Description
VILLAGE		CHAMPASAK.WK4	Village inventory in Champasak Province
VILLAGE		SARAVAN.WK4	Village inventory in Saravan Province

**Table 5.16(1/2) Data File Structure(Village Inventory Data)**

<b>Column Name</b>	<b>Data type</b>	<b>Description</b>
ID	CHAR (5)	Village code
VILLAGE	CHAR (25)	Village name
DISTRICT	CHAR (20)	District name
TOPOGRAPHY	CHAR (20)	Topography
GEOLOGY	CHAR (20)	Geology
DISTANCE	NUMBER (5,1)	Distance from Pakxe
ROAD	CHAR (10)	Access to village (road)
BRIDGE	CHAR (10)	Access to village (bridge)
ELECTRICITY	CHAR (5)	Electricity
VILLAGEHEAD	CHAR (20)	village head
HOUSEHOLD92	NUMBER (6)	Household in 1992
HOUSEHOLD94	NUMBER (6)	Household in 1994
POPULATION92	NUMBER (6)	Population in 1992
POPULATION94	NUMBER (6)	Population in 1994
SEXMALE	NUMBER (6)	Male population
SEXFEMALE	NUMBER (6)	Female population
SEXCHILDREN	NUMBER (6)	Children population
TOILET	CHAR (10)	Sanitary condition (toilet)
TOILETOWNER	CHAR (10)	Sanitary condition (owner)
TOISECURITY	CHAR (10)	Sanitary condition (secured)
TOIDISPOSAL	CHAR (10)	Sanitary condition (disposal site)
MALARIA	NUMBER (6)	Malaria (person/year)
DIARRHEA	NUMBER (6)	Diarrhea (person/year)
HOSPITAL	CHAR (20)	Hospital or clinic
HOSDISTANCE	NUMBER (4)	Distance to hospital or clinic (km)
MEDIEXPENSE	NUMBER (8)	Average medical expense (Kip/person)
PRISCHOOL	CHAR (3)	Primary school
TEACHER	NUMBER (4)	Number of teachers
AGRIPRODUCTS	CHAR (30)	Main agricultural products
PADDYAREA	NUMBER (4)	Paddy area (ha)
YIELD	NUMBER (5,1)	Yield (ton/ha/year)
RICECONSUM	NUMBER (4)	Rice consumption
IRRIGATION	CHAR (15)	Irrigation system
IRRIWATERFEE	NUMBER (5)	Water fee per ha
INDUSTRY	CHAR (15)	Other industries
FARMERASSO	CHAR (15)	Farmer's association
ACTIVITYFARM	CHAR (15)	Activities of farmer's association
WOMENASSO	NUMBER (5)	Women's association
ACTIVITYWOM	CHAR (25)	Activities of women's association

**Table 5.16(2/2) Data File Structure(Village Inventory Data)**

<b>Column Name</b>	<b>Data type</b>	<b>Description</b>
<b>WATERRIVER</b>	NUMBER (3)	Percentage of river to water consumption
<b>WATERWELL</b>	NUMBER (3)	Percentage of well to water consumption
<b>WATERPUMP</b>	NUMBER (3)	Percentage of pump to water consumption
<b>WATERPOND</b>	NUMBER (3)	Percentage of pond to water consumption
<b>WATERSPRING</b>	NUMBER (3)	Percentage of spring to water consumption
<b>WATEROTHERS</b>	NUMBER (3)	Percentage of others to water consumption
<b>DUGWDIA</b>	CHAR (10)	Diameter of a dug well (m)
<b>DUGWDEPTH</b>	CHAR (10)	Depth of a dug well (m)
<b>DUGWWLEVEL</b>	CHAR (10)	Water level (m)
<b>DUGWRING</b>	CHAR (20)	Type of ring
<b>DUGWCOMPLE</b>	NUMBER (4)	Completion year
<b>DUGWFUND</b>	CHAR (20)	Construction fund
<b>BOREDIA</b>	CHAR (10)	Diameter of a borehole (m)
<b>BOREDPTH</b>	CHAR (10)	Depth of a borehole (m)
<b>BOREHWLEVEL</b>	CHAR (10)	Water level (m)
<b>BOREHCASING</b>	CHAR (20)	Type of casing
<b>BOREHCOMPLE</b>	NUMBER (10)	Completion year
<b>BOREHFUND</b>	CHAR (20)	Construction fund
<b>HANDPTYPE</b>	CHAR (20)	Type of a handpump
<b>HANDPSTATUS</b>	CHAR (20)	Present status of a handpump
<b>MOTORPTYPE</b>	CHAR (10)	Type of a motor pump
<b>MOTORPCAPA</b>	CHAR (10)	Capacity of a motor pump
<b>MOTORPHP</b>	CHAR (10)	Horse power of a motor pump
<b>SPRING</b>	CHAR (20)	Condition of a spring
<b>SPRINGPIPE</b>	NUMBER (4)	Pipe diameter of gravity system
<b>SPRINGDIS</b>	NUMBER (4)	Discharge of spring
<b>WQTEMP</b>	NUMBER (5,1)	Water temperature ( C)
<b>WQPH</b>	NUMBER (5,1)	PH
<b>WQEC</b>	NUMBER (5,1)	Electrical conductivity (mS/m)
<b>WQTASTE</b>	CHAR (10)	Taste
<b>WQSMELL</b>	CHAR (10)	Smell
<b>WQTURBIDITY</b>	CHAR (10)	Turbidity
<b>WATERUSE</b>	NUMBER (10)	Daily water use per family
<b>USEDRINKING</b>	NUMBER (2)	Percentage of drinking to total consumption
<b>USECOCKING</b>	NUMBER (2)	Percentage of cocking to total consumption
<b>USEWASHING</b>	NUMBER (2)	Percentage of washing to total consumption
<b>USEOTHERS</b>	NUMBER (2)	Percentage of others to total consumption
<b>CARRINGTRIP</b>	NUMBER (5)	Carrying buckets (trip/day)
<b>CARRINGTIME</b>	NUMBER (5)	Carrying buckets (minutes/trip)
<b>DISWATER</b>	NUMBER (4)	Distance to a main water source
<b>WILLINGPAY</b>	NUMBER (10)	Amount of willing to pay (Kip/month/family)
<b>GRADING</b>	CHAR (6)	Surface grading



## SUPPORTING REPORT

### CHAPTER 6 AGRICULTURAL WATER USE

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## 6. AGRICULTURAL WATER USE

### 6.1 Existing Irrigation Facilities

The pump irrigation facilities are only found in the small scale pump irrigation projects along the Mekong and the Xe Don rivers, such as; Khamthong, Boungkang, Phone Ngam, Veune Pakouang irrigation projects in the Xe Don river, and B.Pha Phine, B.Vaththat, B. Veunkhao, B.Nokkok, B.Na irrigation projects in the Mekong river. The total pump irrigation area is about 500 ha in Champasak and Saravan provinces in the dry season. Supplementary irrigation is done only in existing irrigation areas in drought years. Under limited budget and technology, the provincial governments are concentrating on low cost irrigation agriculture with farmers participation in the first step of irrigation development.

There are 3 types of irrigation facilities in the study area, and total number of facilities are shown below. (Refer also to Tables 6.1a to 6.1d and Figure 6.1)

Type of Facilities	Number of Facilities in Champasak Province	Number of Facilities in Saravan Province
Pump (Electric and Diesel)	7	2
Weir	20	11
Reservoir (include flood gate and pond)	3	4
Sub-total	30	17

#### (1) Pump irrigation water charge

Existing pump irrigation systems are used mainly for paddy cultivation during the dry and rainy season. At present, water charge is collected from the electric charge of pump operation. Electric charge in Champasak and Saravan is 7 kip/kwh for irrigation purpose, 8 kip/kwh for domestic use, 47 kip/kwh for hotel, factory, government office, restaurant, 30 kip/kwh for groundwater use of domestic water supply and 60 kip/kwh for foreigner in 1994. For example, in Phone Ngam Pump Irrigation Project, the electric charge in the dry season paddy in 1994 was about 26,400 kip/ha, and the total water requirement is estimated at 17,200 m<sup>3</sup>/ha (See Phone Ngam Pump Irrigation Project in Champasak province below).

- Specification of Pump: 70 kw x 3, D = 300 mm
- Irrigation Area (Dry): 80 ha planning (28 ha operation in 1994)
- Total Electricity: 42,720 kwh
- Total Electric charge: 299,000 kips
- Unit Electric Price: 7 kip/kwh
- Total Pump-up Volume: 483,300 m<sup>3</sup>
- Pump-up Volume per ha: 17,200 m<sup>3</sup>

## (2) Water Rights

At present, the law or regulation for the water rights are not enacted in the study area. The natural water, such as rivers, lakes, ponds and groundwater, belongs to the nation and, therefore, every farmers possesses equal right to it. The utilization of water in villages are determined by the farmers through a village head. When the interest of water use affects more then two villages, discussions are made among the village head with the officials from the district or irrigation division of agriculture and forestry department in the province.

## 6.2 Present Agricultural Conditions

The agricultural characteristics in the study area are enumerated below.

- Family management, considerably low investment and unstabilized rain-fed paddy cultivation.
- Production market is small and prices are unstable.
- Lack of domestic water supply and shortage of agricultural population.
- The average of cultivation ratio is 6.9% (total area of 15,415 km<sup>2</sup>) in Champasak, and 5.4% (total area of 10,385 km<sup>2</sup>) in Saravan Province. The rain-fed paddy and irrigation ratio in both provinces are as below.

Province	Cultivation Area (ha)	Rain-fed Paddy Ratio (%)	Irrigation Ratio (%)
Champasak	106,726	74.5 %	2.4 %
Saravan	56,550	74.6%	4.2%

The paddy yield transition data in both provinces is shown in Table 6.2a. The main cropping conditions is shown in Table 6.2b.

## 6.3 Evaluation of Groundwater Utilization for Agriculture

Based on the hydrogeological study, the shallow aquifer (about 20–60 m below ground surface) in the basalt slope of the Boloven plateau has a good groundwater potential for agriculture use in such areas as Bachiang, Lao ngam and Saravan districts.

According to the results of puming test, the transmissivity ranges from 0.74 to 1,500 m<sup>2</sup>/day, while the specific capacity ranges from 2.9 to 1,900 m<sup>3</sup>/day/m. Considering the standard depth (50m) and the diameter (300mm or more), more than 3,000 m<sup>3</sup>/day of pumping might be possible, if the transmissivity shows a highest value such as 1,500 m<sup>2</sup>/day as was obtained in B.Beng. However, the aquifer constants vary place to place particularly in the basalt slope. Because of its geologic feature, the drilling location of the well must be carefully decided, since a large amount of water is required for the irrigation comparing with the drinking water supply for the village people.



Table 6.1a

Existing Irrigation Project in Champasak

Project Name	District Name	Village Name	Water Source	Irrigation Facility	Complete Date	Reservoir Capa. (m3)	Discharge Q (m3/s)	Actual Irr. Area		Planning Area	
								Irr. Area Rain (ha)	Dry (ha)	Irr. Area Rain (ha)	Dry (ha)
1. Phone Ngam	Pakxe	Phonggam	Ke Don	E. Pump	1986	-	0.44	100	80	359	359
2. Veune Pakouang	Pakxe	Phonsikhai	Ke Don	E. Pump	1985	-	0.40	100	70	283	283
3. Houay Gsang	Pakxe	Houaxe	H. Gsang	Weir	1988	-	1.50	50	40	250	250
4. Houay Sang	Pakxe	Khonelai	H. Sang	Weir	1985	-	0.14	70	70	70	70
5. Houay To Mo	Pathumphone	Tomp	H. Tomo	Weir	1992	-	4.00	200	100	800	800
6. Houay Nam Say	Pathumphone	Namsai	H. Namsai	Weir	1988	-	0.50	20	10	300	300
7. Na Kham	Pathumphone	Nakham	H. Namkham	Weir	1989	-	0.06	10	10	10	10
8. Wong Pa Poi	Pathumphone	Phalaibok	N. Pa Poi	Weir	1988	-	0.06	20	20	20	20
9. Houay Set	Pakxong	Khongtoun	H. Set	Weir	1985	-	0.10	50	0	50	0
10. Thong Houng	Pakxong	Nongmek	H. Houng	Weir	1993	-	0.10	20	20	20	20
11. Houay Xone	Sanasomboon	Nalong	H. Xon	Weir	1980	24,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
12. Houay Xone	Sanasomboon	Nalak	H. Xon	Weir	1986	23,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
13. Houay Done	Phonthong	Houaidone	H. Done	Weir	1987	27,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
14. Houay Xe	Phonthong	Fangdeng	H. Xe	Weir	1970	25,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
15. Houay Xe	Phonthong	Phonthong	H. Xe	Weir	1960	22,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
16. Houay Chot	Phonthong	Nonkhoun	H. Chot	Weir	1989	15,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
17. Houay Pheng	Phonthong	Mai	H. Pheng	Reservoir	1989	13,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
18. Houay Deng	Phonthong	Wongtao	H. Deng	Reservoir	1982	25,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
19. Houay Palai	Bachiang	Thongkim	H. Palai	Weir	1996	-	1.00	0	0	400	150
20. Houay Kouangxi	Bachiang	Khuangsi	H. Meung	Pond	1993	-	0.28	L.U.D.	L.U.D.	L.U.D.	L.U.D.
21. Houay Khanath	Bachiang	Lak-23	H. Khanath	Weir	1987	25,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
22. H. Luat Khouay1	Khong	Thapho Nok	Luatkhouay	Weir	1989	30,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
23. H. Luat Khouay2	Khong	Keong Nok	H. Phai	Weir	1990	26,500	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
24. Ban Veunkhao	Khong	Vuangkheo	Nam Khong	D. Pump	1989	-	0.10	60	60	60	60
25. Ban Nokkok	Khong	Nokkok	Nam Khong	D. Pump	1993	-	0.25	30	30	70	70
26. Ban Na	Khong	Na	Nam Khong	D. Pump	1993	-	0.25	50	50	100	100
27. Ban Pha Phine	Champasak	Phaphine	Nam Khong	E. Pump	1992	-	0.25	50	50	605	605
28. Ban Vaththat	Champasak	Vaththat	Nam Khong	E. Pump	1992	-	0.20	50	50	405	405
29. Houay Phai	Subkuma	Khokkhong	H. Phai	Weir	1990	35,000	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.
30. Houay Ngang	Bachiang	Chiangsai	H. Ngang	Weir	1993	-	0.10	10	10	70	35
Total								890	670	3,872	3,537

Remark: L. U. D. = Livestock, Upland crops, Domestic water use  
 E. Pump = Electric Pump, D. Pump = Diesel Pump  
 Irr. Area (Rain) = Irrigation for Paddy in Rain Season  
 Irr. Area (Dry) = Irrigation for Paddy in Dry Season

Table 6.1b

Existing Irrigation Project in Saravan

Project Name	District Name	Village Name	Water Source	Irri. Facility	End Date	Reservoir Capa. (m3)	Discharge Q (m3/s)	Actual Irrigable Area				Planning Area			
								Irr. Area (ha)	Rain (ha)	Dry (ha)	Upland Crop (ha)	Irr. Area (ha)	Rain (ha)	Dry (ha)	Upland Crop (ha)
1. Nong Deng	Saravan	Bungxai	Ke Set	Weir	1989	-	5.00	450	200	100	100	1,700	800	200	
2. Dong Monh	Napy	Saria	H. Iapoung	Weir	1988	-	5.00	200	100	50	50	800	500	100	
3. B. Nakasso	Saravan	Nakasso	H. Pet	Weir	1965	-	0.50	200	50	15	15	300	250	30	
4. Houay Soung	Saravan	Thongkapok	H. Soung	Weir	1993	-	0.40	113	30	5	5	190	80	20	
5. B. Len	Laong	Len	H. Toumsan	Weir	1994	-	0.35	70	30	20	20	80	70	10	
6. Viengkham	Saravan	Viengkham	H. Khalong	Weir	1968	-	0.24	50	10	5	5	50	20	5	
7. B. Soutabali	Saravan	Soutabali	Ke set	Weir	1989	-	0.25	50	0	0	0	50	50	0	
8. B. Naxai	Saravan	Naxai	Ke set	Weir	1985	-	0.23	30	0	0	0	70	50	0	
9. B. Khmai	Khongxexedon	Khmai	H. Gngang	Reservoir	1990	350,000	-	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	
10. Nongsseng	Lakhnepheng	Nongsen	H. H. Sane	Reservoir	1980	470,000	-	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	
11. Seisam	Lakhnepheng	Napabang	Lamphong	Reservoir	1987	96,000	-	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	
12. Houay Te	Lakhnepheng	Lakhonsi	H. Te	Reservoir	1985	24,500	-	-	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	L.U.D.	
13. B. Khamthong	Khongxexedon	Khamthong	Ke Don	E. Pump	1993	-	0.20	100	30	10	10	150	70	10	
14. B. Boungkang	Khongxexedon	Boungkang	Ke Don	E. Pump	1993	-	0.20	100	50	10	10	150	50	10	
15. Houay E Meua	Samuoi	Lalaykong	H. Imui	Weir	1994	-	0.14	50	30	0	0	50	30	0	
16. Houay Pa Lai	Samuoi	Salaysoy	H. Phalo	Weir	1994	-	0.09	10	5	0	0	10	5	0	
17. Houay Cho	Tai	Chouhay	H. Cho	Weir	1994	-	0.08	30	20	0	0	30	20	0	
Total								1,453	555	215	215	3,630	1,995	385	

Remark: L. U. D. = Livestock, Upland Crops, Domestic Water Use

E. Pump = Electric Pump, D. Pump = Diesel Pump

Irr. Area (Rain) = Irrigation for Paddy in Rain Season

Irr. Area (Dry) = Irrigation for Paddy in Dry Season

Upland Crops = Irrigation for Upland Crops in all Season

Table 6.1c (1/2)

## Future Irrigation Plan in Champasak Province (1993 - 2000)

No.	Facility and Project Name	Dry (ha) Season	Rain (ha) Season	Cost (Mil. kip)	Study Year	Construction Year
A	Pump Irrigation					
A-1	Newly Construction					
1	B. Papin	605	605	703	1990	1994 - 1995
2	B. Watthat	450	450	550	1989	1994 - 1996
A-2	Study Completed					
1	B. Photaxi	40	40	92	1990	1996 - 1997
2	B. Sonse	70	70	224	1990	1997 - 1998
3	B. Donekho	70	70	153	1991	1998 - 1999
4	B. Sadhay	50	50	143	1991	1999 - 2000
5	B. Phaling	110	110	228	1992	1999 - 2000
6	B. Watsay	450	450	550	1992	1995 - 1997
7	B. Phanone	600	600	780	1991	1996 - 1999
8	B. Kateu	600	600	780	1992	1996 - 1999
9	B. Nongvene	580	580	780	1992	1996 - 1999
10	B. Nhouadeng	160	160	257	1994	1997 - 1998
11	B. Solonoy	100	100	163	1994	1998 - 1999
12	B. Nakham	250	250	415	1995	1999 - 2000
13	B. Nhio	70	70	114	1995	1999 - 2000
A-3	Not study yet					
1	B. Bungkha	300	300	426	1994	1995 - 1997
2	B. Okmuang	300	300	426	1994	1996 - 1998
3	B. B. Nakeo	300	300	426	1994	1997 - 1999
4	B. Yong	300	300	426	1994	1998 - 2000
5	B. Nakhouang	300	300	426	1994	1995 - 1997
6	B. Nonghoy	300	300	426	1994	1996 - 1998
7	B. Saphay	350	350	497	1995	1997 - 1999
8	B. Khyly	300	300	426	1995	1997 - 1999
9	B. Khamyat	400	400	568	1995	1997 - 2000
10	B. Solo	400	400	568	1995	1996 - 1999
11	B. Deua	300	300	426	1995	1996 - 1998
12	B. Paksong	300	300	426	1996	1997 - 1999
13	B. Veunxay Nhay	300	300	426	1996	1998 - 2000
14	B. Veunxay Noy	300	300	426	1996	1997 - 1999
15	B. Lao	300	300	426	1996	1998 - 2000
16	B. Sakmuong	300	300	426	1996	1997 - 1999
17	B. Saman	300	300	426	1996	1998 - 2000
18	B. Samoliep	300	300	426	1997	1998 - 2000
19	B. Nongboua Noy	222	222	315	1999	2000
20	B. Boun Nhay	215	215	305	1999	2000
21	B. Thaxeng	225	225	320	1996	1998 - 1999
22	B. Outtoumkhao	100	100	142	1996	1999
23	B. Veunh	84	84	120	1997	2000
24	B. Naphang	243	243	345	1998	1999 - 2000
25	B. Mayxamkham	99	99	141	1998	2000
26	B. Xeng	254	254	361	1999	2000
27	B. Hianxiao	100	100	142	2000	2000
28	B. Tayphoum	150	150	213	2000	2000
29	B. Muongsene	400	400	568	1998	1999 - 2000
30	B. Kengkeo	300	300	426	1999	2000
31	B. Mouang	300	300	426	1999	2000
32	B. Xongxay	300	300	426	1999	2000
33	B. Xomhong	500	500	710	1999	2000
34	B. Xanon	300	300	426	1999	2000
35	B. Natan	300	300	426	1999	2000
	Total - A	13,947	13,947	19,767		

Table 6.1c (2/2)

No.	Facility and Project Name	Dry (ha) Season	Rain(ha) Season	Cost (Mil.kip)	Study Year	Construction Year
B	Weir Irrigation					
B-1	Study Completed					
1	B. Houipalay	150	450	742	1990	1993 - 1996
B-2	Not study yet					
1	B. Tongpha	53	53	53	1995	1995
2	B. B. Tum	40	40	40	1996	1996
	Total - B	243	543	835		
C	Reservoir					
C-1	Study Completed					
1	Houay Kadiane	-	-	32	1989	1996
2	Houay Khang	-	-	30	1990	1997
C-2	Not study yet					
1	Houay Tao 1	-	-	25	1994	1995
2	Houay Xet Tao 2	-	-	27	1994	1996
3	Houay Xamkanaxomhom	-	-	29	1994	1994
4	Houay kanouane	-	-	44	1997	2000
5	Houay Banekoutchix	-	-	25	1995	1997
6	B. Kengkang	-	-	31	1996	1999
7	Houay Hoknava	-	-	22	1995	1998
8	Houay Xonbanxonphak	-	-	23	1996	1999
	Total - C	-	-	288		
D	Repair Project					
D-1	Electric Pump					
1	Veune Pakouang	283	283	68	1994	1994 - 2000
2	Phone Ngam	325	325	79	1994	1994 - 2000
3	Pha Phine	605	605	43	1994	1994 - 2000
4	Vatthhat	450	450	19	1994	1994 - 2000
D-2	Diesel Pump					
1	B. Nokkok	100	100	9	1990	1994 - 2000
2	B. Veunkhao	60	60	6	1990	1994 - 2000
3	B. Na	100	100	10	1990	1994 - 2000
D-3	Weir					
1	B. Lak 8	250	250	52	1995	1994 - 2000
2	Khonelay	70	70	18	1995	1994 - 2000
3	Houay Namxay	20	20	12	1995	1994 - 2000
4	Houay Tomo	160	160	9	1992	1994 - 2000
D-4	Reservoir					
1	H. Ke Ban Fangdeng	-	-	7	1991	1994 - 2000
2	H. Ke Phonthong	-	-	6	1991	1994 - 2000
3	H. Deng Ban Yangtao	-	-	5	1992	1994 - 2000
4	H. Phay Ban Keng	-	-	2	1990	1994 - 2000
5	H. Luatkhouay	-	-	1	1990	1994 - 2000
6	H. Phai Ban Khokkong	-	-	1	1990	1994 - 2000
7	H. Xon Ban Nalong	-	-	2	1991	1994 - 2000
8	H. Xon Ban Nalak	-	-	1	1991	1994 - 2000
9	H. Khanath B. Nonhoun	-	-	4	1991	1994 - 2000
	Total - D	2,423	2,423	354		
E	Flood Protection					
1	Bung Phapho	-	10,000	40	1994	1994 - 2000
2	Keng Panay Xe Don	-	400	60	1995	1997
3	Nongveng Champasak	-	10,000	506	1995	1997 - 2000
4	Phaling Phonthong	-	3,000	200	1997	1999 - 2000
5	Ban Bun Pathumphone	-	600	100	1998	2000
	Total - E		24,000	906		
	Total A, B, C, D, E	16,613	40,913	22,150		

Table 6.1d  
Future Irrigation Plan in Saravan Province (1996 - 2000)

No.	Project Name	Cropping	Full (ha) Season	Dry (ha) Season	Cost (Mil. kip)	Construction Year
	(Weir Irri.)					
1	Nong Deng	Paddy	1,700	1,000	434	1996 - 2000
2	Houay Sanot	Paddy	700	550	7,223	1996 - 2000
3	Phapong					
	Nakasao	Paddy	500	350	400	1996 - 2000
4	Dong Monh	Paddy	1,300	800	1,262	1996 - 2000
5	B. Kang	Paddy	300	300	203	1996 - 2000
6	B. Khamthong	Paddy	300	300	203	1996 - 2000
7	B. Taopoun	Paddy	300	200	400	1996 - 2000
	(Pump Irri.)					
8	B. Dane	Paddy	300	200	240	1998 - 2000
9	B. Houay Khon	Paddy	300	200	240	1999 - 2000
10	Vapy Pump	Paddy	300	200	240	1999 - 2000
11	B. Kha	Paddy	300	200	240	1996 - 2000
12	B. Saphat	Paddy	300	200	240	1996 - 2000
13	B. Tanpiao	Paddy	300	200	240	1996 - 2000
14	B. Hinsiao	Paddy	300	200	240	1996 - 2000
15	B. Pakseuak	Paddy	300	200	240	1999 - 2000
16	B. Thaliang	Paddy	300	200	240	1999 - 2000
17	B. Okat	Paddy	300	200	240	1999 - 2000
18	B. Kenghoat	Paddy	300	200	240	1999 - 2000
	(Reservoir)					
19	Vang Phookiao	Paddy	400	250	308	1999 - 2000
20	Houay Seak - Houay Lamphong	Paddy	800	650	640	1999 - 2000
21	Houay Pakeuan	Paddy	800	650	640	1996 - 2000
22	Houay Nakang	Paddy	500	350	400	1996 - 2000
23	B. Takdet	Paddy	150	100	120	1996 - 2000
	(Mountain Side)					
24	Taoi District	Paddy	800	650	640	1996 - 2000
25	Samuoi Dist.	Paddy	800	650	640	1996 - 2000
26	Mountain Border	Coffee	500	-	400	1996 - 2000
27	Pump					
	Paktadhane	Coffee	800	650	77	1996 - 1998
28	Groundwater		100	-		
	Development	Coffee	Places		114	1996 - 2000
29	Pond	Other	750	-		
	Development	Crop	Places		265	1996 - 2000
30	Small River	Other	80	-		
	Development	Crop	Places		265	1996 - 2000
	Total		13,950	9,650	17,274	

Source : Provincial Irrigation Department

Table 6.2a Paddy Yield Transition Data

	Culti. Area '94	Irri. Area '94	1991	1992	1993	1994	1994 t/ha
	ha	ha	t	t	t	t	
Champasak	9,957	0	19,800	26,140	19,847	24,571	2.46
Sanasomboon	3,672	0	2,103	2,138	1,694	8,308	2.26
Bachiang	6,059	59	46,343	15,733	14,618	17,896	2.95
Pathoomphone	9,633	0	8,792	14,004	17,532	26,009	2.70
Sukhuma	11,533	0	26,665	32,133	28,854	29,317	2.54
Khong	19,293	0	10,147	51,453	34,629	48,436	2.51
Phonthong	10,372	102	21,292	26,626	22,812	26,319	2.54
Champasak	6,216	0	11,502	15,449	14,950	16,200	2.61
Moonlapamok	907	0	34	55	48	878	0.97
Pakxong	1,939	103	4,448	5,701	4,348	5,965	3.07
Pakxe							
<b>Total</b>	<b>79,581</b>	<b>264</b>	<b>151,126</b>	<b>189,432</b>	<b>159,332</b>	<b>203,899</b>	<b>Av. 2.56</b>
<b>Saravan</b>							
Lakhonpeng	6,687	0	22,067	20,863	20,730	22,735	3.40
Khongxedon	9,509	45	32,711	34,898	29,953	33,523	3.53
Vapy	5,324	41	17,569	18,953	16,611	18,594	3.49
Saravan	10,863	116	32,263	36,282	32,372	35,295	3.25
Lao ngam	3,960	12	5,504	8,316	5,940	5,823	1.47
Toumlam	2,499	0	6,248	6,922	6,123	6,574	2.63
Ta oi	2,470	10	2,445	3,458	2,717	2,299	0.93
Samuoi	858	12	1,081	1,287	1,098	1,148	1.34
<b>Total</b>	<b>42,170</b>	<b>236</b>	<b>119,889</b>	<b>130,981</b>	<b>115,543</b>	<b>125,991</b>	<b>Av. 2.50</b>

Remark : Culti. = Cultivation Irri. = Irrigation  
Source : Provincial Agriculture Department

Table 6.2b Main Cropping Condition

Variety	Cropping Season	Seeding (kg/ha)	Yield (t/ha)		Cost (kip/kg)		Crop. Days
			Low	High	Low	High	
Rain Paddy	Rain	55~60	1,000	2,500	60	90	150
Irri. Paddy	Dry	45~55	2,500	3,500	60	90	125
Sweet Corn	Full	20~25	1,800	4,000	250	400	100
Sweet Potato	Rain	1,500	5,000	10,000	150	260	180
Taro	Rain	1,600	5,000	3,500	150	300	240
Green Bean	Rain	30~35	500	1,000	250	400	120
Soy Bean	Rain	30~35	500	1,000	150	200	120
Sugar Cane	Full	380	50,000	70,000	150	250	420
Tea	Rain	-	450	1,200	300	1,000	210
Coffee	Full	-	500	1,000	500	1,500	240
Tobacco	Full	2~15	4,000	6,000	250	1,200	160
Fruit	Full	-	1,500	2,600	300	3,000	180

Remark : Rain = Rain-fed Paddy, Irri. = Irrigation Paddy  
Source : Provincial Agriculture Department

Figure 6.1 (1/3)

# MAIN IRRIGATION PROJECT IN SARAVAN PROVINCE

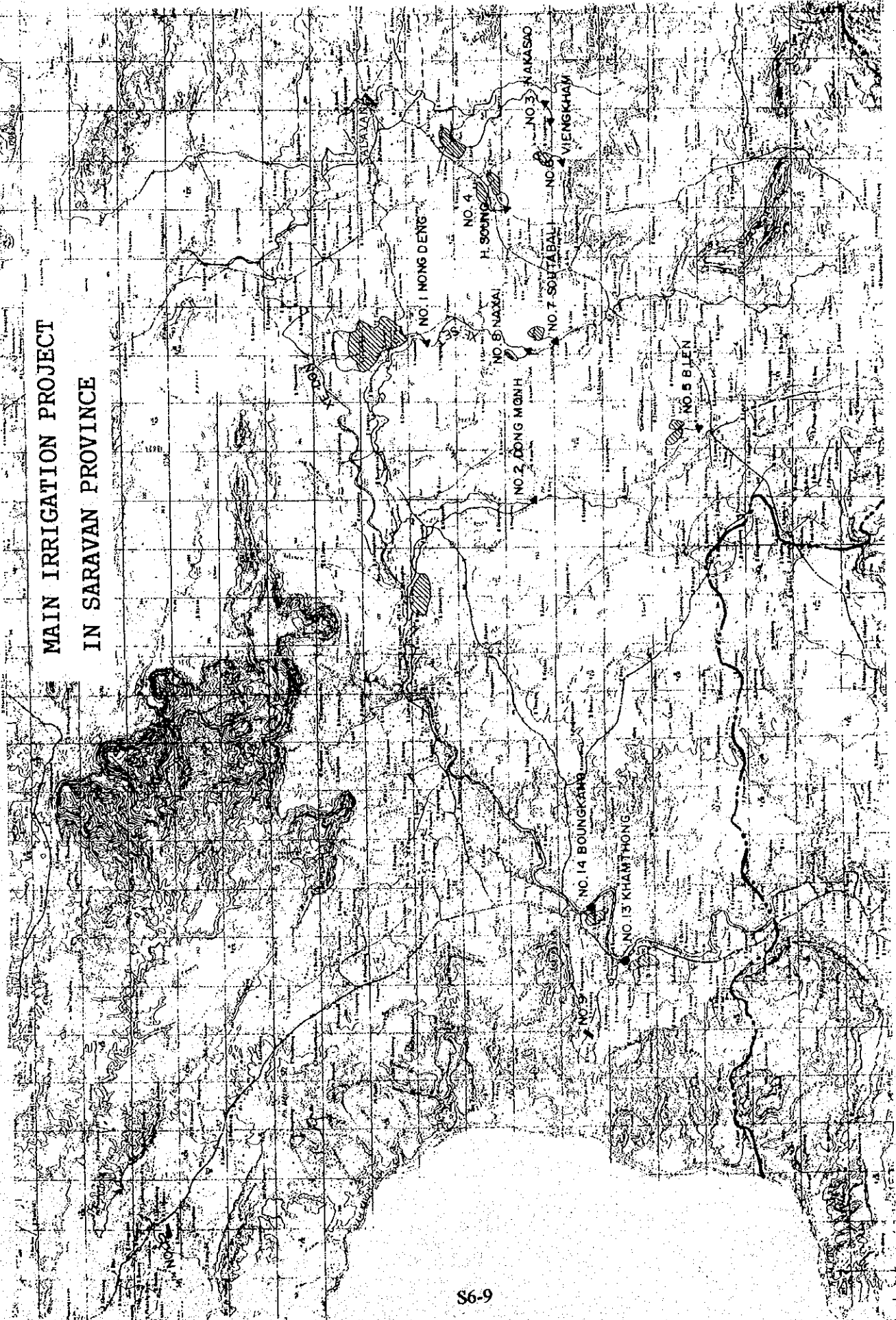


Figure 6.1 (2/3)

NO. 2

# MAIN IRRIGATION PROJECT IN CHAMPASAK PROVINCE

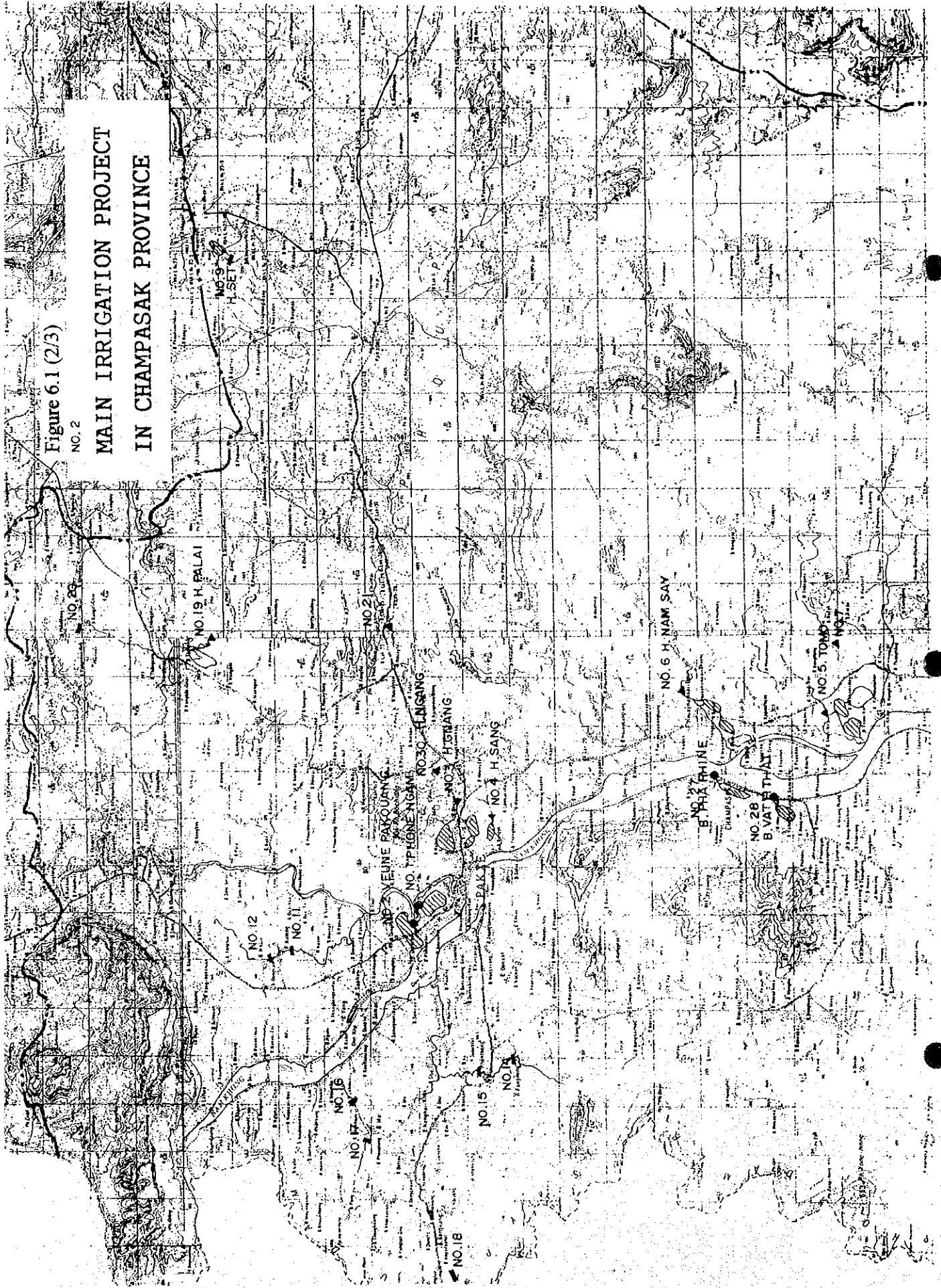
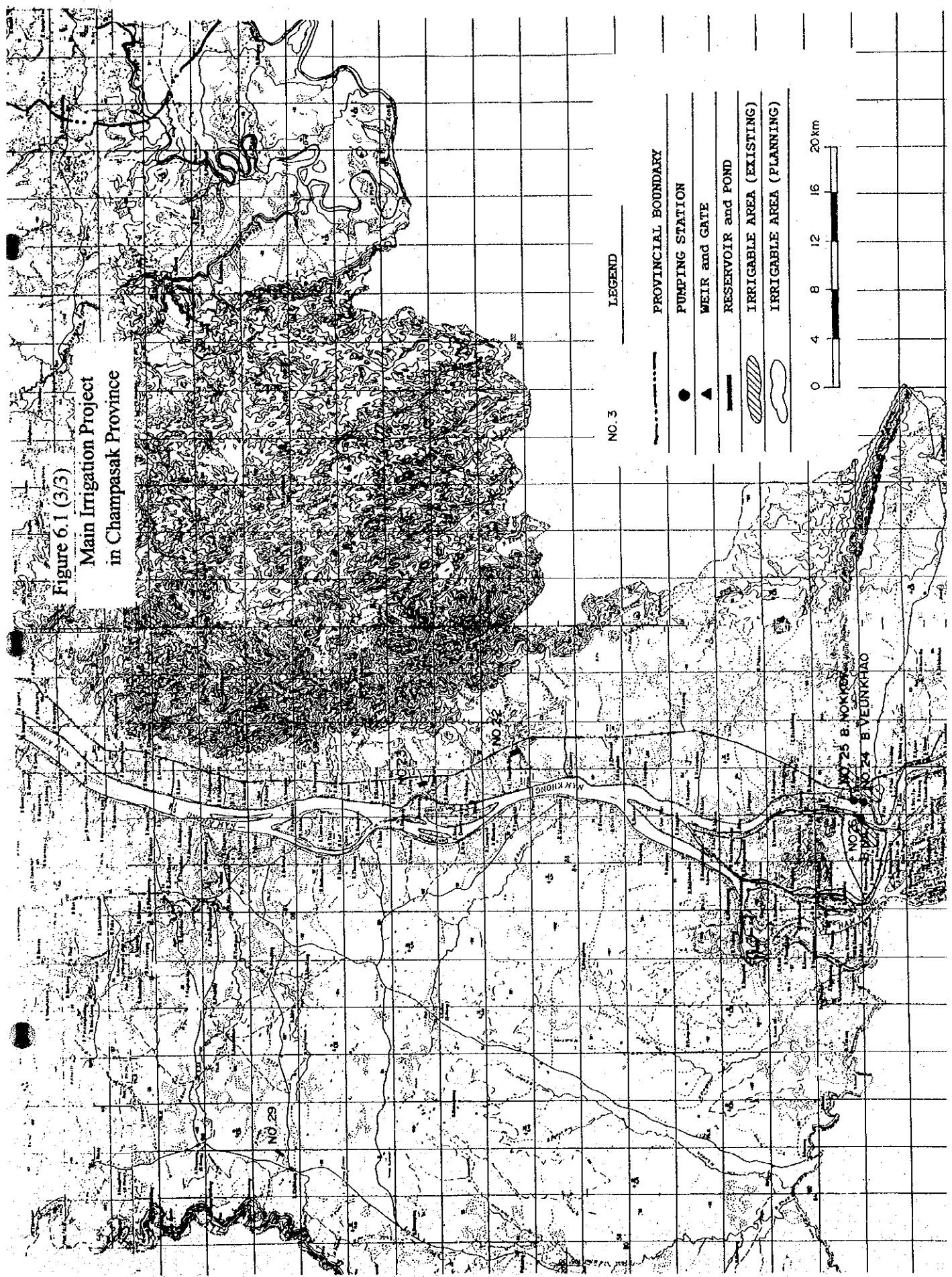




Figure 6.1 (3/3)

Main Irrigation Project  
in Chamapasak Province



# SUPPORTING REPORT

## CHAPTER 7 SURVEY ON DRILLING CONTRACTORS

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7.1	Thai Contractors	S7-1
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## **7. SURVEY ON DRILLING CONTRACTORS**

The survey aimed to evaluate the ability and capability of local drilling contractors with regard to drilling of production wells and pumping tests. The survey was conducted in Bangkok, Thailand and Vientiane, Laos.

### **7.1 Thai Contractors**

In order to appraise the capabilities, the questionnaires were sent and filled up by the Study Team. Warehouses and shops of several companies were visited.

The questionnaire contents are as follows:

- 1) Company's Name
- 2) Address
- 3) Registration
- 4) Date Established
- 5) Line of Business
- 6) President's Name
- 7) Annual Proceeds
- 8) Capital
- 9) Number of Employees
- 10) Company Brochure
- 11) Address of Warehouse and Repair Shop
- 12) Ongoing Drilling Project
- 13) Drilling Machines and Equipment

Results of the survey are summarized in Table 7.1

**Table 7.1 Drilling Contractors in Thailand**

COMPANY NAME	INTEREST	DRILLING CAPACITY (MAX. DEPTH)	STOCK YARD	WORK SHOP
AZTEC INTERNATIONAL	x	o (2,000m)	o	600 m <sup>2</sup>
CHOK SI CHAI KARN CHANG CO.,LTD.	o	o ( 350m)	small	
CHOLLASAP GEORESOURCES	o	o ( 300m)	2,000 m <sup>2</sup>	
SIAM TONE CO.,LTD.	o	o ( 550m)	66,000 m <sup>2</sup>	1,000 m <sup>2</sup>
SO SAENG HATTAKARN CO.,LTD.	x	?	2,400 m <sup>2</sup>	
SOR-ANANT WATER WELL	o	o ( 450m)	500m <sup>2</sup>	
T.RUAG RUANG CO.,LTD.	o	o ( 600m)	5,000 m <sup>2</sup>	100 m <sup>2</sup>
UNITED WATER WELL CONSTRUCTION	o	o ( 275m)	800 m <sup>2</sup>	
VIWAT TURBINE LTD., PARTNERSHIP	o	o ( 914m)	7,000 m <sup>2</sup>	3,500 m <sup>2</sup>
WELLCON HYDROLOGY CONSULTANT CO.,LTD.	o	o ( 300m)	3,500 m <sup>2</sup>	

## 7.2 Lao Contractors

In Vientiane, information of drilling contractors were collected. Few informations were obtained during the course of the study. Brochures or information obtained are as follows:

**Table 7.2 Drilling Contractors in Vientiane**

Name of Company	Drilling Rig		Capability
(1) STUDY SURVEY & DESIGN CENTER	UGB-50m	2	Drilling depth 50m in 10 inch diameter
	Mobile Drill	1	
	Acker Drill	1	
(2) HEC-HYDROPOWER ENGINEERING CO.	CRALIUS D900	1	Drilling depth 20 to 100 m with 3 to 7 inch diameter
	KOKEN KT150	1	
(3) GEO-MINING ENTERPRISE	SKB 4	2	Drilling for mining purpose up to 500m depth.
	UGB 50	3	
	Mindrill	1	
	Longyear	1	











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