TABLE 3.5-1

CLIMATIC DATA OF THE STUDY AREA

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Station
Rainfall (mm)	63.30	67.10	80.60	61.40	38.60	57.60	246.70	296.40	109.50	29.60	20.50	29.50	1,101.60	Rawalpindi
Rainfall (mm)	133.43	122.27	155.36	127.61	89.32	121.65	349.02	330.37	153.65	71.50	35.13	58.76	1,748.07	Murree
Temperature (°c) (Mean Daily)	9.9	12.2	17.2	22.7	27.7	31.6	29.9	28.8	27.2	22.7	16.5	11.2	21.5	Rawalpindi
Sunshine Hours (hours) (Mean Daily)	9.9	12.2	17.2	22.7	27.7	31.6	29.9	28.8	27.2	22.7	16.5	11.2	21.5	Rawalpindi
Wind Velocity (m/sec)	1.18	1.59	1.85	1.85	1.90	1.80	1.70	1.29	1.08	0.93	0.87	0.93	1.39	Rawalpindi
Relative Humudity (%)	70.9	69.4	64.9	54.2	41.2	41.6	63.9	74.1	69.3	62.9	66.2	70.5	61.6	Rawalpindi

* 1. Observation for the year 1954 - 1984
- . Rainfall (Rawalpindi)
- . Tempreature (Rawalpindi)
- . Relative humidity (Rawalpindi)

2. Ovservation for the year 1954 - 1983
- . Rainfall (Murree)
- . Wind Speed (Rawalpindi)
- . sunshine Hours (Rawalpindi)

TABLE 3.6-1 **MONTHLY MEAN DISCHARGE OF SOAN RIVER AT RAWALPINDI**

Drainage Area = 650 sq.miles (= 1,638.5km^2)

Month	Discharge in cusecs						cu.m/sec
	1960	1961	1962	1963	1964	Average	
January	591	837	40	115	924	521	14.7
February	263	373	198	251	233	264	7.5
March	459	165	275	236	153	258	7.3
April	430	856	142	170	164	352	10.0
May	78	112	87	135	107	104	2.9
June	53	74	88	62	95	74	2.1
July	2,270	1,690	1,040	1,280	3,981	2,052	58.1
August	2,440	2,410	2,650	3,190	2,031	2,544	72.0
September	694	3,000	545	1,630	435	1,261	35.7
October	306	378	127	138	133	216	6.1
November	94	259	164	140	100	15 2	4.3
December	85	170	184	255	108	160	4.5
Average	647	860	470	634	705	663	18.8
Runoff (cusec per square mile)	1.00	1.32	0.72	0.98	1.08	1.02	

Average for 5 years (1960-64) = 663 cusec = 18.8m^3/s = 593 x 10^{6}m^3/yr

Maximum instantaneous discharge = 90,000 cusecs on 7th August, 1956

Minimum daily discharge = 15 cusec on 11 and 15 May, 1953

Runoff coeffecient : $\frac{593 \times 10^6}{2,356.9 \times 10^6} = 25\%$

1 cusec = 0.0283 cu.m per sec.

Source: Geohydrology of the Federal Capital Area (Islamabad) West Pakistan, 1966, WAPDA

TABLE 3.6-2 **MONTHLY MEAN DISCHARGE OF SOAN RIVER AT CHARAH**

Drainage Area = 126 sq.miles (= 326km^2)

Month	Discharge in cusecs						cu.m/sec
	1960	1961	1962	1963	1964	Average	
January	-	261	16	10	237	131	3.7
February	-	141	27	62	63	73	2.1
March	-	404	97	115	22	160	4.5
April	(68)	303	40	29	27	100	2.8
May	(14)	34	12	18	20	21	0.6
June	(8)	32	8	6	4	13	0.4
July	(251)	502	287	377	347	378	10.7
August	(264)	741	440	506	803	623	17.6
September	(168)	861	124	361	540	472	13.4
October	(37)	118	14	13	39	46	1.2
November	(13)	56	27	13	7	26	0.7
December	(12)	26	29	9	7	18	0.5
Average	-	290	93	127	176	172	4.9
Runoff (cusec per square mile)	-	2.30	0.74	1.02	1.40	1.37	

Average for 4 years (1960-64) = 172 cusec = 4.9m^3/s = 155 x 10^{6}m^3/yr

Maximum instantaneous discharge = 33,100 cusecs on 8th August, 1961

Minimum daily discharge = zero cusec on 11 and 15 May, 1953

$$\text{Runoff coeffecient} : \frac{155 \times 10^6}{4{,}564 \times 10^6} = 34\%$$

1 cusec = 0.0283 cu.m per sec.

Source: Geohydrology of the Federal Capital Area (Islamabad) West Pakistan, 1966, WAPDA

TABLE 3.6-3 **MONTHLY MEAN DISCHARGE OF KURANG RIVER AT LOI BHER**

Drainage Area = 207 sq.miles (= 536km^2)

Month	Discharge in cusecs						cu.m/sec
	1960	1961	1962	1963	1964	Average	
January	-	151	79	59	-	96	2.7
February	(78)	60	84	83	-	76	2.2
March	(103)	41	102	78	-	74	2.3
April	(801)	104	62	59	-	75	2.1
May	(22)	36	48	54	-	46	1.3
June	(35)	30	43	38	-	37	1.0
July	(669)	720	133	444	-	432	12.2
August	(692)	725	215	1,178	-	706	20.0
September	(248)	1,649	130	633	-	804	22.8
October	(98)	109	68	69	-	82	8.2
November	(40)	94	69	66	-	76	2.2
December	(30)	81	91	69	-	80	2.3
Average	-	317	94	236		216	6.6
Runoff (cusec per square mile)	-	1.53	0.45	1.14	-	1.04	

Average for 3 years (1961-64) = 216 cusec = 6.11m^3/s = 192 x 10^{6}m^3/yr

Maximum instantaneous discharge = 51,500 cusecs on 23rd August, 1963

Minimum daily discharge = 15 cusec on 11 and 15 May, 1953

$$\text{Runoff coeffecient} : \frac{193 \times 10^6}{536 \times 1/4 \times 10^6} = 26\%$$

1 cusec = 0.0283 cu.m per sec.

Source: Geohydrology of the Federal Capital Area (Islamabad) West Pakistan, 1966, WAPDA

TABLE 3.6-4 **RESERVOIR OPERATION STATEMENT OF RAWAL DAM**

Year	Outflows (Canal)	Outflows (Spill)	Inflows		Storage	
1962/63	15,954	28,600	+48,487	-8,544	+14,688	-19,300
			39,943		-4,612	
1963/64	17,610	1,156	+29,930	-8,254	+24,562	-21,728
			21,676		2,836	
1964/65	13,796	45,814	+77,894	-6,620	+26,179	-13,996
			71,274		11,663	
1965/66	14,928	45,310	+46,692	-8,543	+5,012	-27,100
			38,149		-22,088	
1966/67	30,158	-	+44,401	-2,943	+26,287	-14,986
			41,458		11,301	
1967/68	25,616	38,336	+65,877	-3,05	+15,381	-16,487
			62,848		-1,106	
1968/69	35,318	32,692	+56,126	-4,567	+12,686	-29,237
			51,559		-16,551	
1969/70	27,358	-	+26,741	-7,065	+13,798	-21,477
			19,679		-7,689	
1970/71	27,472	3,796	+40,540	-5,860	+32,459	-29,047
			34,680		3,412	
1971/72	33,240	65,726	+102,641	-1,727	+23,172	-21,224
			100,914		1,948	
1972/73	22,733	-	+16,966	-2,417	+8,590	-16,763
			14,549		-8,175	
1973/74	33,552	23,922	+63,379	-5,239	+29,476	-26,790
			58,640		2,686	
1974/75	30,734	-	+29,819	-1,402	+21,485	-26,790
			28,417		-2,417	
1975/76	25,522	-	+55,627	-7,149	+42,839	-20,187
			48,478		22,652	
1976/77	29,602	98,041	+117,627	-3,213	+7,597	-20,539
			114,414		-12,942	
1977/78	30,084	30,926	+65,771	-3,213	+22,140	-20,592
			62,558		1,548	
1978/79	29,380	107,046	+149,385	-3,540	+22,910	-13,291
			145,845		9,619	
1979/80	35,425	-	+17,865	-1,343	+10,022	-26,680
			16,522		-16,658	

- continued -

Year	Outflows (Canal)	Outflows (Spill)	Inflows		Storage	
1980/81	34,425	30,302	+88,492	-3,068	+35,841	-14,644
			85,424		21,197	
1981/82	33,044	39,278	+76,530	-6,724	+18,881	-21,386
			69,806		-2,505	
1982/83	32,436	106,767	+142,838	-2,311	+12,254	-10,931
			+140,526		+1,323	
1983/84	22,563	89,368	+110,123	-3,208	+5,015	-21,022
			+106,915		-16,007	
1984/85	32,562	93,052	+125,661	-2,462	+17,926	-19,836
			+123,199		-1,910	
Total	644,713	880.132	+1,599,412	-102,463	-22,475	
Acre. feet	1,524,845		1,496,949			
m^3	795×10^6	$-1,086 \times 10^6$	$1,973 \times 10^6$		-126×10^6	
	$1,881 \times 10^6$		$1,846 \times 10^6$		$-(28 - 35) \times 10^6$	

23 years Average (AF)

Canal		Spill		Outflow		Storage		Inflow
28,000	+	38,300	=	66,300 (AF)	-	1,000	≒	65,100 (AF)
35×10^6	+	47×10^6	=	82×10^6	-	$1 \times 10^6 (m^3)$	≒	$80 \times 10^6 (m^3)$

Source: Small Dams Organization, Islamabad

TABLE 3.7-1

DISTRIBUTION AND CONDITIONS OF WELLS AND PONDS

Markaz	Sihala			Bhara Kau			Tarlai					Total
Union Council	Koral	Rawat	Sihala	Bhara Kau	Phulgran	Shah Allah Ditta	Kirpa	Tarlai Kalan	Sohan	Tamair	Charah	
1. Total Population	4,546	11,455	16,033	10,590	11,248	7,576	19,480	12,289	13,162	13,638	17,837	137,854
(a) Male	2,351	6,005	8,620	5,552	5,839	4,032	9,892	6,699	6,978	7,284	9,228	72,480
(b) Female	2,195	5,450	7,413	5,038	5,409	3,544	9,588	5,590	6,184	6,354	8,609	65,374
2. Total Wells (Nos)	59	70	105	77	61	10	135	99	174	44	129	963
(a) Depth (feet) (to bottom)	64	98	56	72	62	33	61	63	28	56	51	58
(b) Diameter (feet)	5.6	9.9	7.0	10.0	7.2	6.0	5.7	5.0	9.6	6.0	5.6	7.1
(c) Depth (feet) (to W.L.)	41	88	32	64	49	25	51	42	13	47	43	45
(d) In dry season												
-No Water (Nos)	1	27	12	24	20	0	29	9	2	15	38	177
-Scarce (Nos)	12	42	14	11	14	0	40	29	24	20	39	250
-Enough (Nos)	46	1	79	42	27	10	66	61	148	9	52	537
(e) Wells for Irrigation (Nos)	0	0	12	7	0	1	0	31	106	0	5	162
3. Total Ponds (Nos)	2	3	4	4	3	6	19	1	0	3	8	53
(a) Capacity/Depth	1,000GLN	0	0	0	0	-	2ft	2.5ft	0	2,000-3,000GLN	2.5ft	-
(b) Usage												
-Animal's Use (Nos)	2	3	4	4	3	6	17	1	0	3	8	51
-Irrigation (Nos)	0	0	0	0	0	0	0	0	0	0	0	0
-Others (Nos)	0	0	0	0	0	0	2	0	0	0	0	2
1./2. Population/wells	77	164	153	138	184	316	144	124	178	310	138	157

Source: Village Basic Facts Survey, LGRD, 1985

TABLE 3.7-2 OBSERVATIONS OF SHALLOW WELLS

UC	Water Level from ground surface (m)	Well Depth (m)	PH	Electric Conductivity (μS/cm) (25°C)	Water Temperature (°C)	Ammonia (ppm)
Koral	5.3	11.7	8.1	726	23.7	0.4-0.5
Rawat	5.7	10.3	8.4	911	25.6	0.4-0.5
Sihala	5.3	10.8	-	-	-	-
Bhara Kau	16.6	19.4	8.4	657	23.7	0.4-0.5
Phulgran	13.5	15.8	8.0	750	24.0	0.4-0.5
Shah Allah Ditta	11.9	18.1	8.3	685	23.5	0.4-0.5
Kipa	9.8	13.3	8.0	1069	24.2	0.4-0.5
Tarlai	5.7	11.0	7.9	753	24.2	0.4-0.5
Sohan	6.9	11.3	8.6	711	24.8	0.4-0.5
Tamair	9.8	13.6	9.6	996	25.3	0.4-0.5
Charoh	5.7	11.0	7.9	753	24.2	0.4-0.5
Average	9.3	12.9	8.2	857	24.5	0.4-0.5

TABLE 4-2-1 **ACHIEVEMENT OF SCHEMES UNDER THE PROGRAMS**

Sector	No. of Scheme	Physical Achievement	
Communication	55	- Metalled Road:	18.18km
		- Shingled Road:	12.20km
		- Katcha Road:	7.00km
		- Culvert & Causeways:	1.50km
		- Repair of Roads:	
Water Supply	98	Open Surface Completed	
Health and Sanitation	94	185,254 sq.ft (street pavement & drainage)	
Electrification	2	2 villages	
Purchase of Road Making Machinery		- Road Roller:	2
		- Tar Boiler:	5
Community Development		- UC Office Building:	3
		- Community Center:	8

TABLE 4.5-1 INFANT MORTALITY RATE IN ASIAN COUNTRIES

	1960	1982
Afghanistan	230	200
Bhutan	190	150
Nepal	190	150
India	170	120
Laos	150	120
Pakistan	160	120
Burma	160	100
Papua New Guinea	170	100
Indonesia	150	90
Viet Num	160	90
Philippines	110	50
Thailand	100	50
China	140	39
Sri Lanka	70	39
Korea (Rep. of)	80	30
Singapore	36	11
Japan	31	7

Note: Infant Motality Rate (IMR) = $\frac{\text{No. of dead baby (0-12 Months)}}{\text{1,000 live birth}}$

Source: The State of the World's Children, 1985 UNICEF

TABLE 4.5-2 **WOMEN EDUCATION CENTER**

No.	Name of the Village	Enrolment
1.	Tarlai	23
2.	Kirpa	25
3.	Panjgran	23
4.	Hummak (Niazian)	30
5.	Mughal	35
6.	Kijnah	32
7.	Shah Allah Ditta	21
8.	Rummaly	22
9.	Bhimbar Tarar	35
10.	Malot	24
11.	Pind Begwal	25
12.	Harno Thanda Pani	25
13.	Charah	18
14.	Koral	15
15.	Ali Pur (Farash)	25
16.	Jagiot	23
17.	Jhang Sayaddan	24
18.	Miana Thab	26
19.	Sarai Mahdoo	25
20.	Loi Bher	27
21.	Karmabad	26
22.	Jand Gran	16
23.	Malpur	25
24.	Khadrirpur	32
25.	Pind Malakan	34
26.	Sarai Khurbooza	29
27.	Gurah Mast	21
28.	Dara	26
29.	Johd	23
30.	Kot Hathial (Qaziabad)	26
31.	Rihara	10
	Total	771

Source: Ministry of Educaiton

TABLE 4.5-3 **VILLAGE LIST OF RURAL WOMEN'S DEVELOPMENT PROGRAM**

Tarlai Markaz		Bhara Kau Markaz		Sihala Markaz	
UC	Village	UC	Village	UC	Village
Tarlai	Tarlai Khurd	Bhara Kau	Kot Hathial	Sihala	*Gagri
				Sihala	Jandala
Tarlai	*Khana Dak	Bhara Kau	*Shah Darah	Rawat	*Rawat
Kirpa	Darwala	Shah A. Ditta	*Jori	Rawat	Hummak
Kirpa	Kirpa				
Kirpa	Gurah Mast	Shah A. Ditta	S. Allah Ditta	Koral	Pahg Panwal
		Shah A. Ditta	Talhar		
Charah	*Jagiot	Phulgran	Bobri	Koral	Boora Bangial
Tamair	Kijnah	Phulgran	Phulgran		
Tamair	Sihali				
Tamair	Maira Begwal				
Sohan	Sohan				
Charah	Muhrian				
Sohan	Jaba Teli				

Note: * Location for Women's Community Centres/Mohallah Schools/ Sanitation/Health and Nutrition/Women's economic activities.

Source: UNDP

TABLE 4.6-1 NUMBER OF PONDS AND USAGE

UC	No. of Ponds	Usage		
		Animal	Irrigation	Others
1. Koral	2	*1/	-	-
2. Rawat	3	*	-	*
3. Sihala	4	*	-	*
4. Bhara Kau	4	*	-	-
5. Phulgran	3	*	-	-
6. Shah Allah Ditta	19	*	-	*
7. Tarlai Kalan	6	*	-	*
8. Sohan	1	*	-	-
9. Kirpa	0	*	-	-
10. Tamair	3	*	-	-
11. Charah	8	*	-	-
Total	53			

1/ * marks indicate the usage.

Source: LGRD, IA

TABLE 4.6-2 **VILLAGE SCHOOL WORKSHOP**

No.	Name of the Village	Course	Enrolment
1.	Tarlai	Metal	8
2.	Kirpa	Wood	9
3.	Hummak (Niazian)	Wood	10
4.	Shah Allah Ditta	Wood	19
5.	Rummaly	Metal	10
6.	Bhimbar Tarar	Metal	12
7.	Koral	Masonry	10
8.	Miana Thab	Wood	10
9.	Sarai Mahdoo	Wood	10
10.	Karmabad	Wood	12
11.	Jand Gran	Wood	12
12.	Malpur	Wood	13
13.	Pind Malakan	Wood	10
14.	Sarai Khurbooza	Wood	10
15.	Dora	Masonry	11
16.	Johd	Wood	12
17.	Kot Hathial (Qaziabad)	Wood	11
18.	Rihara	Wood	11
19.	Bhara Kau	Wood	6
20.	Shah Darah Khurd	Metal	10
	Total		216

Source: Ministry of Education, 1985

TABLE 5.2-1 SOIL CLASSIFICATION OF THE STUDY AREA

Soil Groups/Land Types	Area (ha)	Proportion (%)	Mapping Code
1. Soils Derived from Alluvial Deposits	1,190	2.0	
Level to nearly level, deep, medium-textured soil derived from Soan River deposits	(270)	(0.5)	AS
Level to nearly level, deep, medium-textured soil derived from Kurang River deposits	(920)	(1.5)	AK
2. Soils Derived from Wind Deposits	13,490	22.7	
Nearly level, deep, fine-textured soil	(610)	(1.0)	LF
Level to nearly level, deep, medium-textured soil	(4,640)	(7.8)	LML
Gently sloping, deep, medium-textured soil	(8,240)	(13.8)	LMG
3. Soils Derived from Mountain Outwash Deposits	2,150	3.6	
Level to nearly level, deep, medium-textured soil	(2,150)	(3.6)	OM
4. Residual Soils	6,290	10.6	
Soil complex of gently sloping, moderately deep, medium to fine textured soils & shallow, coarse-textured soils	(6,290)	(10.6)	RS
5. Miscellaneous Land Types	36,380	61.1	
Rough broken land & stony land 1/	(12,710)	(21.4)	
Mountain & hilly area 2/	(18,370)	(30.9)	
Others 3/	(5,300)	(8.9)	
Study Area	59,500	100.0	

1/ Include culturable wasteland & unculturable wasteland in the plains.

2/ Include reserved forests

3/ Institutional area, industrial area & right-of-way

TABLE 5.4-1

CROPPING INTENSITY AND CROPPING PATTERN[1/]

	Rabi Crops						Kharif Crops							Annual
	Cropped Area (ha)					Cropping Intensity (%)	Cropped Area (ha)						Cropping Indensity (%)	Cropping Intensity (%)
Crop Year	Wheat	Oil Seeds	Others	Total	Fallow		Maize	Pulses	CEreals	Others	Total	Fallow		
1981/82	10,980	420	660	12,060	9,610	56	4,820	4,150	860	920	10,750	10,920	50	105
1982/83	10,940	440	810	12,190	9,480	56	4,400	4,220	890	850	10,360	11,310	48	104
1983/84	10,550	440	770	11,760	9,910	54	4,800	4,940	660	780	11,180	10,490	52	106
Average	10,820	430	750	12,000	9,670	55	4,670	4,440	800	850	10,760	10,910	50	105
Cropping Pattern 2/ (%)	50	2	4	55	45	-	22	21	4	4	50	50	-	-

1/ Based on data supplied by Land Revenue Department, IA and CDA. Total cultivated area under study is 21,670 ha because data on some villages in the Study Area are not available.

2/ Cropping pattern of each cropping season.

3/ Crops; Oil seeds - rape & mustard, pulses - mung & mash, cereals - sorhgum & millet
Others - vegetable, green fodder, gram, barley. etc.

TABLE 5.4-2 ESTIMATED CROPPING CONDITIONS IN THE STUDY AREA

1. Cropping Conditions

	Rabi	Kharif	Annual
Cropping Intensity (%)	55	50	105
Cropped Area (ha)1/	12,700	11,600	24,300

2. Cropping Pattern

	Rabi		Kharif		
	Cropping Pattern (%)	Cropped Area (ha)2/	Cropping Pattern (%)		Cropped Area (ha)2/
Wheat	90	11,400	Maize	43	5,000
Oil Seeds3/	4	500	Pulses5/	41	4,800
Others4/	6	600	Other Cereals6/	8	900
			Others4/	8	900
Total	100	12,700	Total	100	11,600

1/ Cropping intensity x Cultivated area in the Study Area (23,120 ha)

2/ Cropping pattern (%) x Cropped area for each cropping season (12,700 & 11,600 ha for rabi & kharif, respectively)

3/ Rape & mustard

4/ Vegetable, green fodders, etc. Vegetable cropped area is estimated at about 400 ha in both cropping seasons.

5/ Mung & mash

6/ Sorghum & millet

TABLE 5.4-3 CROP YIELDS IN THE STUDY AREA

(Unit: kg/ha)

	Wheat	Maize	Sorhgum	Millet	Mung	Mash	Oil Seeds
1. Arerage Yield1/							
1978/79	710	730	440	420	420	410	420
1979/80	1,070	720	440	370	420	420	460
1980/81	1,160	670	680	400	420	490	570
1981/82	940	690	440	250	420	530	500
1982/83	1,230	700	470	330	420	530	500
Average	1,020	700	490	350	420	480	490
2. Yield Survey2/							
1980/81	1,230	750	550	-	390	420	-
1981/82	1,380	850	640	-	410	470	-
1982/83	1,470	900	780	-	460	540	-
3. Inter-view	700-1,900	600-1,400	-	-	-	-	-
4. Poten-tial Yeild	5,000	4,000	1,500-3,000	-	1,500	1,400	2,000

1/ Average yield of the Study Area. 1978/79 & 1979/80 - average yield in Rawalpindi District. Other crop years - Averge yield of ICT. Source: Agricultural Statistics of Pakistan, 1979-1983.

2/ According to crop cut surveys by NARC.
Source: Agriculture Dept., IA

3/ Results of interview with farmers.

4/ Potential yield based on experimental data under recommended farming practices conducted by NARC.
Source: Crop Science Division, NARC etc.

TABLE 5.4-4 **AVERAGE YIELD OF WHEAT FROM 1973/74 TO 1982/83 (RAWALPINDI DISTRICT)**

	1973/74	74/75	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83
Average yield (kg/ha)	470	560	610	540	570	710	1,070	1,150	930	1,230
Improved variety (%)1/	16	19	22	23	9	11	58	50	74	95

1/ % of cropped area with improved varaieties (LYP-73, Pak-81, etc.); (Area under improved varieties ÷ total area under wheat) x 100

Source: Agricultural Statistics of Pakistan, 1974-1983

TABLE 5.5-1 NUMBER OF TRACTORS AND IMPLEMENTS OPERATING IN THE AREA

Items	Sihala	Bhara Kau	Tarlai	Total
Number of Tractor				
Private	82	20	101	203
Markaz hiring service	5	4	13	22
Total	87	24	114	225
Number of Seed Drill				
Private	46	2	1	49
Markaz hiring service	2	0	7	9
Total	48	2	8	58
Number of Thresher				
Private	61	9	51	121
Markaz hiring service	2	2	11	15
Total	63	11	62	136
Number of Bulldozer				
Private	0	0	0	0
Markaz hiring service	-	-	7	7
Total	0	0	7	7

TABLE 5.5-2 **NUMBER OF TRACTORS AND IMPLEMENTS AT EACH MARKAZ FOR HIRING SERVICES**

Items	Tarlai	Sihala	Bhara Kau	Total
TRACTOR				
Fiat 480 (48HP)	3	3	2	8
Fiat 466 (54HP)	1	0	0	1
Fiat 640 (64HP)	3	2	2	7
Fiat 666 (68HP)	1	0	0	1
Fiat 766 (78HP)	4	0	0	4
Fiat 9090 (90HP)	1	0	0	1
BULLDOZER				
Komatsu D-40A	6	0	0	6
Fiat Model 135	1	0	0	1
IMPLEMENTS				
Cultivator	13	5	4	22
Mould Board Plow	8	1	1	10
Chisel Plow	5	0	0	5
Disc Harrow	7	0	0	7
Teeth Harrow	2	0	0	2
Blade	8	2	1	11
Digger	3	1	1	5
Ridger	5	0	0	5
Seed Drill	3	2	0	5
Fertilizer Spreader	2	0	0	2
PTO Sprayer	1	0	0	1
Wheat Cutter (Reaper)	12	2	2	16
Thresher	11	2	2	15

TABLE 5.5-3 **HIRING SERVICE CHARGE AT MARKAZ**

Items	Fiat 480 (Rs/h)	Fiat 640 (Rs/h)	Komatsu D-40A (Rs/h)
1. with Cultivator	30	32	-
2. with Raja Plow	34	34	-
3. with Flont Blade	35	35	-
4. with Rear Blade	35	35	-
5. with Thresher	50	50	-
6. with Wheat Drill	40	40	-
7. with Trolly	45	45	-
8. Bulldozer	-	-	81

In September 1985, new big tractors were provided by Crop Maximization Project. The hiring service charges per hour for the new tractor are as follows;

Item	Fiat 466 (Rs/h)	Fiat 666 (Rs/h)	Fiat 766 (Rs/h)	Fiat 9090 (Rs/h)	Fiat 135 (Rs/h)
with Trailed Implements 1/	35	45	50	55	85
with PTO Driven Implements 2/	40	50	60	65	-

1/ Cultivator, Mould board plow, Tiller, Disc harrow, Weeder etc. - pulled implements.

2/ Rotary harrow, Rotary cultivator, Rotary hoe etc.

* service charge per hour for hiring private tractors with cultivator;

Fiat 480: Rs. 60/h

Fiat 640: Rs. 70/h

TABLE 5.6-1 PRESENT STATUS OF LIVESTOCK HOLDINGS IN THE STUDY AREA[1/]

Classification[2/]	Milk Animal		Draft-animal			Meat Purpose		Total	Poultry[5/]
Items	Cow	Buffaloe	Bull	Donkey	Others	Goat	Sheep		
Total No. of Animals	24,090	11,200	15,580	1,560	890	25,300	5,680	84,300	96,400
%	29	13	18	2	1	30	7	100	-
Adult Stocks[3/]	16,860	8,400	7,790	1,170	180	18,970	4,260	57,630	-
Young Stocks[3/]	7,230	2,800	7,790	390	710	6,330	1,420	26,670	-
Adult Cow Units[4/]	19,270	13,530	10,390	460	420	3,690	830	48,590	-

1/ Based on livestock census, 1980, conducted by Livestock and Dairy Development Dept., IA, "Status of Livestock Production and Heatlh in the District of Islamabad, PARC" and livestock census conducted by LGRD, 1985.

2/ Classification: classification based on major purposes of stocking animals.

3/ Number of adult and young stocks: based on following assumptions; ratio of adult stocks to young stocks; cow-7:3, bull-1:1, buffaloe, donkey, goat & sheep-3:1, others-1:4

4/ Calculated based on the following conversion factors:

No. of animals equivalent to one adult cow unit

	Adult Stock (head)	Young Stock (head)
Cow	1	3
Buffaloe	2/3	3
Goat & Sheep	6	12
Donkey	3	6
Others	1	3

5/ Not including poultry farms.

TABLE 5.6-2 MAJOR FEATURES OF LIVESTOCK SECTOR IN THE STUDY AREA[1/]

Total No. of Households	20,800	. . . .	①
No. of Farm Households[2/]	14,190	. . . .	②
No. of Farm Households Holding Livestock	12,830	. . . .	③
No. of Landless Livestock Holders	2,070	. . . .	④
No. of Households Holding Poultry	15,590	. . . .	⑤
Total No. of Livestock	84,300	. . . .	⑥
Total No. of Livestock (Adult Cow Units)	48,590	. . . .	⑦
Total No. of Poultry	96,400	. . . .	⑧
Total Cultivated Area (ha)	23,120	. . . .	⑨
-Percent of Farm Households Stocking Livestock to Total Households (%)	③ ÷ ①		62
-Percent of Farm Households Stocking Livestock to Total Farm Households (%)	③ ÷ ②		90
-Percent of Households Holding Poultry to Total Households (%)	⑤ ÷ ①		75
-Average No. of Livestock per Farm Household Holding Livestock (head/household)	⑥ ÷ ③		6.6
-Average No. of Livestock (Adult Cow Units) per Farm Household Holding Livestock (head/household)	⑦ ÷ ③		3.8
-Average No. of Poultry per Household Holding Poultry (birds/household)	⑧ ÷ ⑤		6.2
-Cultivated Area per Adult Cow Unit (ha/head)	⑨ ÷ ⑦		0.48

1/ Based on TABLE 5.6-1 and livestock census conducted by LGRD, 1985.

2/ Cultivator + Landless livestock holders.

TABLE 5.6-3 **LIVESTOCK HOLDINGS IN RAWALPINDI DISTRICT**[1/]

1. Livestock Holdings

Animals	No. of Holdings	No. of Farm Households[1/]	%[2/]
Cow	391,000	121,400	77
Buffaloe	126,000	64,800	41
Goat	335,000	100,000	63
Sheep	52,000	7,500	5
Draft Animals	145,000	72,500	46

Animals	Average No. of Holdings (head/household)	
	No. of Holdings[3/]	Adult Cow Unit
Cow	3.2 (2.1)	2.4
Buffaloe	1.9 (2.3)	2.1
Goat	3.3 (3.0)	0.3
Sheep	6.9 (3.8)	1.0
Draft Animals	2.0 -	-

2. Number of Draft-animals by Farm Size

Farm size (ha)	less than 1	1-2	2-5	5-10	larger than 10
No. of Draft-animals per Household (head)	1.5	1.6	2.1	2.5	3.0

3. Livestock Holding Size

Holding Size/Household (head)	Percent of Livestock Holders by Holding Size	
	Milk ls[4/]	Goat & Sheep
1 - 2	77	80
3 - 4	20	17
5 - 6	2	2
More than 7	1	1

1/ Include landless livestock holders

2/ Percent of farm households holding livestock to estimated total farm households in Rawalpindi District (158,000 households)

3/ ( ): average holding size of landless livestock holders

4/ Adult cow & buffaloe cow

Source: Pakistan Census of Agriculture, 1980

TABLE 5.6-4 **ESTIMATED NUTRIENT SUPPLIES FROM CULTIVATED AREA IN THE STUDY AREA**

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1. Nutrient Requirements for Maintenance of Livestock in the Study Area

Daily maintenance requirement of dry matter/adult cow unit	6.1kg 1/
Daily maintenance requirement of TDN/adult cow unit	2.7kg 1/
Daily maintenance requirement of DCP/adult cow unit	0.24kg 1/

Annual requirement of nutrition;

Dry matter: 6.1 kg/day x 365 days x 48,590 2/ ≒ 108,000 t

TDN: 2.7 kg/day x 365 days x 48,590 2/ ≒ 47,900 t

DCP: 0.24 kg/day x 365 days x 48,590 2/ ≒ 4,260 t

2. Annual Supplies of Dry Forages and Their Nutritional Value

Annual supplies of dry forages from cultivated area 3/

= 2 t/ha x 23,120 ha(total cultivated area) x 0.9 4/

≒ 41,600 t/year

Nutritional values of dry forages supplied from cultivated area 5/:

Dry matter = 41,600 t x 0.75 ≒ 31,200 t

TDN = 41,600 t x 0.35 ≒ 14,600t

DCP = 41,600 t x 0.015 ≒ 620 t

4. Supplies of Nutrient Requirements for Maintenance from Cultivated Area

Dry matter: 31,200t/108,000t x 100 ≒ 29%

TDN : 14,600t/47,900t x 100 ≒ 30%

DCP : 620t/4,260t x 100 ≒ 15%

1/ Based on : "Nutrient Requirement of Ruminants in Developing Countries, International Feedstuffs Institute, Utah State University, U.S.A."

2/ Number of livestocks in adult cow units in the Study Area

3/ Assuming that 2 t/ha of dry forages could be produced annually in cultivated area.

4/ Assuming about 90% of dry forages produced could be used for animal feeds.

5/ Average nutritional values of dry forages are assumed as follows; dry matter 75%, TDN 35% and DCP 1.5%

TABLE 5.7-1 PRODUCTION COST AND RETURN PER UNIT

	Wheat	Maize	Pulses	Sorghum (grain)	Cow	Buffaloe Cow	Goat
1. Yield/Production 2/	1.02	0.70	0.45	0.49	300	1,350	25
2. Unit Price (Rs) 3/	1,950	1,900	5,700	2,200	3.0	4.0	380
3. Gross Return (Rs/ha or head)	1,989	1,330	2,565	1,078	900	5,400	380
4. Production Cost (Rs/ha or head) 4/	1,926	1,218	1,008	1,016	1,460	2,190	110
5. Return from by-product (Rs/ha)	750	700	250	1,000	-	-	-
6. Net Return (Rs)	813	812	1,807	1,062	-560	3,210	270

1/ Estimated production cost and return per ha or per head of animal. Details are presented in Additional Information and Data Book.
2/ Unit: ton/ha for crops, milk production per year in kg for cow and buffaloe, annual weightgain in kg for goat.
3/ Estimated farm gate prices. Rs/ton for crops, Rs/kg for milk and Rs/head for goat of 25 kg weight.
4/ Without costing labour. Costs of farm machinery and draft animal are estimated on hiring basis. Only cost for feeds is included in production cost of livestock products.

TABLE 5.7-2 FARM INCOME FROM AGRICULTURE SECTOR BY FARM SIZE 1/

	Farm Size 1.0 ha	Farm Size 2.0 ha
1. Income from Crop Sector (Rs)2/		
Wheat	447	894
Maize	162	325
Pulses	361	723
Sorghum	106	212
Total	1,076	2,154
2. Income from Livestock Sector (Rs)3/		
Cow (1 head	-560	-560
Buffaloe (1 head)	3,210	3,210
Goat (3 heads)	810	810
Total (Income)	3,460	3,460
Cost of Feeding Young Animal (Rs)	1,100	1,100
Net Income	2,360	2,360
3. Farm Income from Agriculture Sector (Rs)	3,436	4,514

1/ Farm income from agriculture sector of owner farm household.Estimated based on TABLE 5.7-1. Details are presented in Annex.

2/ Assuming cropping intensity of 105% and cropping pattern of 55:20:20:10 to wheat: maize:pulses:sorghum, for all farm size.

3/ Assuming farm household stocking 1 adult cow, 1 adult buffaloe, 3 goats and 1 young stock of large milk animal, irrespect of farm size.

TABLE 5.7-3 TYPICAL FARM BUDGET1/

	Farm Size (1.0 ha)
1. Gross Income (Rs)	12,123
Gross Farm Income	10,123
Crop Sector	2,683
Livestock Sector	7,440
Other Income	2,000
2. Expenditures (Rs)	11,687
Farming Expenditures	6,687
Crop Sector	1,607
Livestock Sector	5,080
Living Expenses2/	5,000
3. Net Income (Capacity to pay)	436

1/ Farm budget of owner farm household

TABLE 5.10-1 **ADVANCEMENT OF CROP LOANS BY PUNJAB PROVINCIAL COOPERATIVE BANK**

(AS OF 23 MARCH, 1985)

Crop Season		Total Advance	Total Recovery	Balance/Recovery Ratio
		Rs.	Rs.	Rs. %
Rabi	1981-82	1,497,180	1,497,180	- /100.0
Kharif	1982	-	-	- / -
Rabi	1982-83	1,009,497	1,009,497	- /100.0
Karif	1983	1,476,903	1,476,903	- /100.0
Rabi	1983-84	2,719,230	2,709,807	9,423/ 99.7
Kharif	1984	2,370,200	2,310,200	60,000/ 97.5
Rabi	1984-85	3,950,664	123,066	3,827,598/ -

Source: Punjab Provincial Cooperative Bank, Rawalpindi Zonal Office

TABLE 5.10-2 **DISTRIBUTION OF COOPERATIVE SOCIETIES BY CLASS AND LOCALITY**

Class of Coop. Society	Tarlai Markaz	Sihala Markaz	Bhara Kau Markaz	Total
Thrift & Credit	33	14	16	63
Coop. Farming	-	2	-	2
M.P. Villlage Farmers 1/	3	1	-	4
Vegetable Growers	3	-	-	3
Poultry Breeding	1	-	-	1
Dairy Farming	-	1	-	1
Irrigation	1	-	3	4
Markaz Federation	1	1	-	2
Religious School	-	1	-	1
Total	42	20	19	81

1/ Multipurpose village farmers cooperative society, data are as of June, 1985

Source: Registration of Cooperative Sciety, Dept. of Cooperatives, IA

TABLE 5.10-3 **NO. OF DIFFERENT COOPERATIVE SOCIETIES IN ICT**

Class of Society	Urban Area	Rural Area	Total
1. Agriculture Related Societies			
1) Thrift & Credit	16	63	79
2) Coop. Farming	2	2	4
3) M.P. Village Farmers[1/]	-	4	4
4) Vegetable Growers	1	3	4
5) Poultry Breeding	-	1	1
6) Dairy Farming	-	1	1
7) Markaz Federation	-	2	2
Sub-Total	20	80	100
2. Non-agricultural Societies			
1) Housing	152	-	152
2) Multipurpose	7	-	7
3) Thrift and Saving	1	-	1
4) Finance	1	-	1
5) Religious School	1	1	2
6) Welfare	1	-	1
7) Muslim Development	2	-	2
Sub-Total	165	1	166
Total	185	81	266

[1/] Multipurpose village farmers cooperative society, data are as of June, 1985

Source: Registration of Cooperative Society, Dept. of Cooperatives, IA

TABLE 6.1-1 **GENERAL FEATURES OF PUNJAB BARANI TRACT**

1. Geographical Area (in million ha)

Punjab Barani Tract	7.53 (36.5% of Punjab)
Livestock Range	4.02 (53.4% of Tract)
Cultivated Area	3.20 (42.5% ")
Forest	0.31 (4.1% ")
Punjab Province	20.63
Pakistan	79.61

2. Population (1981 Census, in million)

Punjab Barani Tract	14.89 (31.6% of Punjab)
Urban Populaiton	3.46 (23.3% of Tract)
Rural Population	11.43 (76.7% ")
Punjab Province	47.12
Pakistan	83.78
Population Density (persons/km^2)	
Punjab Barani Tract	198
Punjab Province	228
Pakistan	105

3. Livestock Population (in 1980, in thousand heads)

	Cattle	Buffalo	Sheep	Goat
Punjab Barani Tract	3,091	1,630	2,063	2,854
(% of Punjab)	(33)	(19)	(33)	(39)
Punjab Province	9,254	8,687	6,309	7,305

4. Educational Institutions (in 1980-81, in numbers)

	Primary School	Middle School	High School
Panjab Barani Tract	11,532	1,212	728
(% of Punjab)	(33)	(37)	(41)
Punjab Province[1/]	34,692	3,311	1,767

5. Health Institutions (in 1982, in number)

	Hospitals	Dispensary	Rural Health Center
Punjab Barani Tract	68	342	53
(% of Punjab)	(33)	(28)	(46)
Punjab Province[1/]	203	1,212	114

[1/] Data from Punjab Development Statistics, 1981
Source: Punjab Barani Tract in Figures, ABAD, 1984

[redacted] [redacted]

UC / ITEMS#/	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Others
TAMAIR					D	e	A.B		E			c				e					
CHARAH	B	A	c	C.D	E								e								
KIRPA																					
Eastern	A	a	B	D	d			e		C											
Rockey zone	A	a	B.c	D.E								C.e									
Along Lehtrar Road	a.B	A	c	d						c	C	d.e	d.e	d.e				e		d.e	
Southern	A		a.B.c	C.D	E					b		C.e			e						
PHULGRAN																					
Northern	A.b	b		C.d.e	a		d	b	e					c.d.e							
Southern	A.B	E		C	A	D		B.e		d											Bridge Health Center
BHARA KAU																					
Mt. Area	A	*	B	C		E									D						*Reservoir
Plain	A		b	b.C.e	d			b						e	c						Veterinary Center
SHAH ALLAH DITTA																					
Northen Valley		c	d.e	B	A	c		d													Vehicles for Patients
Piedment	a.c		d	e	a.c	B				e					d						
TARLAI KALAN	a.B.c	A	b.C.d	c.D.e				d	e				e			c.d			e		Vegetable, Fruits, Flower
SOHAN	c				a	a.e	b	b	b		a	c		d			e	c		d	Bio-gas Plant
KORAL	A.b	d.e		b.c					e		a	b		C.d	c.d.e					e	
SIHALA																					
North of Soan R.	e					A		B	d				e			c			d		Bulldozer
South of Soan R.	A.B	d	C	e				b.c	b.c				d.c		E		E		b.c.D*		*Orchard Pasture Land
RAWAT	a.c.e	A.b	a.B.d			c	c		E	b	c		d				e	d		e	Seedling of Fodder-trees

#/ 1. Well & Water Supply, 2. Irrigation, 3. Machinery, 4. Livestock, 5. Road, 6. Electricity, 7. Seedlings, 8. School, 9. Post & Telephone, 10. Agr. Technical Guidance, 11. Vinyl House, 12. Suzuki Truck, 13. Sewage Works, 14. Coop. Poultry Farm, 15. Coop. Work Shop, 16. Fish Pond, 17. Community Center, 18. Flower Mill, 19. Land Consolidation, 20. Marketing Facility See Annex for further explanation.

TABLE 9.2-1

MULTIPURPOSE WATER USE

RIVER BASIN	LOCATION	NO.	POSSIBILITY OF WATER USE						NECESSITY OF ASSOCIATED WORKS					
			Irrigation	Livestock	Washing	Fishery	Minihydro	Forestry	Road (km)	Bridge (m)	Pump	Park	Blowoff	Gate
STORAGE DAM														
Kurang River	Sikrila	K-1	○	○	x	○	x	○	L=0.5	x	x	x	x	x
	Sikrila	K-2	○	x	x	△	○	x	x	○ L=90	○	x	○	○
Gumreh Kas	Athal	G-1	○	○	○	○	○	○	x	x	○	○	○	○
	Athal	G-2	△	x	x	x	x	x	x	x	○	x	○	x
	Siali	G-3	○	○	○	○	x	○	○ L=2.0	x	x	x	x	x
	Pind Begwal	G-4	○	○	○	x	x	○	○ L=3.0	○ L=20	○	○	x	x
	Muhrian	G-5	○	○	○	○	x	○	○ L=1.0	○ L=25	○	○	x	○
Malal Kas	Tamair	M-1	○	○	○	○	○	○	x	○ L=45	○	○	x	○
	Jhang Sayaddan	M-2	○	○	○	○	○	○	△ L=1.0	○ L=55	○	○	○	○
Hills and Mountains	Shah Allah Ditta	H-1	○	x	x	x	x	x	L=1.5	x	x	x	x	x
	Shah Darah	H-2	△	○	○	○	○	x	x	L=40	○	○	x	x
	Shah Darah	H-3	○	x	○	x	x	x	△ L=1.5	x	x	x	x	x
	Subhan	H-4	△	○	○	x	x	x	△ L=2.0	L=25	x	x	x	x
Soan River	Charah	S-1	○	○	○	○	○	x	L=1.5	x	○	○	○	○
CHANNEL STORAGE														
Kurang River	Khana Dak	Kc-1	○	○	○	x	x	○	x	○	x	x	○	○
	Dhok Ali Muhammad	Kc-2	○	○	○	○	○	○	○ L=0.1	○ L=50	○	○	○	x
Gumreh Kas	Kuri	Gc-1	○	○	○	x	x	○	x	○ L=50	○	x	○	○
	Tarlai Khurd	Gc-2	○	○	○	x	x	○	○ L=0.2	x	○	x	○	○
Nilan N.	Gokina	Nc-1	△	x	○	x	○	x	x	○ L=25	○	x	○	x
	Gokina	Nc-2	△	x	○	x	○	x	x	○ L=25	○	x	○	x

Note: Water use ○ Possible △ Difficult x Impossible
Associated works ○ Construction △ Improvement x Unnecessary

TABLE 9.2-2

FEATURES OF DAMS

Demarcation	Mark	Location	Catchment Area (km^2)	Total Capacity (m^3)	Design Flood Discharge (m^3/s)	Surcharge Head (m)	Water Depth (m)	Free Board (m)	Height of Dam (m)	Type
Kurang river	K-1	Sikrila	2.3	2,500,000	51	1.5	22	1.5	25.0	A
	K-2	Sikrila	137.0	11,000,000	1,875	6	34	2.0	37.0	B
Gumreh kas	G-1	Athal	5.7	80,000	129	2	10.5	1	12.0	C
	G-2	Athal	6.5	240,000	147	2	14	1	17.0	A
	G-3	Siali	13.2	1,200,000	298	2	18.5	1.5	22.0	A
	G-4	Pind Begwal	1.6	240,000	36	1	10	1	12.0	A
	G-5	Muhrian	2.0	135,000	45	1	8.7	1	10.0	C
Malal Kas	M-1	Tamair	10.9	300,000	246	3	11	1	15.0	A
	M-2	Jhang Sayaddan	55.0	500,00	833	4	13.5	1	15.0	C
Hills and Mountains	H-1	Shah Allah Dita	1.3	286,000	29	1	11	1	13.0	A
	H-2	Shah Darah	25.0	1,750,000	564	4	21.5	1.5	27.0	A
	H-3	Shah Darah	3.6	620,000	81	2	23.5	1.5	27.0	A
	H-4	Subhan	5.9	950,000	133	2	23.5	1.5	26.5	A
Soan River	S-1	Charah	175.0	7,500,000	1,752	6	30.5	1.5	32.0	B

TABLE 9.2-3

FEATURES OF WEIRS

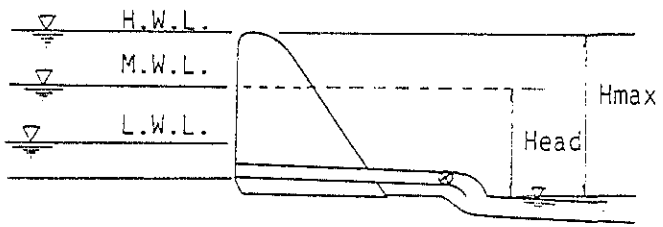
River's Name	Mark	Location	Catchment Area (km^2)	Length of Weir (m)	Height of Weir (m)	Storage Capacity	Weir type	Remarks
Kurang River	Kc-1	Khana Dak	300	100	2.5	40,000	Gated weir	Automatic
	Kc-2	Dhok Ali Muhammad	443	50	5.0	100,000	Fixed weir	-
Gumreh kas	Gc-1	Kuri	91	80	3.5	24,000	Gated weir	Automatic
	Gc-2	Shak Rial	125	60	2.5	9,000	Gated weir	Automatic
Nala Nilan	Nc-1	Gokina	13	30	4.0	7,000	Fixed weir	-
	Nc-2	Gokina	20	30	4.0	7,000	Fixed weir	-

TABLE 9.2-4

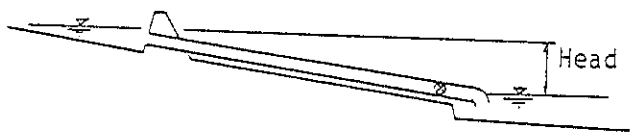
DEVELOPABLE ELECTRIC POWER

Demarcation	Mark	Location	Head He (m)	Discharge Q (m^3/s)	Power P (kw)	Type	Catchment Area (km^2)
Kurang River	K-2	Sakrila	20	0.7	103	Type A	137.0
Gumreh Kas	G-1	Athal	8	0.03	1.8	- do -	5.7
Malal Kas	M-1	Tamair	10	0.05	3.7	- do -	10.9
	M-2	Jhang Sayaddan	10	0.28	21	- do -	55.0
Hills and Mountains	H-2	Shah Darah	15	0.13	14	- do -	25.0
Soan River	S-1	Charah	20	0.88	129	- do -	175.0
Kurang River	Kc-2	Dhok Ali Muhammad	10	2.2	162	Type B	443.0
Nala Nilan	Nc-1	Gokina	5	0.07	2.6	- do -	13.0
	Nc-2	Gokina	5	0.10	3.7	- do -	20.0

TYPE A (DAM)



TYPE B (WEIR)



$P = 9.8 \cdot He \cdot Q \cdot e$

Where P : Power (kw)
He: Hear 9m)
Q : Discharge (m^3/s)
e : Efficiency 0.75

$Q = q \times A$

q : Unit discharge ($m^3/s/km^2$)
0.005 $m^3/s/km^2$
A : Catchment Area (km^2)

TABLE 11.4-1 **VEHICLE OF THE CDA FIRE BRIGADE**

Vehicle	Brand	Year	Remarks
Fire Tender	Leyland	1964	Approved for Disposal
"	Ford	1964	Off road since 1983
"	FIAT 13	1970	Approved for Disposal
"	Bedford	1973	"
Water Tanker	Dodge	1966	Disposed off
"	"	"	"
Rescue Platform	Ford	1966	
Fire Tender	Bedford	1982	

Source: CDA Fire Brigade, 1985

TABLE 14.1-1 **EFFECTIVE CAPACITY OF RESERVOIRS**

Demarcation	Mark	Location	Effective Capacity (m^3)	Effective Capacity A.F
Kurang River	K - 1	Sikrila	2,000,000	1,621
	K - 2	Sikrila	8,800,000	7,134
Gumreh Kas	G - 1	Athal	64,000	52
	G - 2	Athal	192,000	156
	G - 3	Siali	960,000	778
	G - 4	Pind Begwal	192,000	
	G - 5	Muhrian	108,000	88
Malal Kas	M - 1	Tamair	240,000	195
	M - 2	Jhang Sayaddan	400,000	324
Hills and Mountains	H - 1	Shah Allah Ditta	228,000	185
	H - 2	Shah Darah	1,400,000	1,135
	H - 3	Shah Darah	496,000	402
	H - 4	Subhan	760,000	616
Soan River	S - 1	Charah	6,000,000	4,864
Total			21,840,000	17,706

Note: Effective Capacity = 0.8 x Total Capacity

TABLE 14.1-2 **POSSIBLE WATER-INTAKE AT WEIRES**

Mark	Contributory Area (km^2)	Discharge (m^3/s)	Possible Water Intake (m^3/s)
Kc - 1	300	1.5	1.28
Kc - 2	143 (443)	0.72	0.61
Gc - 1	91	0.46	0.39
Gc - 2	34 (125)	0.17	0.14
Nc - 1	13	0.065	0.055
Nc - 2	7 (20)	0.035	0.03

Note: See Annex for detailed discharging quantity of Rivers.

TABLE 14.1-3 **TYPE OF PLACES TO BE BENEFITED**

	Mark	Place	Type
Reservoir by Dam	K - 1	Sikrila	C
	K - 2	Sikrila	C
	G - 1	Athal	A
	G - 2	Athal	C
	G - 3	Siali	C
	G - 4	Pind Begwal	A
	G - 5	Muhrian	A
	M - 1	Tamair	A
	M - 2	Jhang Sayaddan	C
	H - 1	Shah Allah Ditta	B
	H - 2	Shah Darah	B
	H - 3	Shah Darah	B
	H - 4	Shah Darah	B
	S - 1	Charah	C
Reservoir by Weir	Kc - 1	Khana Dak	A
	Kc - 2	Koral	A
	Gc - 1	Kuri	A
	Gc - 2	Tarlai Khurd	A
	Nc - 1	Gokina	B
	Nc - 2	Gokina	B

TABLE 14.1-4

CALCULATION SHEET OF PENMAN REFERENCE CROP ETO

Factor	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Note/Equation
T mean	°C	9.90	12.20	17.20	22.70	27.70	31.60	29.90	28.80	27.20	22.70	16.50	11.20	given data
RH mean	%	70.90	69.40	64.90	54.20	41.20	41.60	63.90	74.10	69.30	62.90	66.20	70.50	- do -
ea	mbar	12.30	14.20	19.60	27.60	37.20	46.50	42.20	39.60	36.10	27.60	18.80	13.30	
ed	mbar	8.70	9.90	12.70	15.00	15.30	19.30	27.00	29.30	25.00	17.40	12.40	9.40	ea x RH mean/100
(ea-ed)	mbar	3.60	4.30	6.90	12.60	21.90	27.20	15.20	10.30	11.10	10.20	6.40	3.90	(1)
u	km/day	102.00	137.00	160.00	160.00	164.00	156.00	147.00	111.00	93.00	80.00	75.00	80.00	
U_2	km/day	102.00	137.00	160.00	160.00	164.00	156.00	147.00	111.00	93.00	80.00	75.00	80.00	u at 2m Height
f (u)	-	0.55	0.64	0.70	0.70	0.71	0.69	0.67	0.57	0.52	0.49	0.47	0.49	0.27 (H u_2/100)
1-w	-	0.43	0.40	0.34	0.27	0.22	0.19	0.21	0.22	0.22	0.28	0.35	0.42	
(1-w)f(u)(ea-ed)	mm/day	0.85	1.10	1.64	2.38	3.42	3.57	2.14	1.29	1.27	1.40	0.90	0.80	(2)
Ra	mm/day	8.38	9.88	12.48	14.84	16.50	17.98	16.80	15.52	13.44	10.88	8.61	7.33	
n	hr/day	6.30	6.80	6.80	8.50	10.00	10.30	8.60	8.50	8.60	9.00	8.20	6.70	given data
N	hr/day	10.20	11.00	11.90	13.00	13.90	14.40	14.20	13.40	12.40	11.40	10.40	9.90	
Rs	mm/day	4.68	5.52	6.69	8.56	10.06	10.92	9.29	8.80	8.02	7.01	5.55	4.31	(0.25+0.50/N)Ra
Rns	mm/day	3.51	4.14	5.01	6.42	7.55	8.19	6.97	6.60	6.02	5.26	4.16	3.23	0.75Rs
f (T mean)	-	12.70	13.20	14.00	15.10	16.20	17.10	16.70	16.50	16.20	15.10	13.90	13.00	
f (ed)	-	0.21	0.20	0.18	0.17	0.17	0.15	0.11	0.10	0.12	0.16	0.19	0.21	$0.34-0.044\sqrt{ed}$
f (n/N)	-	0.66	0.66	0.61	0.69	0.75	0.74	0.65	0.67	0.72	0.81	0.81	0.71	0.1 + 0.9 n/N
Rnl	mm/day	1.76	1.74	1.54	1.77	2.07	1.90	1.19	1.11	1.40	1.96	2.14	1.85	f(T mean)·f(ed)·f(n/N)
Rn	mm/day	1.75	2.40	3.47	4.65	5.48	6.29	5.78	5.49	4.62	3.30	2.02	1.38	Rns - Rnl
W	-	0.57	0.60	0.66	0.73	0.78	0.81	0.79	0.78	0.78	0.72	0.65	0.58	1 - (1-w)
W·Rn	mm/day	1.00	1.44	2.29	3.39	4.27	5.09	4.57	4.28	3.60	2.38	1.31	0.80	(3)
ETo	mm/day	1.90	2.50	3.90	5.80	7.70	8.70	6.70	5.60	4.90	3.80	2.20	1.60	(2) + (3)

TABLE 14.1-5

IRRIGABLE AREA BY DAMS

Demarcation	Mark	Place	Effective Storage	Irrigable Area (ha)				Planned Crops	
				Wheat	Wheat	Vegetable	Fruit	Name of Crop	Irrigated Area
Kurang River	K - 1	Sikrila	2,000,000	240	481	144	130	Wheat (s)	481
	K - 2	Sikrila	8,800,000	1,059	2,118	635	572	Wheat (s)	2,118
Gumreh Kas	G - 1	Athal	64,000	8	15	5	4	Vegetable	5
	G - 2	Athal	192,000	23	46	14	12	Wheat (s)	46
	G - 3	Siali	960,000	116	231	69	62	Wheat (s)	231
	G - 4	Pind Begwal	192,000	23	46	13	12	Vegetable	14
	G - 5	Muhrian	108,000	13	26	8	7	Vegetable	8
Malal Kas	M - 1	Tamair	240,000	29	58	17	16	Vegetable	17
	M - 2	Jhang Sayaddan	400,000	48	96	29	26	Wheat (s)	96
Hills and Mountains	H - 1	Shah Allah Ditta	228,000	27	54	16	15	Fruit	15
	H - 2	Shah Darah	1,400,000	169	337	101	91	Fruit	91
	H - 3	Shah Darah	496,000	60	119	36	32	Fruit	32
	H - 4	Subhan	760,000	91	183	55	49	Fruit	49
Soan River	S - 1	Charah	6,000,000	722	1,444	433	390	Wheat (s)	1,444
Total			21,840,000	2,628	5,675	1,576	1,418	-	4,647

Note:

Wheat	3mm/day x 10,000m ÷ 0.65 x 6 month x 30 days =	8,307m^3/ha
Wheat (short)	3mm/day x 10,000m ÷ 0.65 x 10 month x 30 days =	4,154m^3/ha
Vegetable	3mm/day x 10,000m ÷ 0.65 x 10 month x 30 days =	13,846m^3/ha
Fruit	3.7mm/day x 10,000m ÷ 0.65 x 10 month x 30 days =	15,369m^3/ha

TABLE 14.1-6

IRRIGABLE AREA BY WEIRS

Mark	Contributary Area (km^2)	Nearby Farmland (1) (ha)	Possible Water-intake (2) (m^3/s)	Irrigable Area Based on (2) (ha)	Irrigable Area Based on (1) & (2) (ha)	Planned Crops
Kc - 1	300	3,700	1.28	2,415	2,415	Wheat
Kc - 2	143 (443)	1,430	0.61	1,150	1,150	Wheat
Gc - 1	91	100	0.39	735	100	Vegetable
Gc - 2	34 (125)	200	0.14	264	200	wheat
Nc - 1	13	20	0.055	104	20	Fruits
Nc - 2	7 (20)	20	0.03	57	20	Fruits

TABLE 14.1-7

WATER SUPPLY PLAN

Demarcation	Mark	Place	Irrigated Area (ha)	Design Discharge (m^3/s)	Canal Length (m)	Canal Diameter (m)	Pump Head	Pump Electric Power (kW)	Crops
Kurang River	K - 1	Sikrila	481	0.36	500	0.5	-	-	Wheat (s)
	K - 2	Sikrila	2,118	1.59	1,000	1.5	15	333.0	Wheat (s)
Gemreh Kas	G - 1	Athal	5	0.0075	200	0.1	20	2.1	Vegetable
	G - 2	Athal	46	0.035	2,000	0.25	-	-	Wheat (s)
	G - 3	Siali	231	0.173	1,500	0.5	-	-	Wheat (s)
	G - 4	Pind Begwal	14	0.021	-	-	10	2.9	Vegetable
	G - 5	Muhrian	8	0.012	-	-	25	4.2	Vegetable
Malal Kas	M - 1	Tamair	17	0.026	-	-	15	5.5	Vegetable
	M - 2	Jhang Sayaddan	96	0.072	-	-	10	10.0	Wheat (s)
Hills and Mountains	H - 1	Shah Allah Ditta	15	0.020	1,000	0.2	-	-	Fruit
	H - 2	Shah Darah	91	0.118	1,000	0.4	-	-	Fruit
	H - 3	Shah Darah	32	0.042	100	0.25	-	-	Fruit
	H - 4	Subhan	49	0.064	-	-	15	13.4	Fruit
Soan River	S - 1	Charah	500	0.375	-	-	15	78.0	Wheat (s)
			944	0.708	2,000	1.0	-	-	Wheat (s)
Kurang River	Kc - 1	Khana Dak	2,415	1.811	-	-	5	252.0	Wheat
	Kc - 2	Koral	1,150	0.86	-	-	5	121.0	Wheat
Gumreh Kas	Gc - 1	Kuri	100	0.15	-	-	2	4.2	Vegetable
	Gc - 2	Shak Rial	200	0.15	-	-	2	8.4	Wheat

Electric Power: $P = 0.233\ Q \cdot H \times 60$

Diamater : $D = \sqrt{\frac{4 \cdot Q}{\pi \cdot V}}$

Peak Water Requirement: Wheat = 0.126mm/month÷30÷86,400x10,000m²÷0.65
= 0.75ℓ/sec/ha

Vegetable = 0.259mm/month÷30÷86,400x10,000m²÷0.65
= 1.5ℓ/sec/ha

Fruit = 0.222mm/month÷30÷86,400x 10,000m²÷0.65
= 1.3ℓ/sec/ha

TABLE 14.1-8 **ELECTRIC POWER FOR IRRIGATION PUMPS**

Mark	Location	Demand for Pump (kW)	Supply from Mini-hydro Power Station (kW)	Supply from Other Source (kW)
K-2	Sikrila	333.0	103.0	230.0
G-1	Athal	2.1	1.8	0.3
G-4	Pind Begwal	2.9	-	2.9
G-5	Muhrian	4.2	-	4.2
M-1	Tamair	5.5	3.7	1.8
M-2	Jhang Sayaddan	10.0	21.0	-
H-2	Shah Darah	13.4	14.0	-
S-1	Charah	78.0	129.0	-
Kc-1	Khana Dak	127.0	-	252.0
Kc-2	Koral	60.0	162.0	-
Gc-1	Kuri	4.2	-	4.2
Gc-2	Shak Rial	4.2	-	8.4

TABLE 14.4-1

PROPOSED ROAD NETWORK - 1

	Sihala			Bhara kau			Tarlai					
Union Council	Koral	Rawat	Sihala	Bhara kau	Phulgran	S.A. Ditta	Kirpa	Tarlai Kalan	Sohan	Tamair	Charah	Total
Metalled Road												
Road Construction (km)	4.6	6.5	9.2	17.5	5.1	1.8	29.8	6.9	-	19.9	17.7	119.0
Road Improvement (km)	1.6	6.3	2.1	8.0	15.9	4.6	16.2	5.8	5.6	8.5	6.4	81.0
Sub-total Road (km)	6.2	12.8	11.3	25.5	21.0	6.4	46.0	12.7	5.6	28.4	24.1	200.0
Other Structures												
Bridge (No.)	1	-	-	-	-	-	2	-	-	-	1	4
Causeway (No.)	2	4	8	11	6	2	9	2	1	12	6	63
Culvert (No.)	4	8	16	20	10	5	20	5	2	20	12	122
Retaining Wall (m)	80	160	320	400	200	100	400	100	40	400	240	2,440
Drain (km)	6	13	11	26	21	6	46	13	6	28	24	200
Afforestation (No.)	1,200	2,600	2,200	5,200	4,200	1,200	9,200	2,600	1,200	5,600	4,800	40,000
Existing Metalled Road (km)	9.8	27.7	28.6	7.0	16.0	13.9	14.3	19.3	41.1	25.2	26.5	229.4
Metalled Road of CDA Programme (km)	-	-	2.0	3.4	2.0	-	-	4.0	12.8	-	-	24.2
Metalled Road of LGRD Programme (km)	-	-	-	(4.0)	-	-	(7.5)	-	-	-	(10.0)	(21.5)
Total Metalled Road (km)	16.0	40.5	41.9	35.9	39.0	20.3	60.3	36.0	59.5	53.6	50.6	453.6
Existing Katcha Road (km)	1.0	12.4	7.6	9.3	3.9	1.4	9.9	4.4	9.6	10.1	11.0	80.6
Total Road (km)	17.0	52.9	49.5	45.2	42.9	21.7	70.2	40.4	69.1	63.7	61.6	534.2

Note: Numbers in brackets are included in road length of construction/improvement.

TABLE 14.4-1

PROPOSED ROAD NETWORK - 2

	Sihala			Bhara kau			Tarlai					
Union Council	Koral	Rawat	Sihala	Bhara kau	Phulgran	S.A. Ditta	Kirpa	Tarlai Kalan	Sohan	Tamair	Charah	Total/ Average
(1) Total Road (km)	17.0	52.9	49.5	45.2	42.9	21.7	70.2	40.4	69.1	63.7	61.6	534.2
(2) Total Metalled Road (km)	16.0	40.5	41.9	35.9	39.0	20.3	60.3	36.0	59.5	53.6	50.6	453.6
(3) Proposed Road (km)	6.2	12.8	11.3	25.5	21.0	6.4	46.0	12.7	5.6	28.4	24.1	200.0
(4) Total Area (km^2)	19.0	48.6	49.8	59.8	48.7	85.2	66.9	24.8	30.7	103.7	57.8	595.0
(5) 2001 Estimate Total Populaiton	7,500 1/	18,800	26,300	17,400	18,400	12,400	31,900	20,100	21,600	22,300	29,200	225,900
(1)/(4) (km/km^2)	0.89	1.09	0.99	0.76	0.88	0.25	1.05	1.63	2.25	0.61	1.07	0.90
(2)/(4) (km/km^2)	0.84	0.83	0.84	0.60	0.80	0.24	0.90	1.45	1.94	0.52	0.88	0.76
(3)/(4) (km/km^2)	0.33	0.26	0.23	0.43	0.43	0.08	0.69	0.51	0.18	0.27	0.42	0.34
(1)/(5) (m/population)	2.27	2.81	1.88	2.60	2.33	1.75	2.20	2.01	3.20	2.86	2.11	2.36
(2)/(5) (m/population)	2.13	2.15	1.59	2.06	2.12	1.64	1.89	1.79	2.75	2.40	1.73	2.01
(3)/(5) (m/population)	0.83	0.68	0.43	1.47	1.14	0.52	1.44	0.63	0.26	1.27	0.83	0.88

1/ Rural population growth rate is estimated at 2.5%

TABLE 14.5-1 **FARM MECHANIZED SYSTEM OF AMS**

Work	Implement	
Fertilizing	Manure spreader, Broadcaster	
Plowing	Mould board plow, Disc plow	
Harrowing	Disc harrow, Rotary harrow	
Sowing	Drill seeder (Wheat)	Corn planter (Corn)
Inter-tilling	Cultivator	
Pest control	Knapsack sprayer	
Harvesting	Reaper (Wheat)	Manpower (Corn)
Threshing	Thresher	-
Transporting	Trailer	

TABLE 14.5-2 **REQUIRED NUMBER OF IMPLEMENTS AT AMS**

Implement	Nos. by Capacity	
Manure spreader	2t ---- 16 units	3t ---- 16 units
Broadcaster	260ℓ ---- 16 units	500ℓ ---- 16 units
Mould board plow	14" x 1 ---- 30 units	14" x 2 ---- 70 units
Disc harrow	18" x 16 ---- 30 units	18" x 20 ---- 70 units
Drill seeder	7 rows ---- 16 units	13 rows ---- 32 units
Corn planter	2 rows ---- 16 units	13 rows ---- 32 units
Cultivator	3 rows ---- 16 units	4 rows ---- 32 units
Sprayer	1.0 ~ 1.5HP	80 units
Reaper	cutting width 1200mm 42 units	
Trailer	2t ---- 16 units	3t ---- 32 units
Thiresher	300kg/H ---- 16 units	1200kg/H ---- 16 units

TABLE 14.6-1 (1)

PROPOSED FACILITIES AND EQUIPMENT FOR LIVESTOCK DEVELOPMENT PROMOTION SCHEME

Particulars	Quantity		Remarks
Livestock Development Pilot Farm	per Farm	Total (3 Farms)	
1. Buildings			
Animal Sheds	5 sheds	15 sheds	Cattle ched, Goat shed, etc.
Office Building	1 building	3 buildings	Including laboratory, verterinary room etc.
Forage Store & Workshop	1 building	3 buildings	
Garage	1 shed	3 sheds	Garage & farm machinery workshop
Staff Quater	6 building	18 buildings	Dormitory
2. Facilities			
Water Supply Facilities	1 set	3 sets	Water Supply for building, field and range land
Irrigation System	1 set	3 sets	1ha/farm sprinkler irrigation
3. Vechicle & Equipment			
3-1. Vehicle			
Vehicle	3 units	9 units	Jeep, Truck
Tractor	1 set	3 sets	Inlcuding trailor & attachments
3-2. Equipment			
Feed Grinder-mixer	1 unit	3 units	Capacity 2.8 m^3, tractor P.T.O. operation
Veterinary Equipment	1 set	3 sets	
Workshop Equipment	1 set	3 sets	
Other Equipment	1 set	3 sets	

TABLE 14.6-1 (2)

Particulars	Quantity		Remarks
4. Land & Field	per Farm	Total (3 Farms)	
4-1. Demonstration Field			
Demonstraion Field	2ha	6ha	Reclamation of wasteland
4-2. Range Land			
Range Land	20ha	60ha	Development of wasteland including fencing 2 km
4-3. Pilot Farm Site			
Pilot Farm Site	1.5ha	4.5ha	
5. Animals	44 heads	132 heads	Initial stage; cow, buffaloe, goat, etc
6. Land Requirements	23.5ha	70.5ha	Wasteland
Livestock Development Station	per Station		
1. Buildings			
Animal Sheds	10 sheds		Cattle shed, goat shed, etc.
Main Building	1 building		
AI & Veterinary Unit	1 building		Including laboratory & AI service room
Training Room	1 building		For 50 trainees
Store & Workshop	6 buildings		Forage store, garage, etc.
Trainee Quater	3 buildings		Dormitory, staff quarter, etc

TABLE 14.6-1 (3)

Particulars	Quantity	Remarks
	per Station	
2. Facilities		
2-1. Milking Parlour		
Milking Parlour	1 set	12 milker/set
Bulk Cooler	1 unit	Volume 2000 litter
2-2. Silo		
Steel Silo	2 units	Capacity 280m^3/unit
2-3. Other Faclilities		
Water Supply Facilities	1 set	
Irrigation System	1 set	2ha, sprinkler irrigaiton
3. Vechicle & Equipment		
3-1. Equipment		
Workshop Equipment	1 set	
Veterinary Equipment	1 set	Including laboratory equipment
AI Equipment	1 set	
Feed Grinder-mixer	1 unit	Capacity 2.8m^3/unit
Weighing Equipment	1 set	
Other Equipment	1 set	
3-2. Vehicle		
Vehicle	16 units	AI servicecar, truck, micro bus, etc.
Tractor	2 set	Including trailor & working machinery
Front Loader	1 unit	
Silage Wagon	1 unit	

TABLE 14.6-1 (4)

Particulars	Quantity	Remarks
	per Station	
4. Land & Field		
4-1. Demonstration Field		
Demonstration Field	5ha	Reclamation of wasteland
4-2. Range Land		
Range Land	50ha	Development of wasteland, including fencing 75km
4-3. Station Site		
Station Site	6ha	Reclamation of wasteland
5. Animals		Initial stage
Cow	110 heads	
Bull	7 heads	
Goat (Female)	110 heads	
Goat (Male)	10 heads	
Buffaloe Cow	10 heads	
Buffaloe	2 heads	
6. Land Requirements	61ha	Wasteland

Veterinary Hospital	per Hospital	Total (4 Hospitals)	
1. Buildings			
Hospital Building	1 building	4 buildings	
Animal Shed	1 shed	4 sheds	
Staff Quarter	1 building	4 buildings	Dormitory

TABLE 14.6-1 (5)

Particulars	Quantity		Remarks
	per Hospital	Total (4 Hospitals)	
2. Other Facilities			
Water Supply Facilities	1 set	4 sets	
Cattle Crash	1 unit	4 units	
3. Equipment & Vechicle			
Veterinary Equipment	1 set	4 sets	Including loboratory
AI Equipment	1 set	4 sets	
Other Equipment	1 set	4 sets	
Vehicle	2 units	8 units	Mobile veterinary unit, etc.
4. Hospital Site	2,000m^2	8,000m^2	
5. Land Requipments	0.2ha	0.8ha	
Veterinary Dispensary	per Dispensary	Total (5 Dispensaries)	
1. Buildings			
Dispensary Building	1 building	5 buildings	
Staff Quarter	1 building	5 buildings	Dormitory
2. Other Facilities			
Water Supply Facilities	1 set	5 sets	
Cattle Crash	1 unit	5 units	

TABLE 14.6-1 (6)

Particulars	Quantity		Remarks
	per Dispensary	Total (5 Dispensaries)	
3. Equipment & Vehicle			
Veterinary Equipment	1 set	5 sets	
Suzuki Van	1 unit	5 units	
Other Equipment	1 set	5 sets	
4. Dispensary Site	1,200m^2	6,000m^2	
5. Land Requirements	0.12ha	0.6ha	

TABLE 14.7-1 (1)

ROPOSED FACILITIES AND EQUIPMENT FOR INLAND FISHERY DEVELOPMENT SCHEME

Particulars	Quantity	Remarks
Fish Hatchery		
1. Pond/Tanks Complex		
1-1. Hatchery Pond Complex		
Brooder Fattening Tank	3 tanks	60m x 30m, depth 1.8m, unlined
Nursery Tank	2 tanks	ø7.5m, depth 1.5m, concrete lining
Nursery Tank	2 tanks	ø3.6m, depth 1.5m
Batch-lining Collectin Tank	2 tanks	9m x 6m, depth 1.8m
Raceway tank	1 tank	45m x 24m, depth 1.5m
1-2. Demonstration Ponds		
Large Size Pond	1 pond 0.4ha	
Medium Size Pond	1 pond 0.1ha	
Mini Size Pond	4 ponds $20m^2$ x 4	
2. Buildings		
Hatchery Office	1 building	Office-cum-laboratory
Overtank Shed	1 shed	
Single Room Hut	2 buildings	
Staff Quarter	2 buildings	Dormitory
3. Water Supply Facilities		
Water Supply Facilities	1 set	

TABLE 14.7-1 (2)

Particulars	Quantity	Remarks
4. Equipment & Vechicle		
Fishing Boat	5 units	
Mobile pumps	2 sets	
Hatchery Equipment	1 set	
Laboratory Equipment	1 set	
Other Equipment	1 set	
Vechicle	5 units	Fish seed transportation van, etc.
Jeep	1 unit	
5. Hatchery Site	3ha	
6. Land Requirements	3ha	

Village Community Pond	per Pond	Total (11 Ponds)	
Community Pond	1 pond 0.4 ha	11 ponds 4.4ha	80m x 50m, depth 1.5m
Water Supply Facilities	1 set	11sets	
Equipment & Tools	1 set	11 sets	

TABLE 14.9-1

PROPOSED FACILITIES AND EQUIPMENT FOR NURSERY STATIONS

Particulars	Quantity		Remarks
1. Nursery	per Station	Total (4 Stations)	
Nursery	0.5ha	2.0ha	
Irrigation System	1 set	4 sets	Sprinkler irrigation
2. Buildings & Others			
Station Office	1 building	4 buildings	
Work shop	1 shed	4 sheds	
Water Supply Facility	1 set	4 sets	
Tractor	1 set	4 sets	Include trailor & attachement

TABLE 15.2-1 COST ESTIMATES FOR 13 DEVELOPMENT SCHEMES

Project Description	Amount mln. Rs	Amount mln. Yen
1. Irrigation Scheme	792.31	10918.05
(a) Upper Kurang Irrigation Project	(293.41)	(4043.25)
K-1 area: 481 ha		
K-2 area: 2118 ha		
Kc-1 area: 2415 ha		
Kc-2 area: 1150 ha		
Gc-2 area: 200 ha		
Total: 6364 ha		
(b) Other Irrigation Schemes	(498.90)	(6874.80)
i) first priority sites (Component of MIRAD Project)		
G-3: 231 ha		
G-5: 8 ha		
M-1: 17 ha		
M-2: 96 ha		
Gc-1: 100 ha		
ii) second priority sites		
G-1: 5 ha		
G-2: 46 ha		
H-1: 15 ha		
H-3: 32 ha		
Nc-1: 20 ha		
Nc-2: 20 ha		
iii) other sites		
G-4: 14 ha		
H-2: 91 ha		
H-4: 49 ha		
S-1: 1444 ha		

(cont'd)

TABLE 15.2-1 COST ESTIMATES FOR 13 DEVELOPMENT SCHEMES

Project Description	Amount mln. Rs	Amount mln. Yen
2. Ground Water Multipurpose Development Scheme	251.46	3465.00
- 7 tubewells for irrigation and for water supply		
- 45 shallow wells for irrigation and water supply		
- 1 water catchment system in spring area (Shall Allah Ditta)		
- improvement of 200 existing wells		
3. Intensive Horticulture Promotion Scheme	254.01	3500.25
- construction of 5 units of farms and provision of farm machinery, solar pumps, irrigation system, etc.		
4. Transportation and Communication Improvement Scheme	310.16	4274.25
(a) Rural Transportation	(288.41)	(3974.25)
- construction and improvement of rural roads		
- construction of structure works such as bridges, causeways, culverts, retaining walls, side gutters and others		
(b) Rural Communication	(21.75)	(300.0)
- installation of telephone lines in Sihala, Humak and Bhara Kau stations		
5. Agricultural Machinery Station Scheme	207.41	2858.25
- construction of 1 main station, 2 substations, 10 tractor sheds and provision of agricultural machinery and equipment		

(cont'd)

TABLE 15.2-1 **COST ESTIMATES FOR 13 DEVELOPMENT SCHEMES**

Project Description	Amount mln. Rs	Amount mln. Yen
6. Livestock Development Promotion Scheme	195.56	2694.75
- construction of 3 pilot farms, 1 livestock station, 4 veterinary hospitals and 5 veterinary dispensaries, and provision of relevant machinery and equipment		
7. Inland Fishery Development Scheme	18.51	255.06
(a) Fish Hatchery	(14.79)	(203.91)
- construction of an office and fish hatchery facilities, and provision of relevant machinery and equipment including fishing boats, mobile pumps, vehicles and others		
(b) Village Community Ponds	(3.72)	(51.15)
- construction of 11 village community ponds and provision of facility, equipment and tools		
8. Village Environmental Improvement Scheme	633.92	8735.40
- improvement of access roads, inner-village roads and roads to fuel wood forest		
- development of fuel wood forest		
- pond and tree planting		
- recreation park development		
9. Land and Water Conservation Scheme	686.90	9465.30
- control of soil erosion from cultivated land		
- prevention of encroachment		
- conservation and utilization of culturable and unculturable wasteland		
- construction of 4 nursery stations		

(cont'd)

TABLE 15.2-1 COST ESTIMATES FOR 13 DEVELOPMENT SCHEMES

Project Description	Amount mln. Rs	Amount mln. Yen
10. Medical and Health Services Improvement Scheme	69.21	953.55
- construction of 3 rural health stations with maternity clinic, and provision of ambulance cars and medical equipment		
11. Manpower Development Scheme	887.84	12234.45
(a) Vocational School	(113.34)	(1561.95)
- construction of a vocational school and provision of related machinery and equipment		
(b) Primary Education Facility Improvement	(774.50)	(10672.50)
- construction of 46 two-room schools and 68 four-room schools and provision of educational equipment		
12. Small-scale Industry Development Scheme	51.00	702.90
(a) Gabion Factory	(23.42)	(322.80)
- construction of factory building and provision of machinery and equipment		
(b) Livestock Feed Factory		
- construction of factory building and provision of machinery and equipment		
(c) Match Factory	(18.61)	(256.50)
- building, machinery and equipment		
13. Rural Development Supporting Services Scheme	176.61	2433.60
- construction of 13 rural development stations		
Grand Total of 13 Development Schemes:	4534.89	62490.81

TABLE 17.2-1

TYPICAL FARM BUDGET
(1.0 ha Farm - Type "C" area)

	Present Condition (Rs)	Future Conditions: Without Project (Rs)	Future Conditions: With Project (Rs)
1. Gross Income	12,123	13,203	24,896
Farm income			
Wheat	1,094	1,641	4,680
Fodder	-	-	1,400
Vegetables	-	-	-
Maize	266	399	950
Pulses	513	513	1,283
Sorghum	108	108	1,283
By-product	702	702	2,350
Livestock income	7,440	7,440	12,450
Other income 1/	2,000	2,400	500
2. Expenditures	11,687	12,687	20,304
Farming expenditures			
Wheat	1,059	1,059	2,106
Fodder	-	-	420
Vegetables	-	-	-
Maize	244	244	475
Pulses	202	202	513
Sorghum	102	102	-
Livestock income	5,080	5,080	6,790
Living expenses	5,000	6,000	10,000
3. Net Income	436	516	4,592

Note: 1/ including non-farm income such as wages, trade profits, remittance from abroad, etc.

TABLE 17.2-2

TYPICAL FARM BUDGET
(1.0 ha Farm - Type "A" area)

	Present Condition (Rs)	Future Conditions: Without Project (Rs)	Future Conditions: With Project (Rs)
1. Gross Income	12,123	13,203	43,766
Farm income			
Wheat	1,094	1,641	1,706
Fodder	-	-	3,000
Vegetables	-	-	25,485
Maize	266	399	
Pulses	513	513	-
Sorghum	108	108	-
By-product	702	702	625
Livestock income	7,440	7,440	12,450
Other income 1/	2,000	2,400	500
2. Expenditures	11,687	12,687	31,240
Farming expenditures			
Wheat	1,059	1,059	682
Fodder	-	-	1,025
Vegetables	-	-	12,743
Maize	244	244	-
Pulses	202	202	-
Sorghum	102	102	-
Livestock expenditure	5,080	5,080	6,790
Living expenses	5,000	6,000	10,000
3. Net Income	436	516	12,526

Note: 1/ including non-farm income such as wages, trade profits, remittance from abroad, etc.

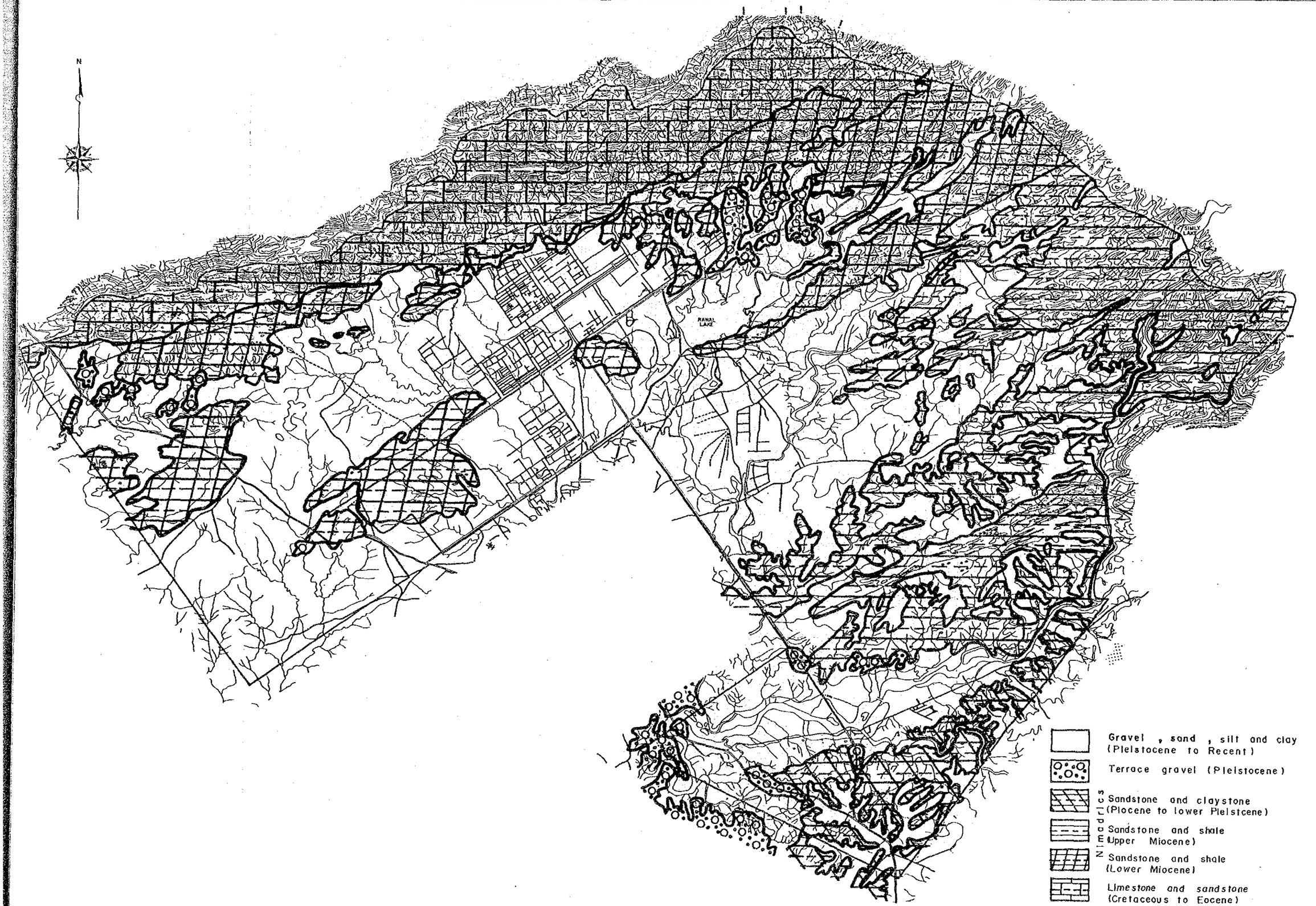


FIG. 3.2-1 **GEOLOGIC MAP OF ISLAMABAD AREA**

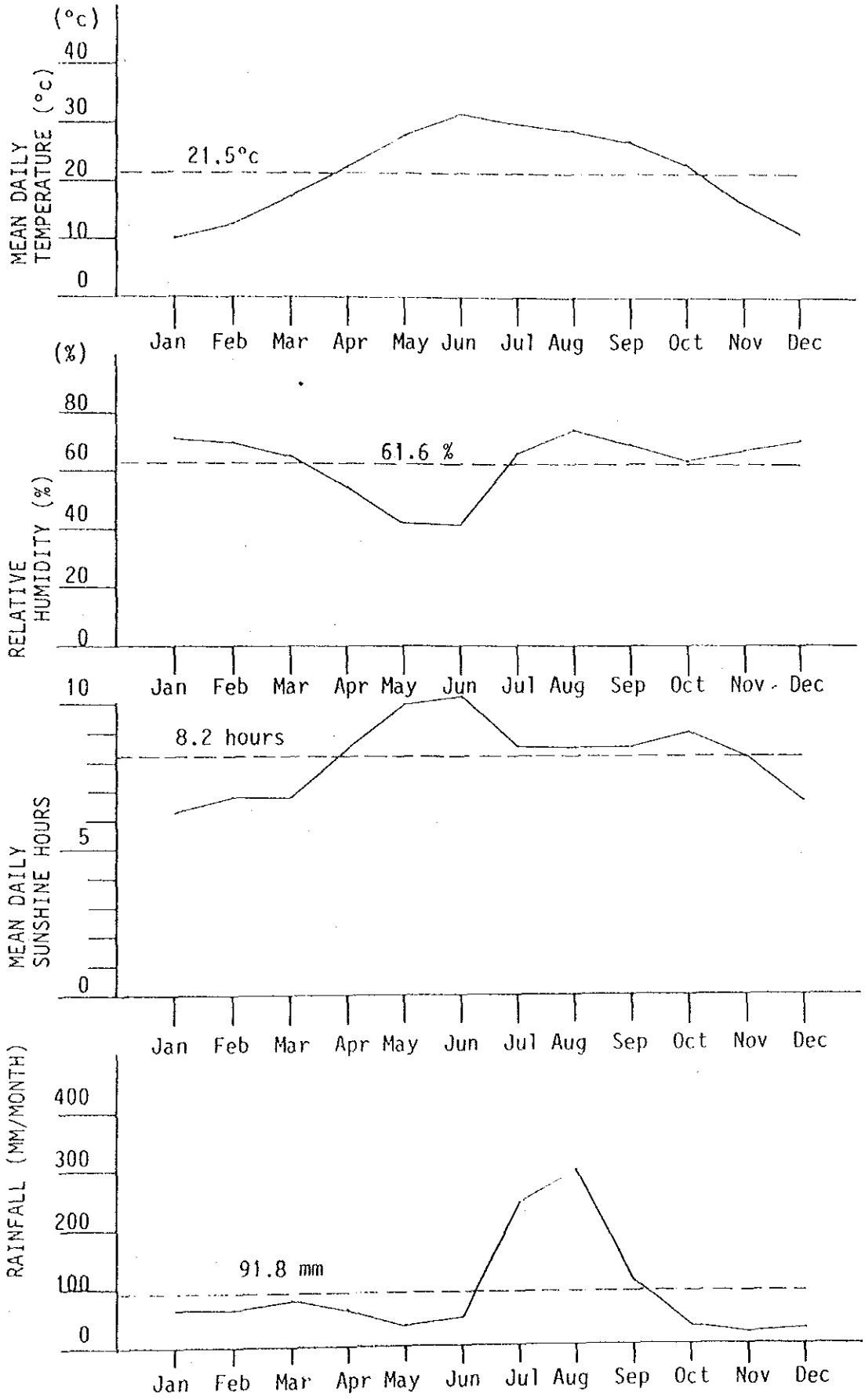
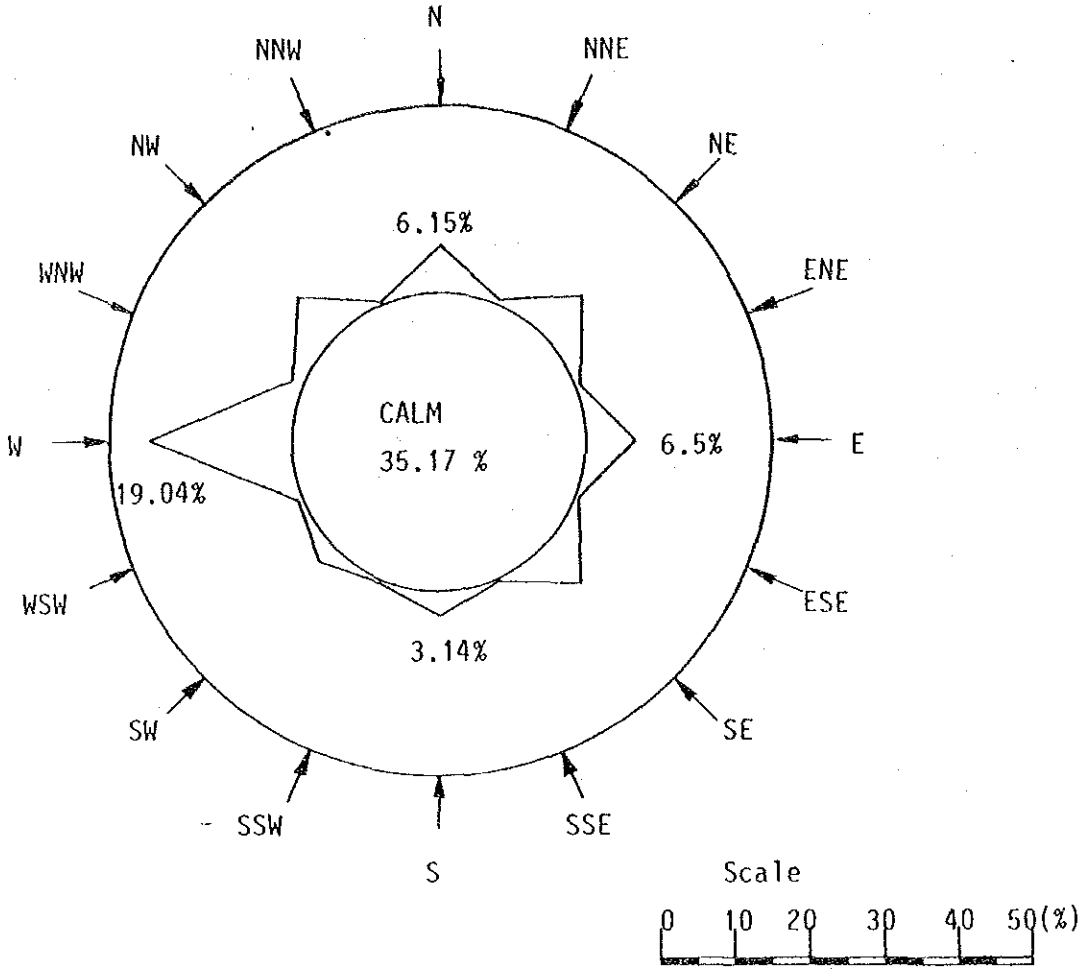


FIG. 3.5-1 **ANNUAL VARIATION OF METEOROLOGICAL ELEMENTS**

(Observation for the year 1954 - 1965)



	(%)		(%)		(%)		(%)
N	6.15	E	6.5	S	3.14	W	19.04
NNE	0.71	ESE	0.77	SSW	0.14	WNW	1.26
NE	7.45	SE	7.21	SW	2.9	NW	7.24
ENE	0.54	SSE	0.46	WSW	0.59	NNW	0.53

FIG. 3.5-2 **WIND DIRECTION FREQUENCIES (OBSERVAITON FOR THE YEARS 1954-1965)**

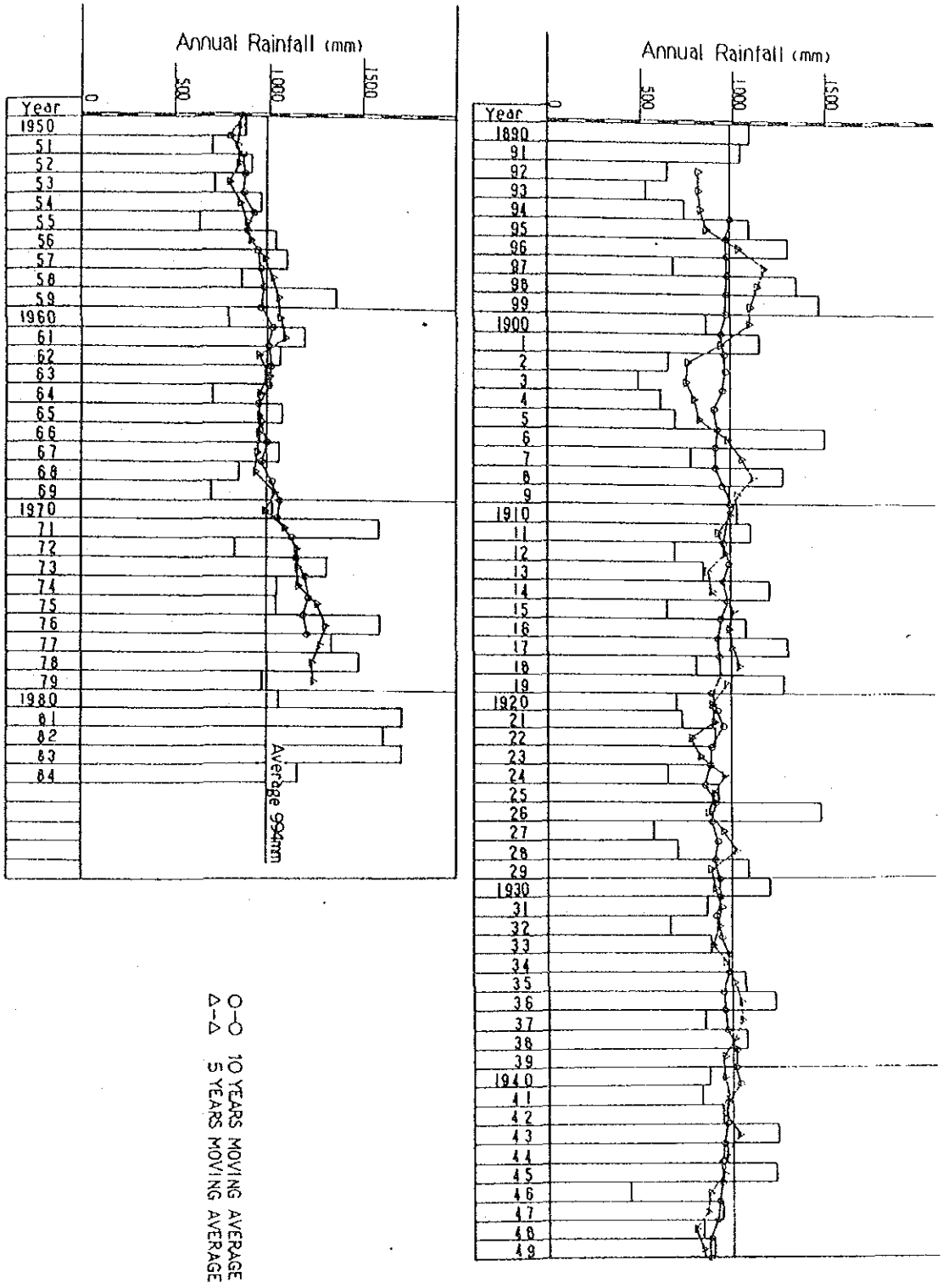


FIG. 3.6-1 SECULAR VARIATION OF RAINFALL
(FROM 1890 TO 1984 IN LAI NULLAH - RAWALPINDI)

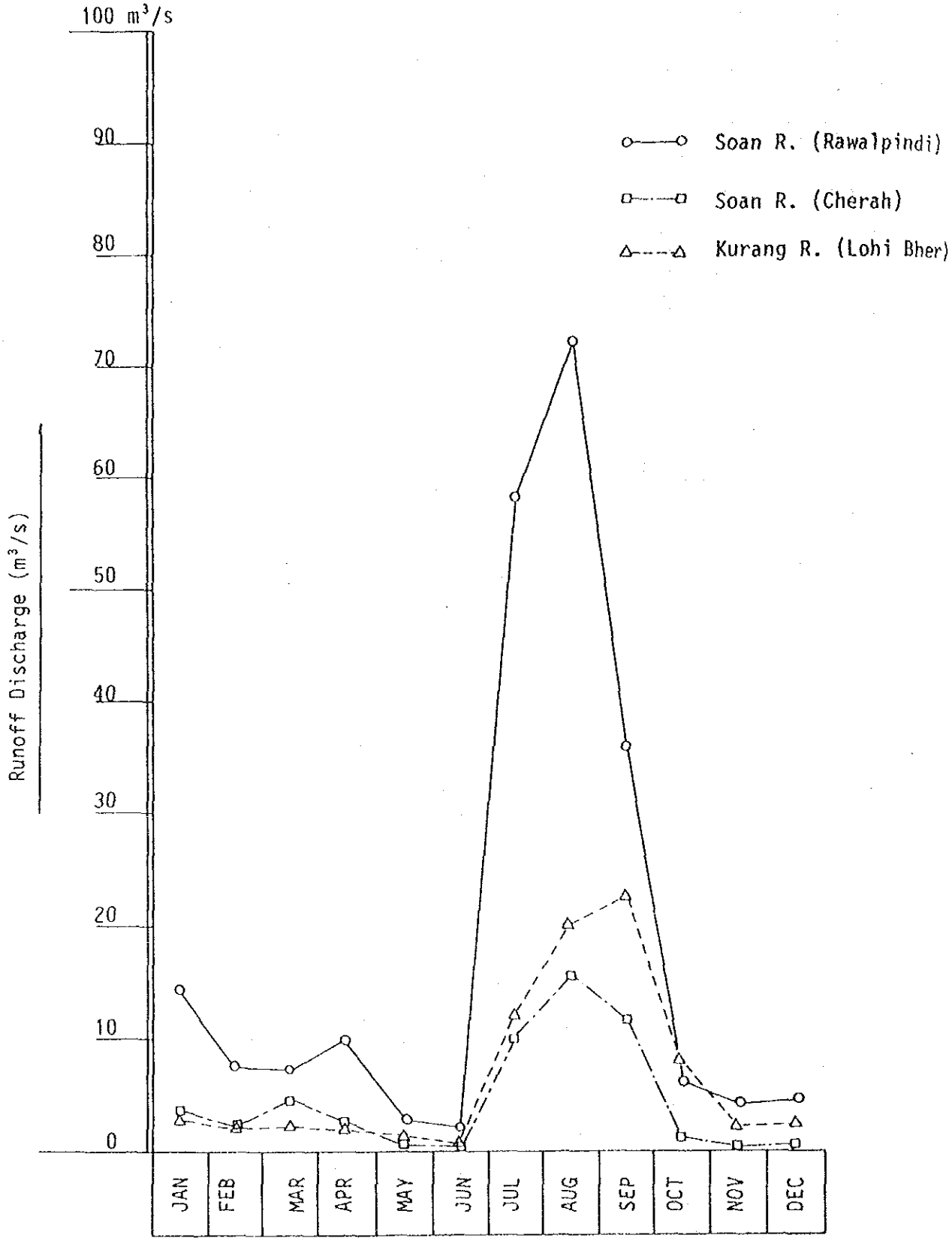


FIG. 3.6-2 MONTHLY RUNOFF DISCHARGE

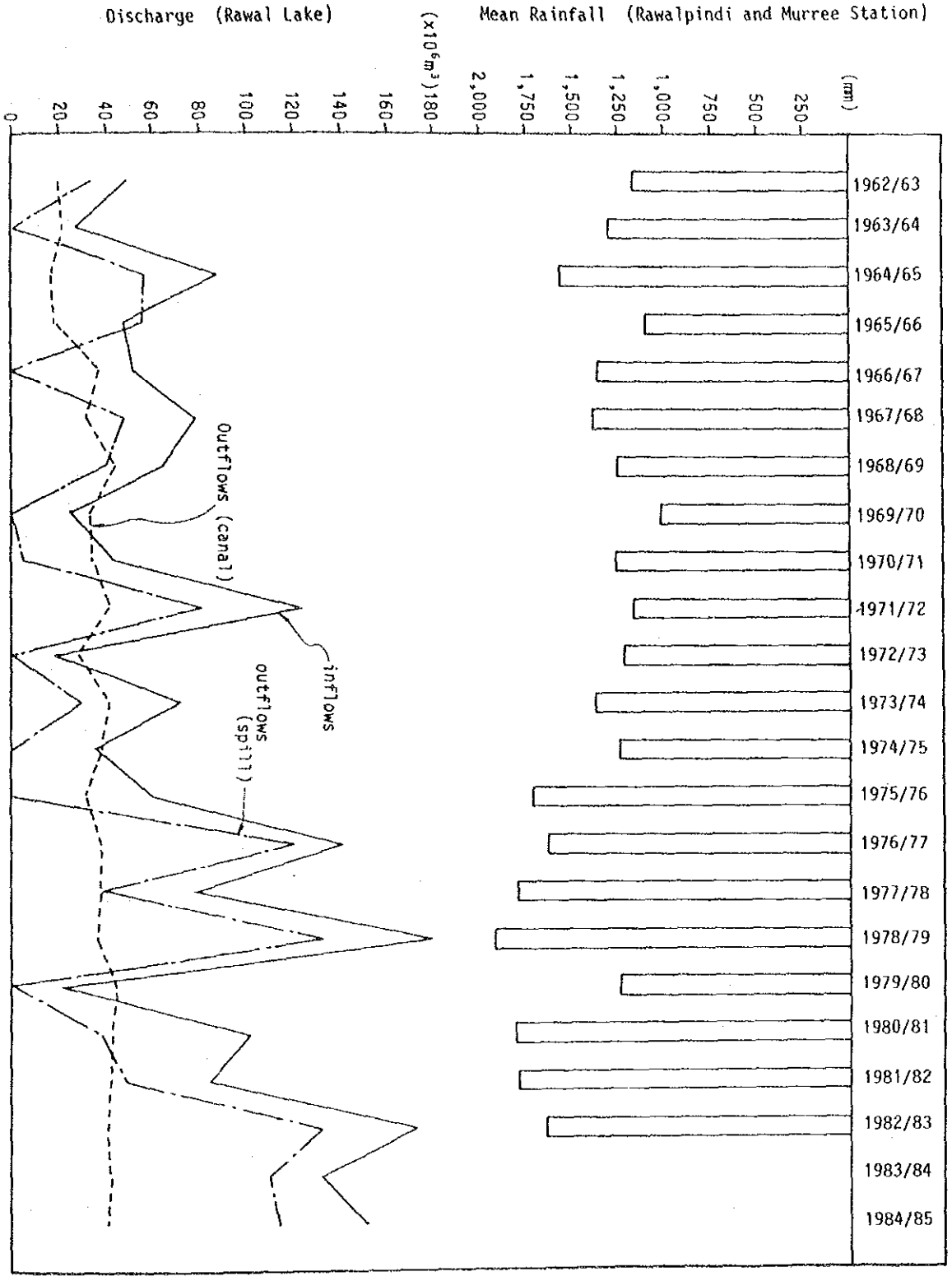


FIG. 3.6-3 **RELATION OF DISCHARGE (RAWAL DAM) AND RAINFALL**

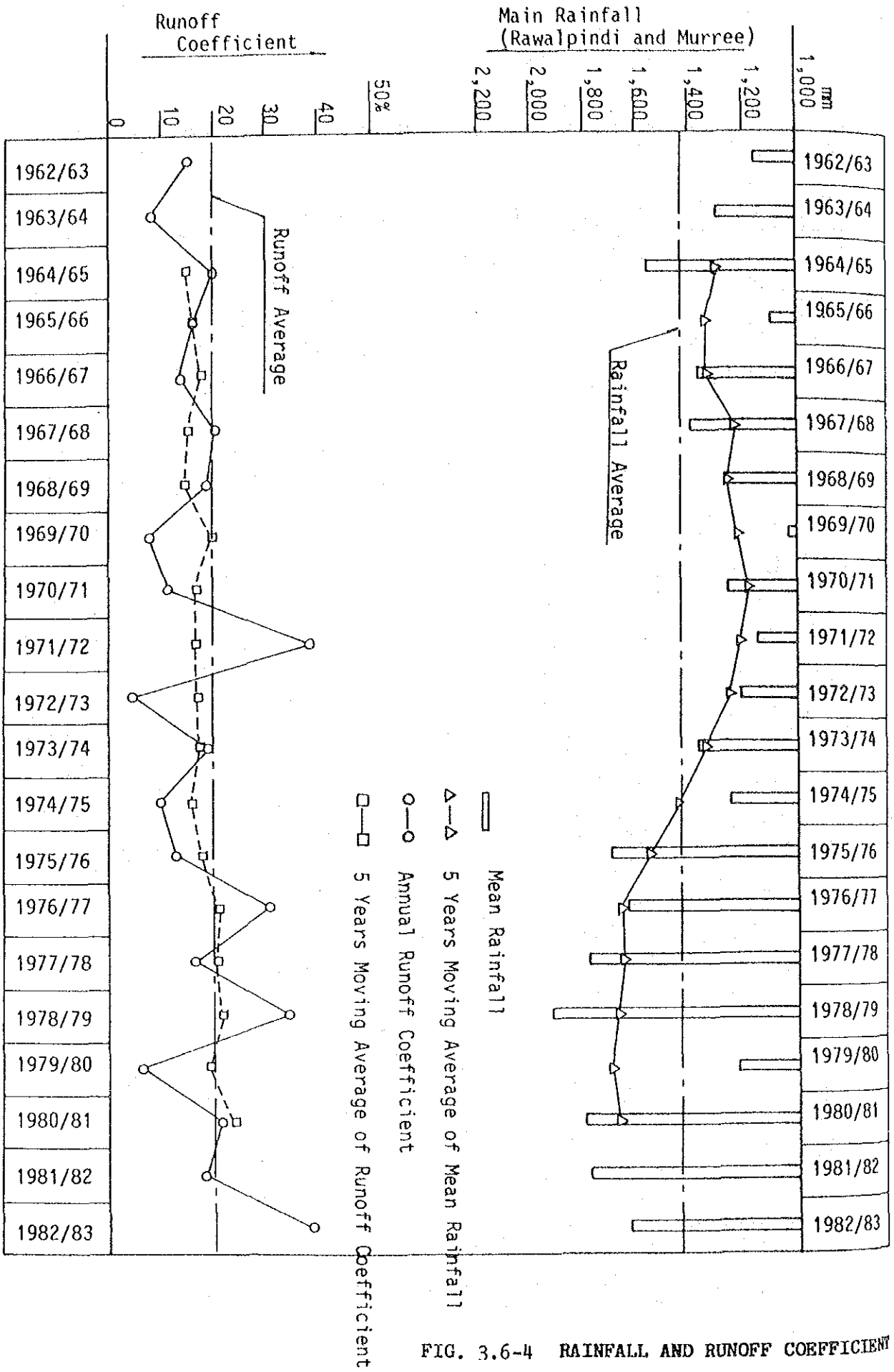


FIG. 3.6-4 RAINFALL AND RUNOFF COEFFICIENT

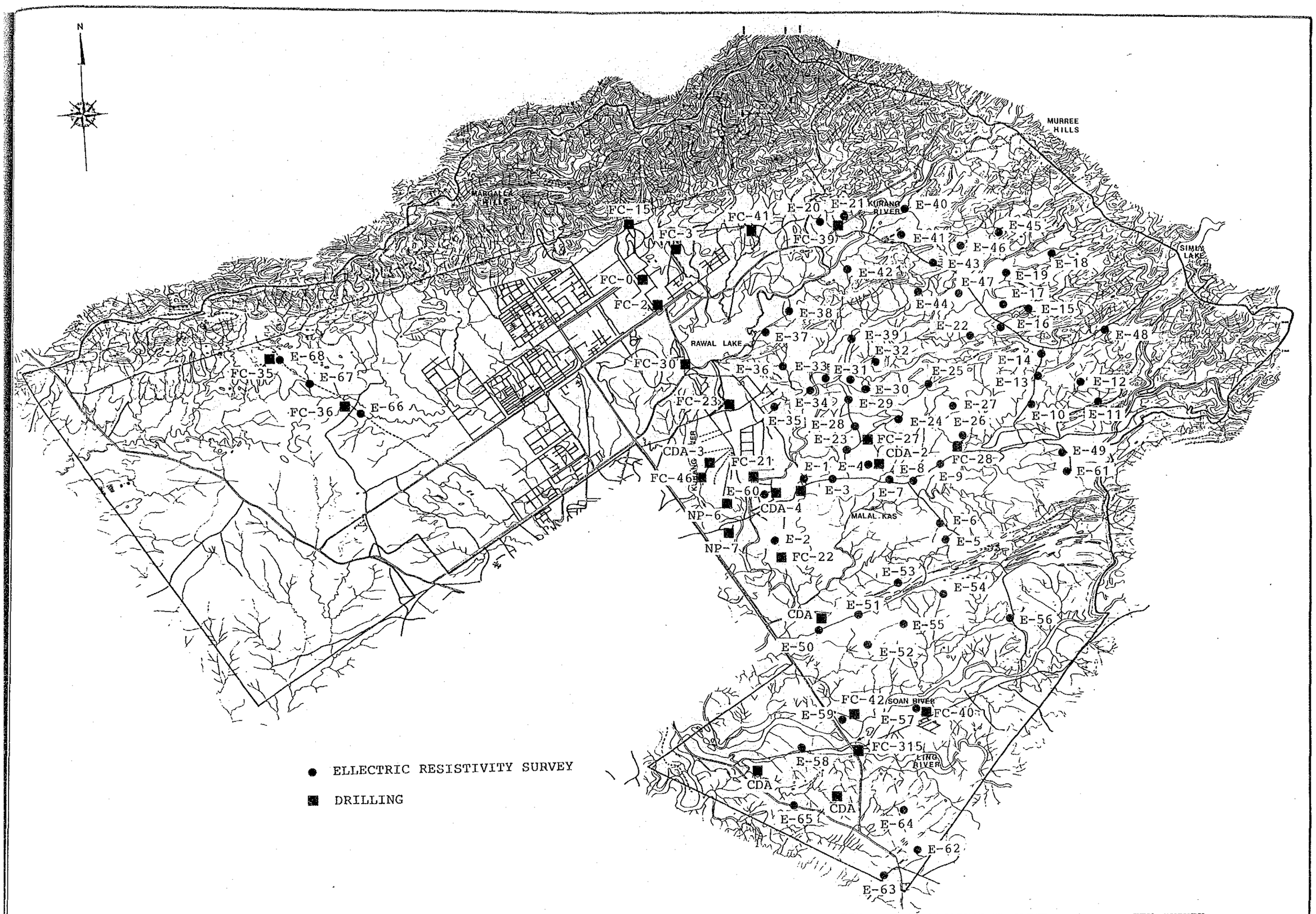


FIG. 3.7-1 LOCATION OF ELECTRIC RESISTIVITY SURVEY

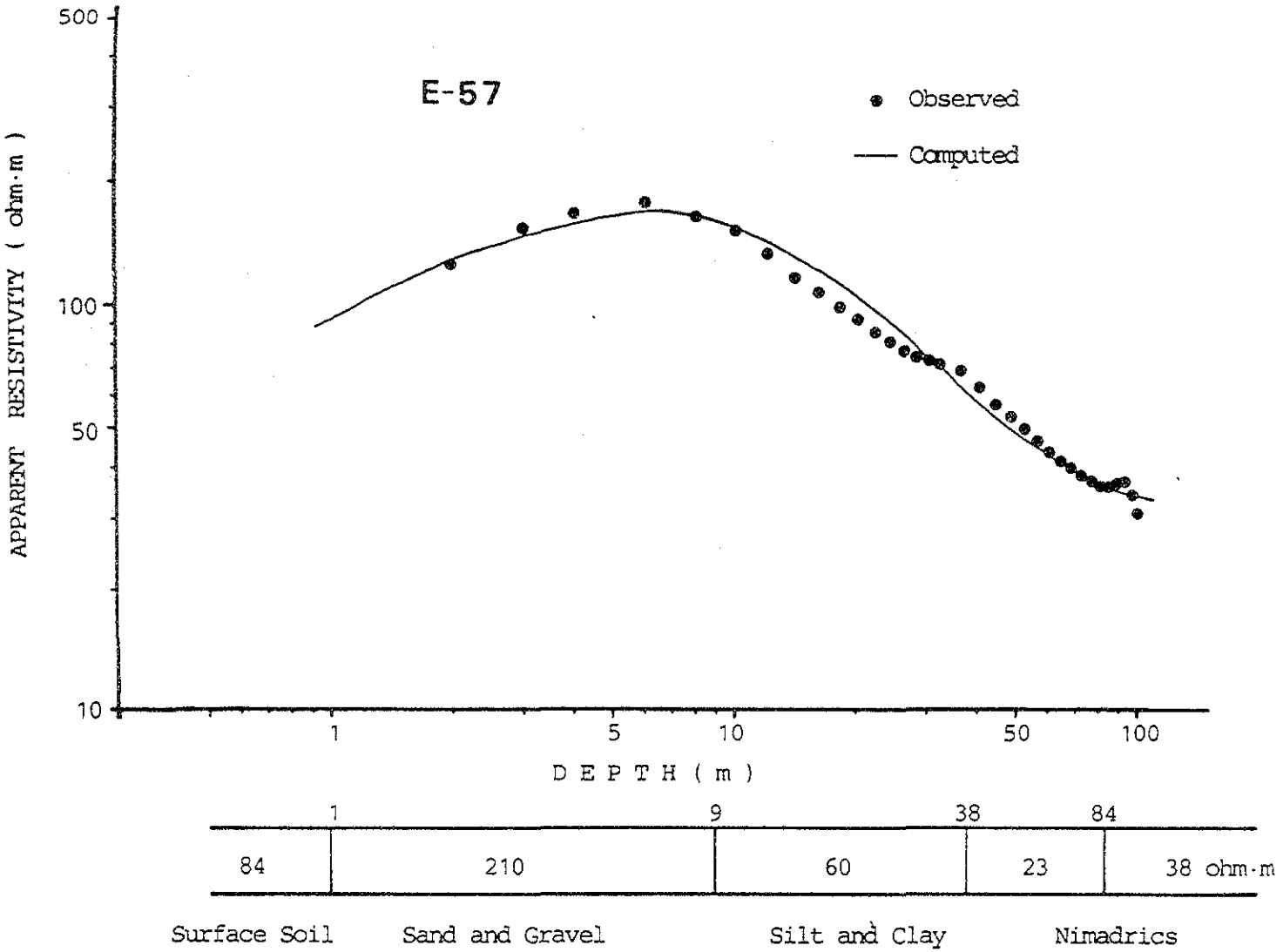


FIG. 3.7-2 ANALYSED RESULT OF AN APPARENT REISTIVITY DEPTH CURVE

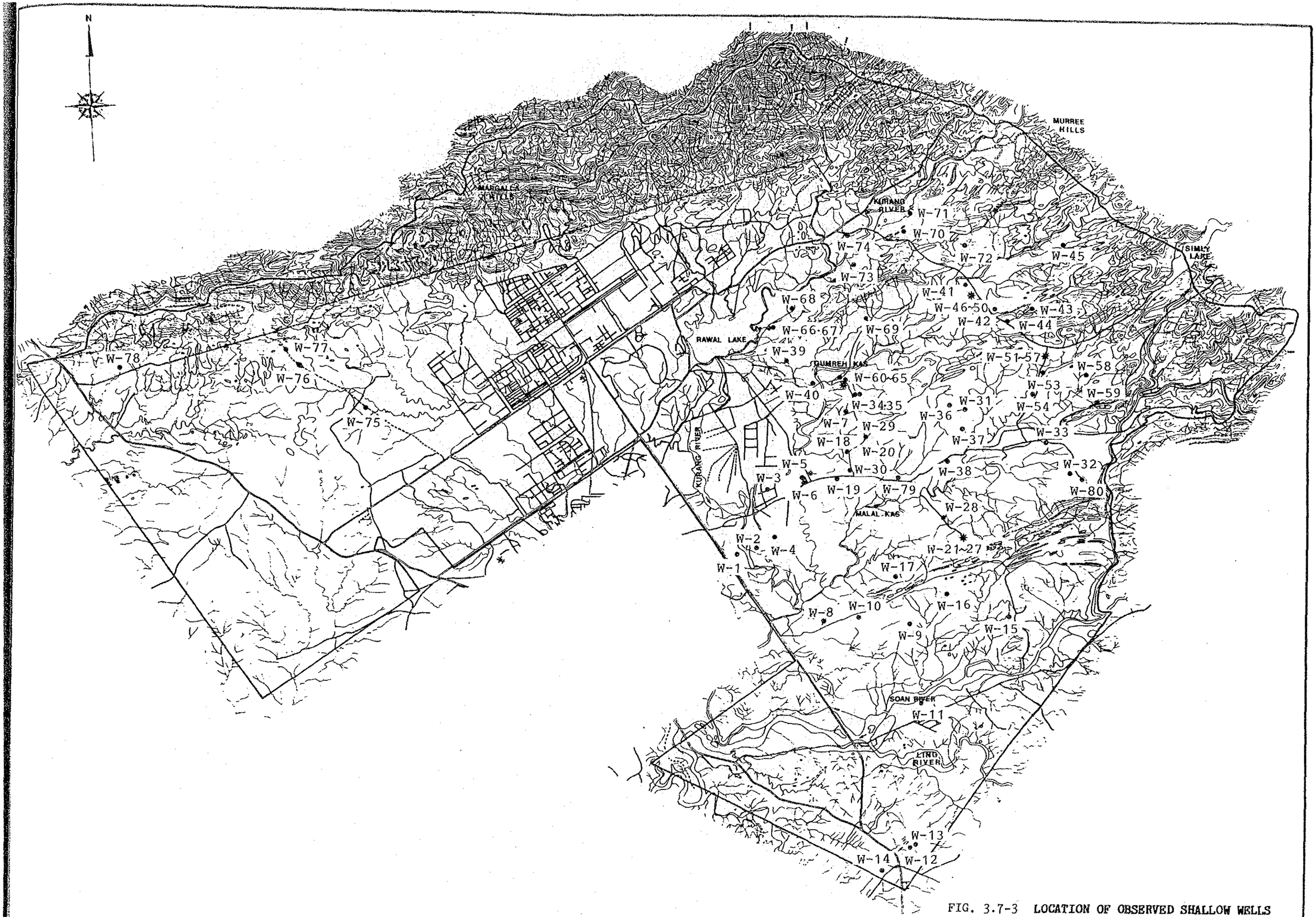


FIG. 3.7-3 LOCATION OF OBSERVED SHALLOW WELLS

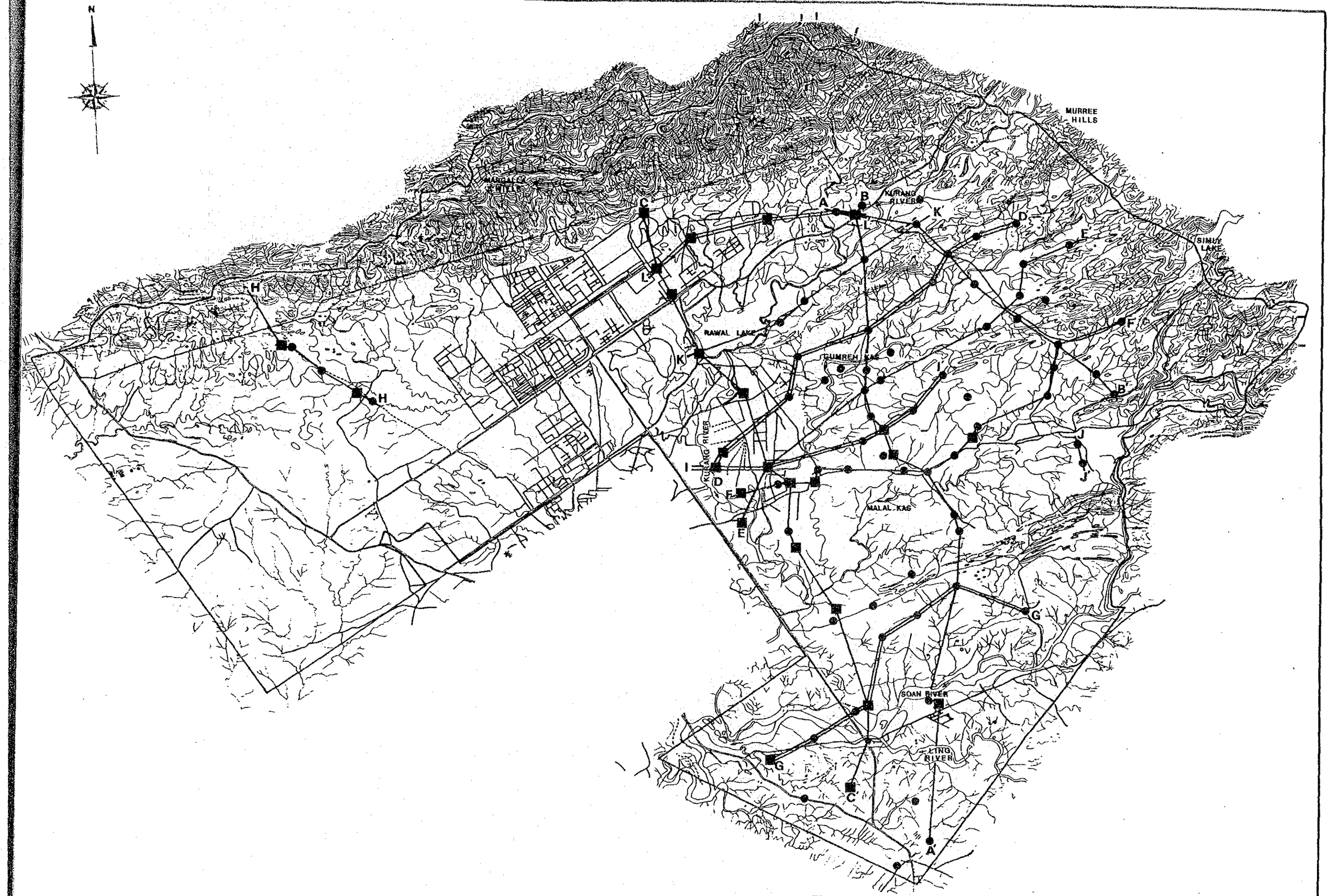


FIG. 3.7-4 LOCATION OF CRASS SECTIONS OF HYDROGEOLOGIC STRUCTURE

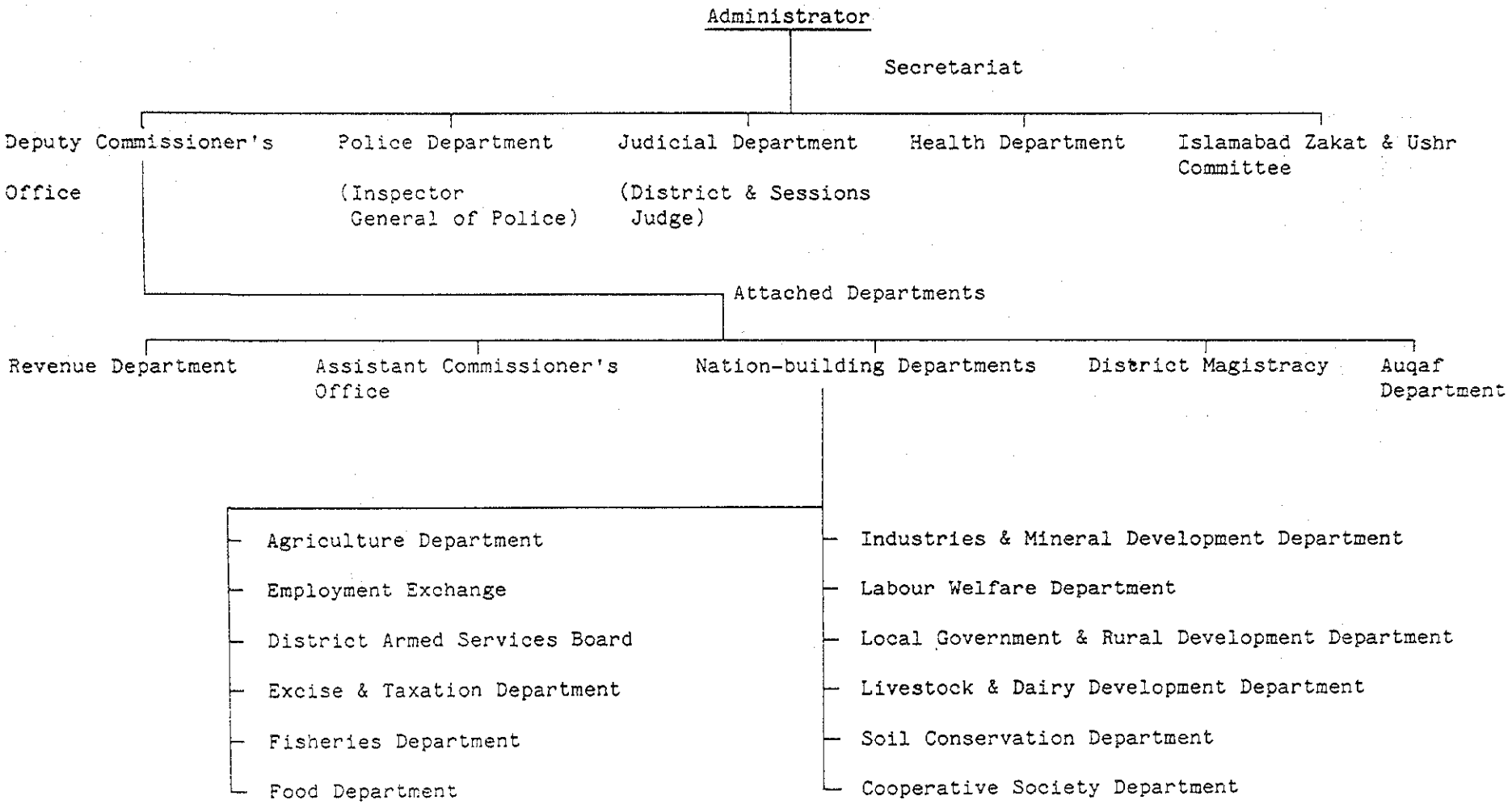


FIG. 4.1-1 ORGANIZATION CHART - ISLAMABAD ADMINISTRATION

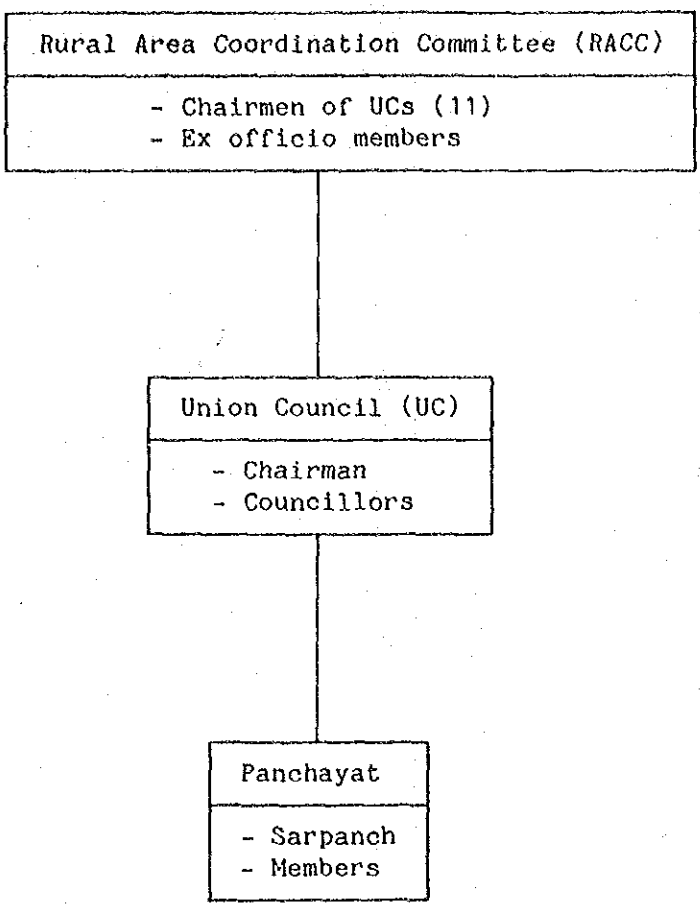


FIG. 4.1-2 *LOCAL GOVERNMENT SYSTEM OF ICT*

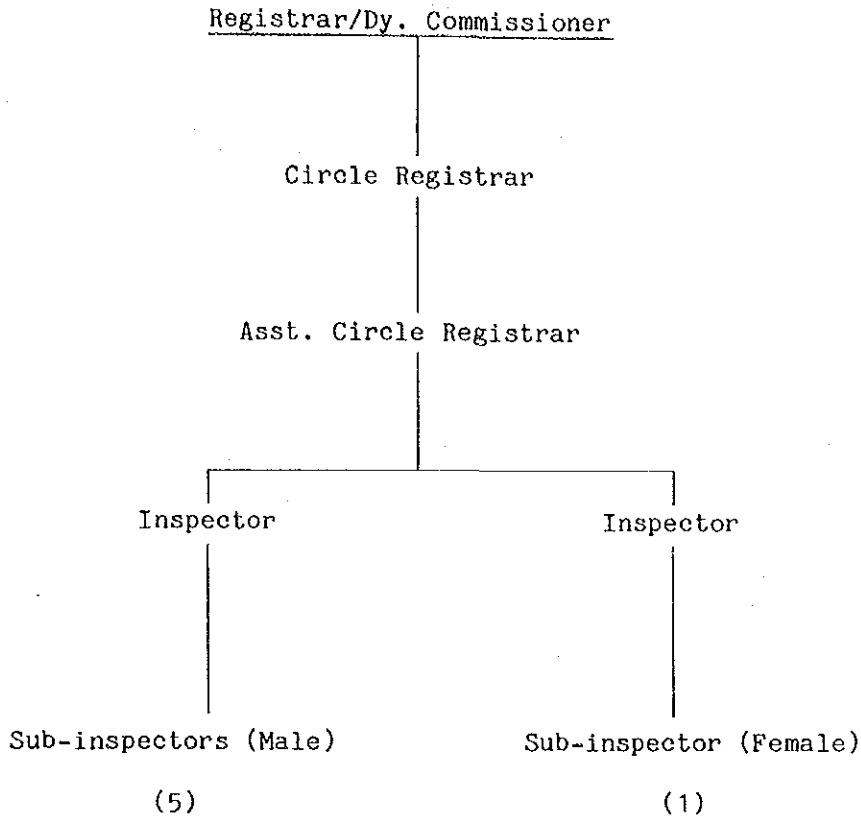


FIG. 4.2-1 **ORGANIZATION SETUP OF THE DEPT. OF COOPERATIVES IN ICT**

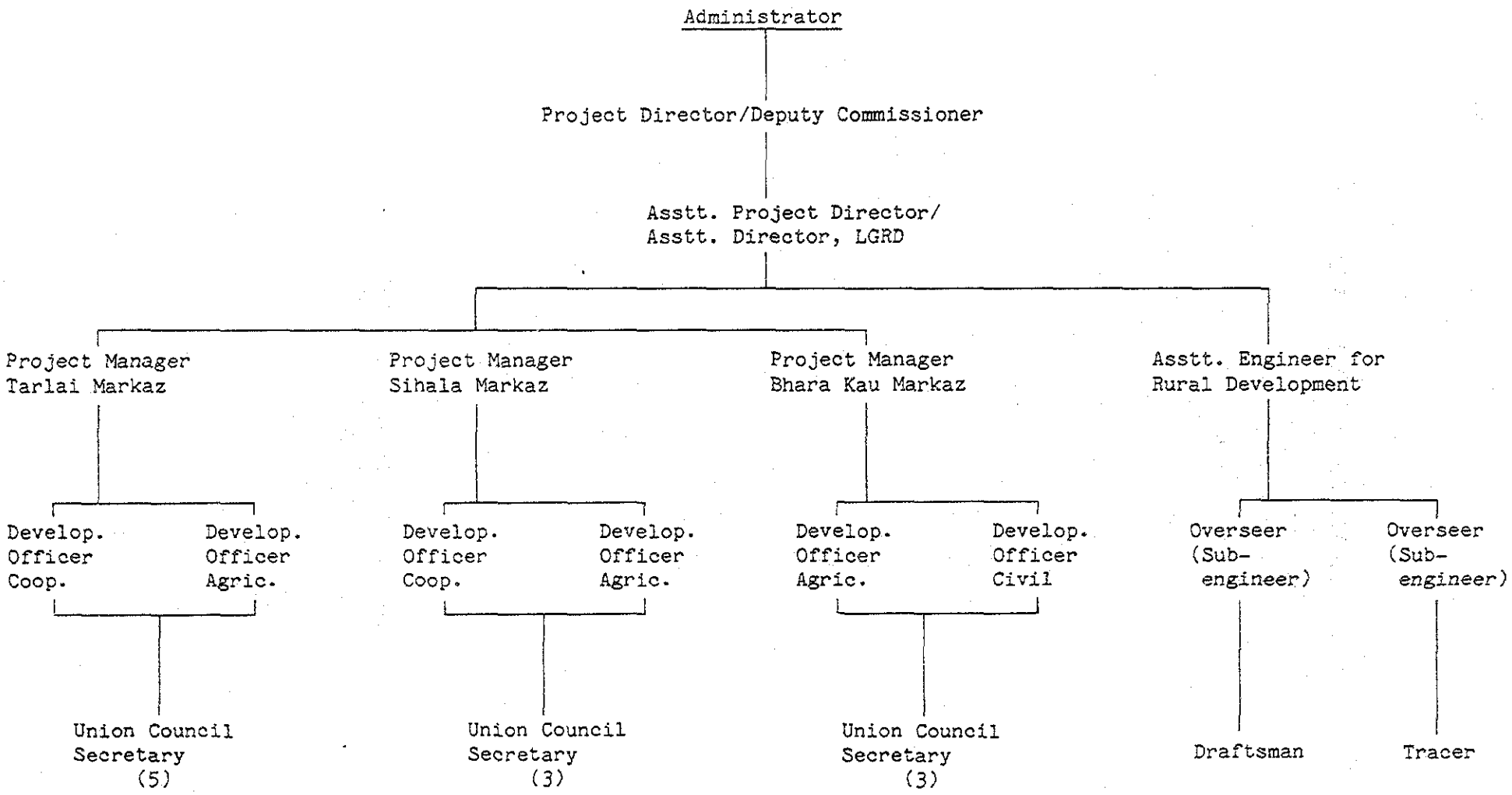
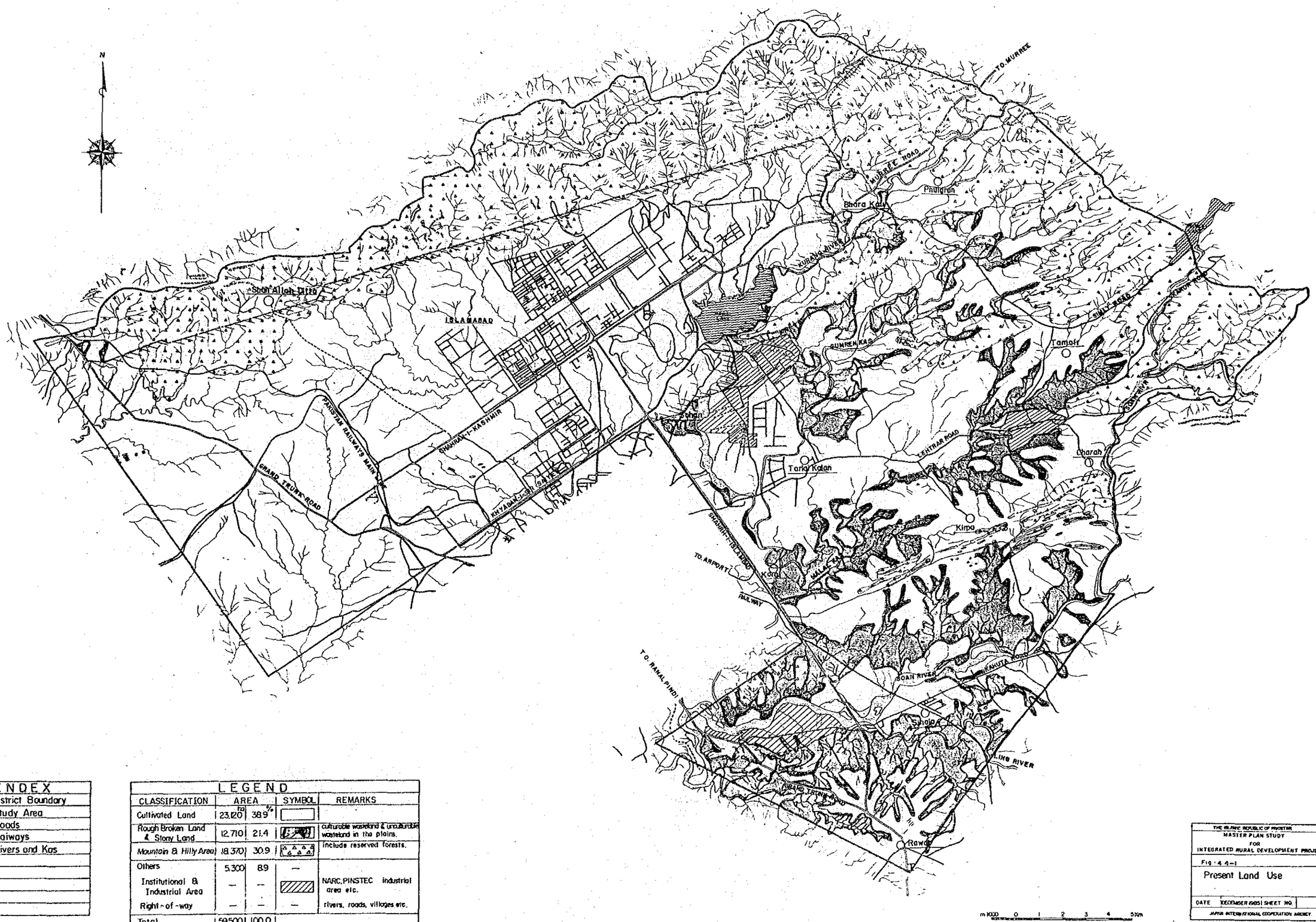


FIG. 4.2-2 **ORGANAIZATION SETUP OF THE DEPT. OF LOCAL GOVERNMENT AND RURAL DEVELOPMENT (LGRD)**



INDEX	
	District Boundary
	Study Area
	Roads
	Raiways
	Rivers and Kas

LEGEND				
CLASSIFICATION	AREA (ha)	AREA (%)	SYMBOL	REMARKS
Cultivated Land	23,120	38.9		
Rough Broken Land & Stony Land	12,710	21.4		cultivable wasteland & uncultivable wasteland in the plains.
Mountain & Hilly Area	18,370	30.9		Include reserved forests.
Others	5,300	8.9	—	
Institutional & Industrial Area	—	—		NARC, PINSTEC industrial area etc.
Right-of-way	—	—	—	rivers, roads, villages etc.
Total	59,500	100.0		

THE ISLAMIC REPUBLIC OF PAKISTAN
MASTER PLAN STUDY
FOR
INTEGRATED RURAL DEVELOPMENT PROJECT

Fig. 4.4-1

Present Land Use

DATE DECEMBER 1985 SHEET NO.

JAPAN INTERNATIONAL COOPERATION AGENCY

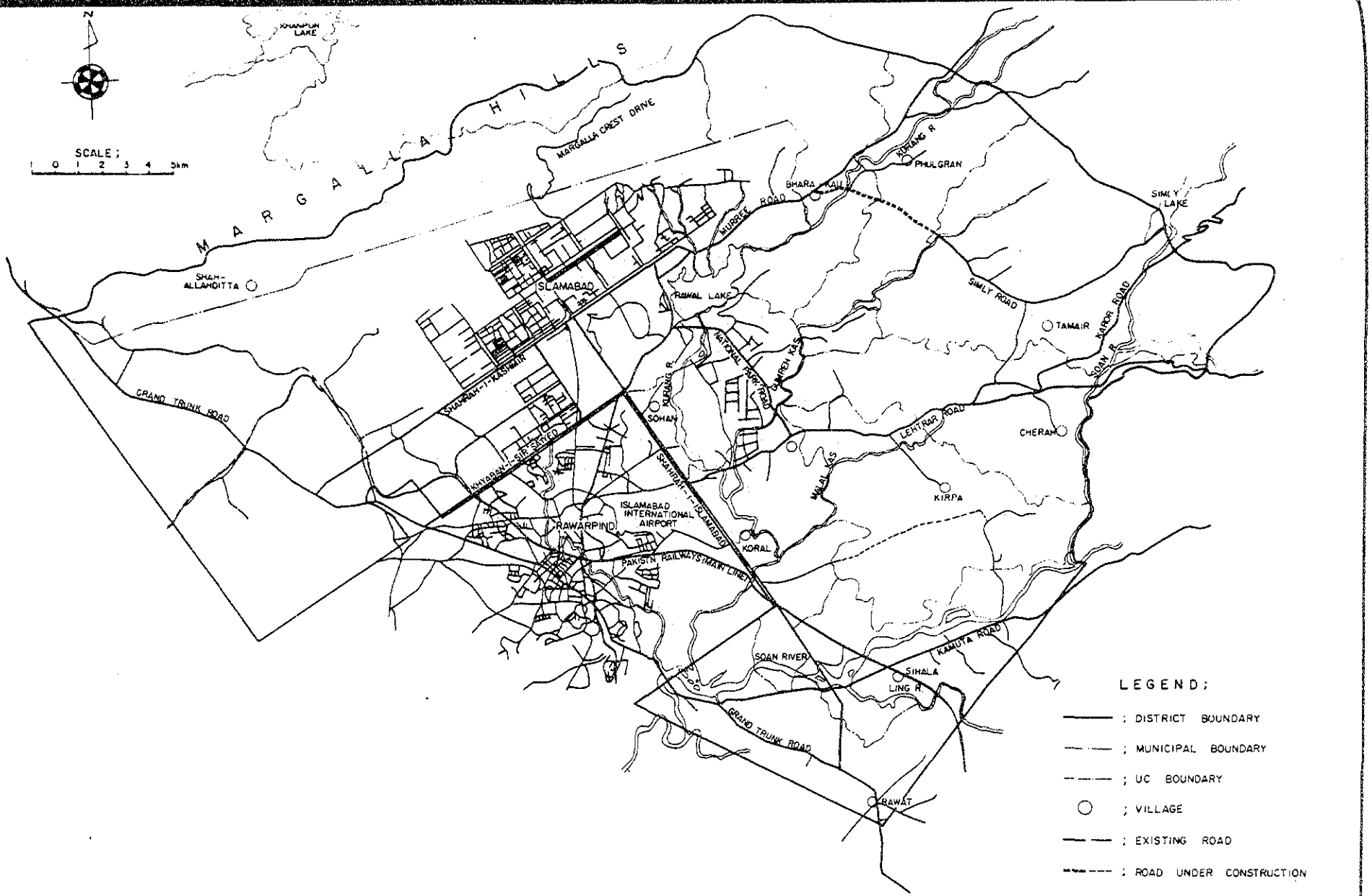


Fig 4.6-1 GENERAL MAP OF EXISTING ROAD NETWORK

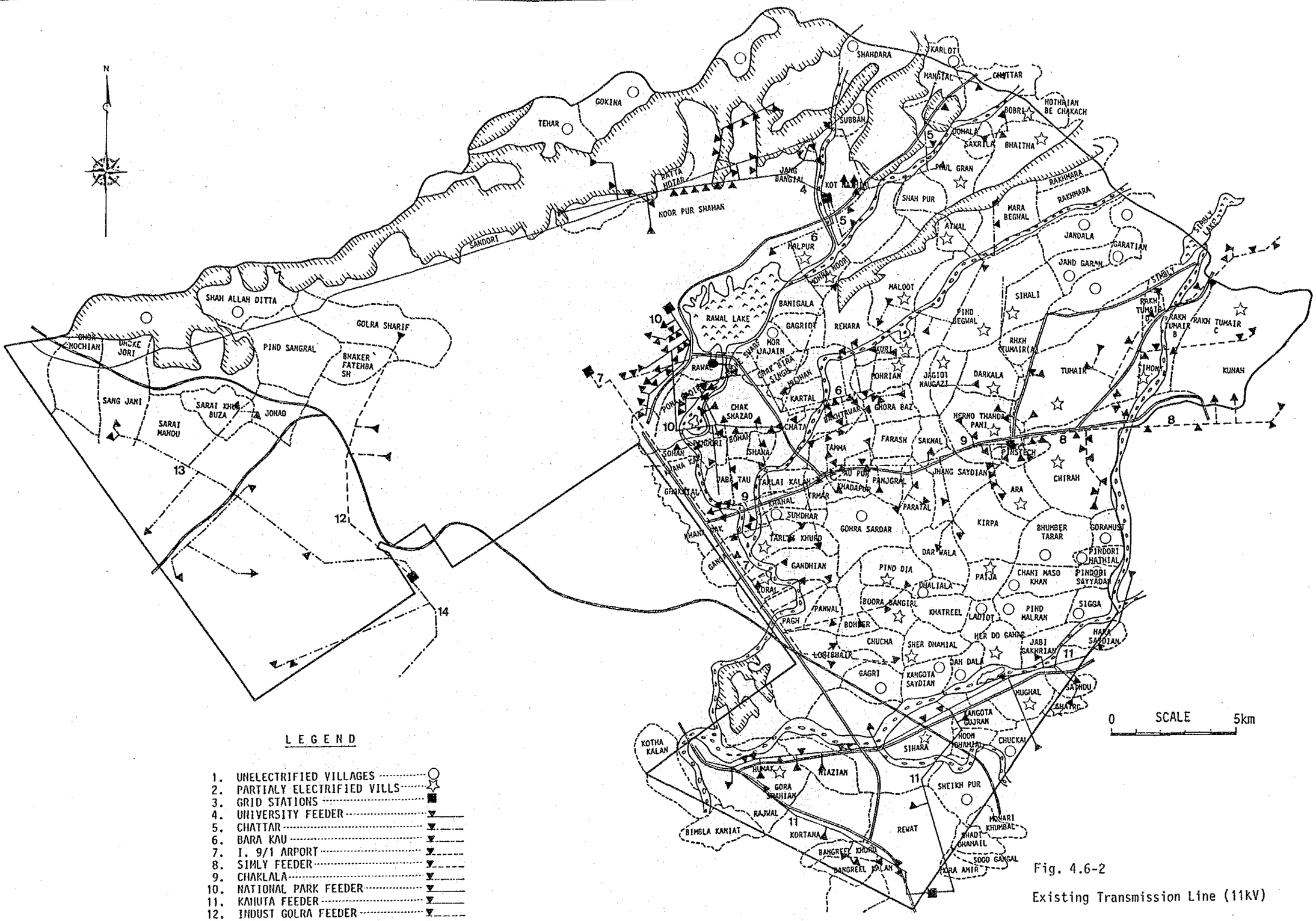
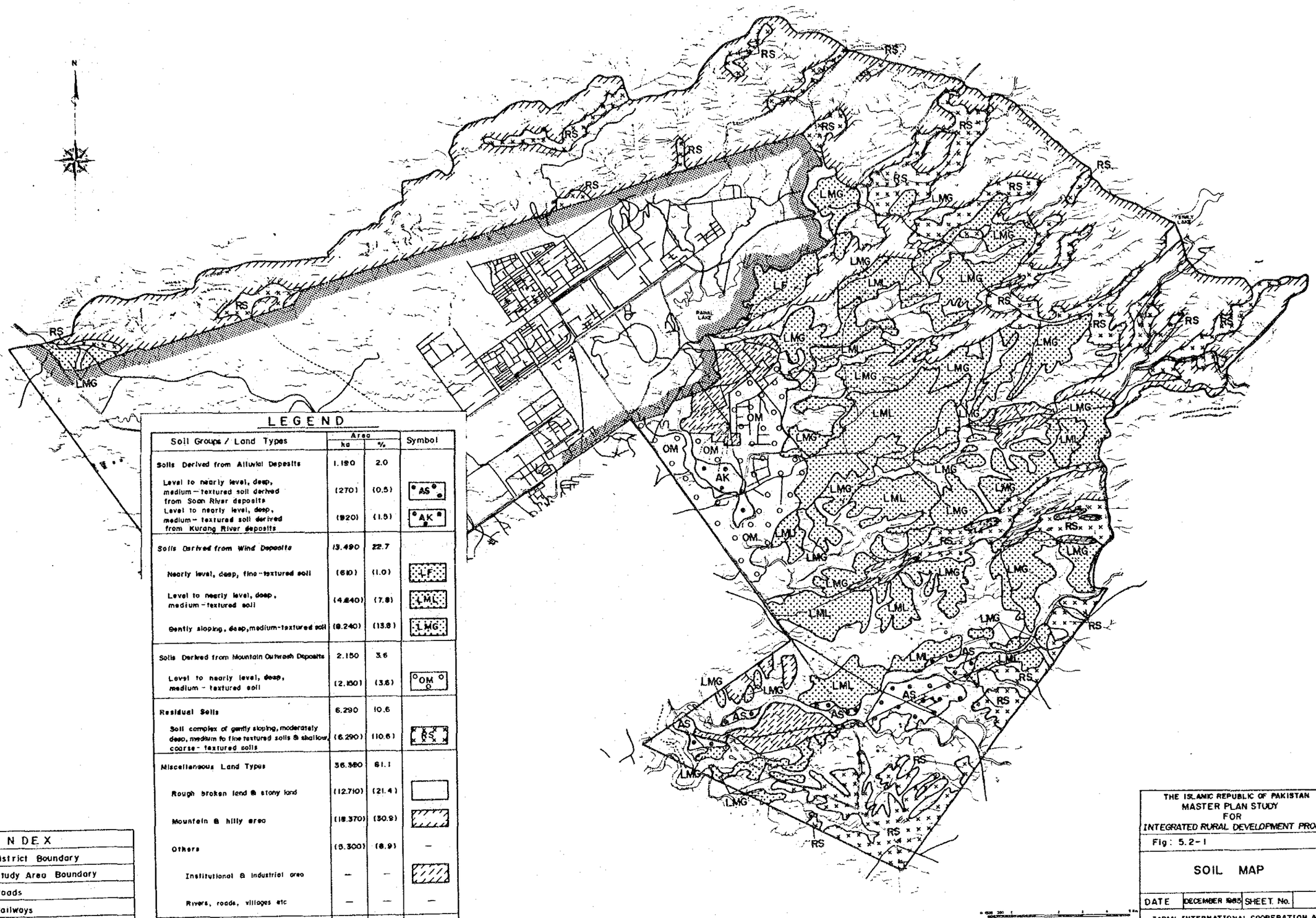


Fig. 4.6-2

Existing Transmission Line (11kV)



LEGEND

Soil Groups / Land Types	Area ha	Area %	Symbol
Soils Derived from Alluvial Deposits	1.190	2.0	
Level to nearly level, deep, medium – textured soil derived from Soan River deposits	(270)	(0.5)	AS
Level to nearly level, deep, medium – textured soil derived from Kurang River deposits	(920)	(1.5)	AK
Soils Derived from Wind Deposits	13.490	22.7	
Nearly level, deep, fine – textured soil	(610)	(1.0)	LF
Level to nearly level, deep, medium – textured soil	(4.640)	(7.8)	LML
Gently sloping, deep, medium-textured soil	(8.240)	(13.8)	LMG
Soils Derived from Mountain Outwash Deposits	2.150	3.6	
Level to nearly level, deep, medium – textured soil	(2.150)	(3.6)	OM
Residual Soils	6.290	10.6	
Soil complex of gently sloping, moderately deep, medium to fine textured soils & shallow, coarse – textured soils	(6.290)	(10.6)	RS
Miscellaneous Land Types	36.380	61.1	
Rough broken land & stony land	(12.710)	(21.4)	
Mountain & hilly area	(18.370)	(30.9)	
Others	(5.300)	(8.9)	–
Institutional & industrial area	–	–	
Rivers, roads, villages etc	–	–	–
Study Area	59.800	100.0	

INDEX	
	District Boundary
	Study Area Boundary
	Roads
	Railways
	Rivers or Kas

THE ISLAMIC REPUBLIC OF PAKISTAN
MASTER PLAN STUDY
FOR
INTEGRATED RURAL DEVELOPMENT PROJECT

Fig: 5.2-1

SOIL MAP

DATE DECEMBER 1985 SHEET No.

JAPAN INTERNATIONAL COOPERATION AGENCY

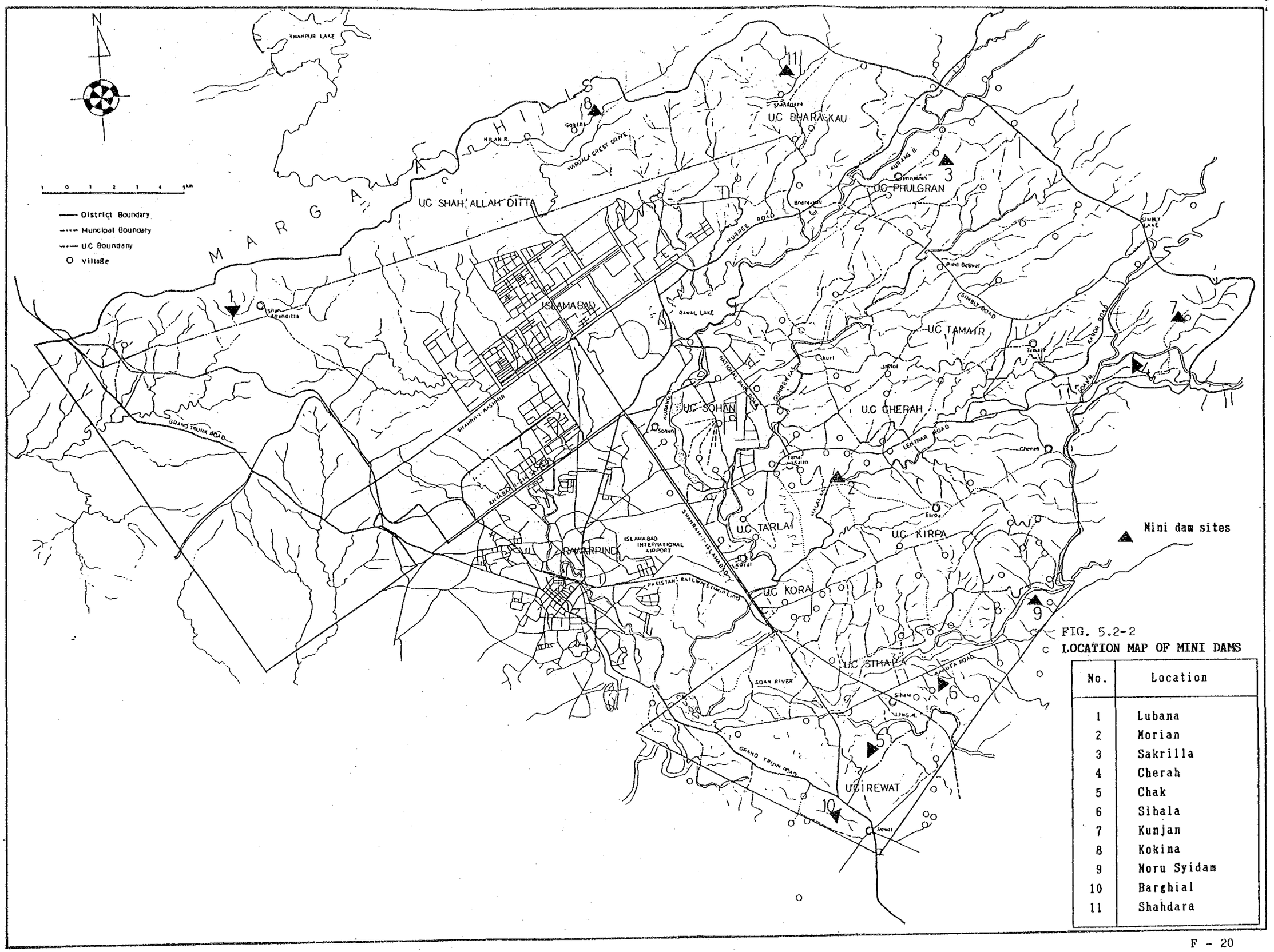


FIG. 5.2-2
LOCATION MAP OF MINI DAMS

No.	Location
1	Lubana
2	Morian
3	Sakrilla
4	Cherah
5	Chak
6	Sihala
7	Kunjan
8	Kokina
9	Noru Syidam
10	Barghial
11	Shahdara

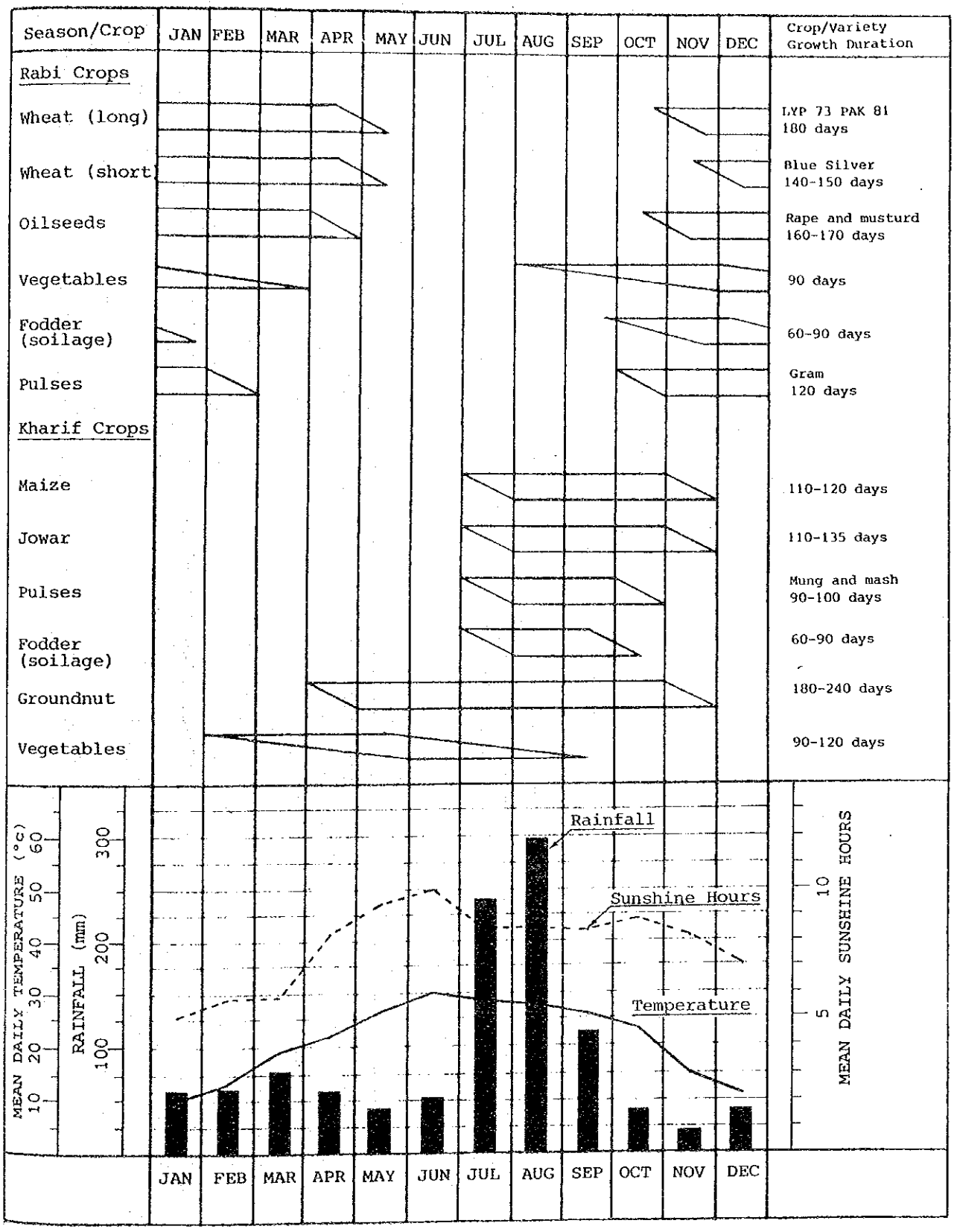


FIG. 5.4-1 **PRESENT CROPPING CALENDAR IN THE STUDY AREA**

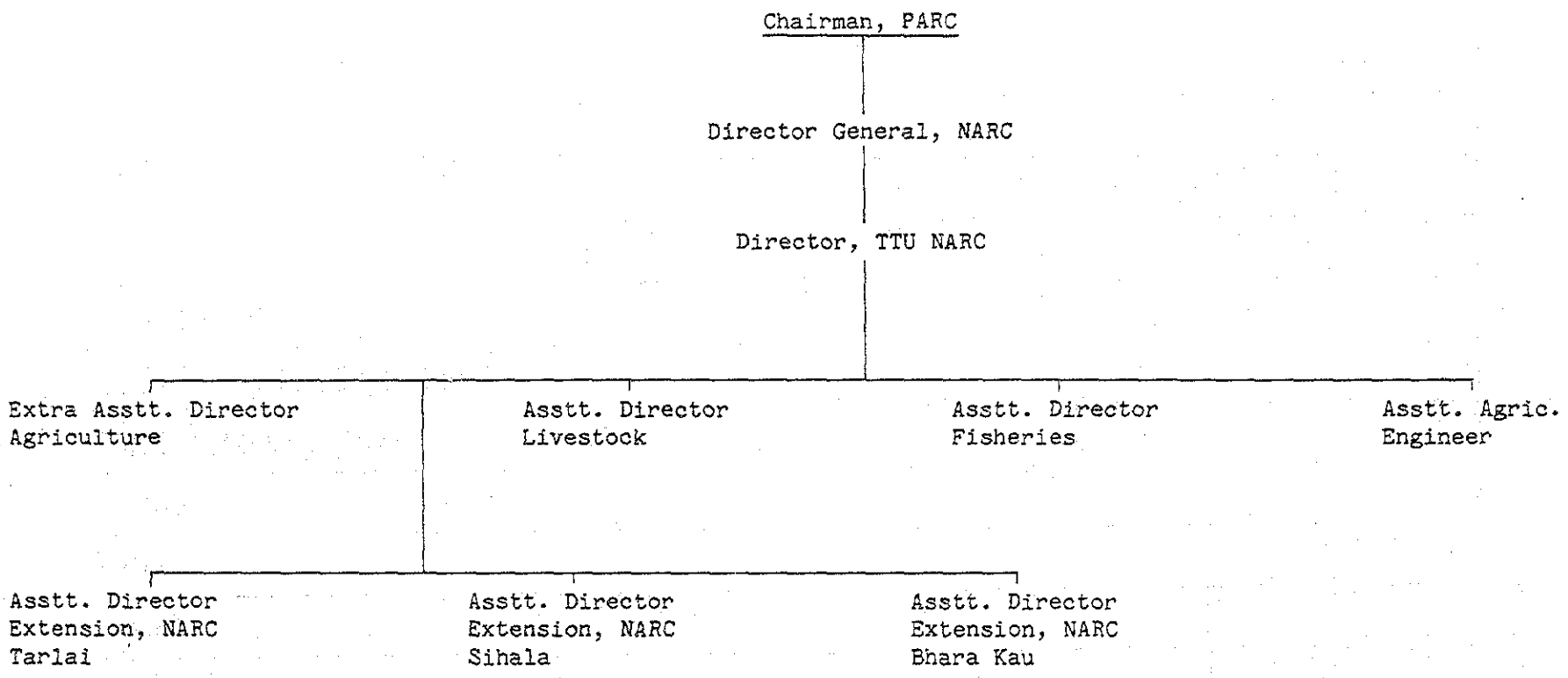


FIG. 5.10-1 **AGRICULTURAL EXTENSION DIRECTORATE IN ICT**

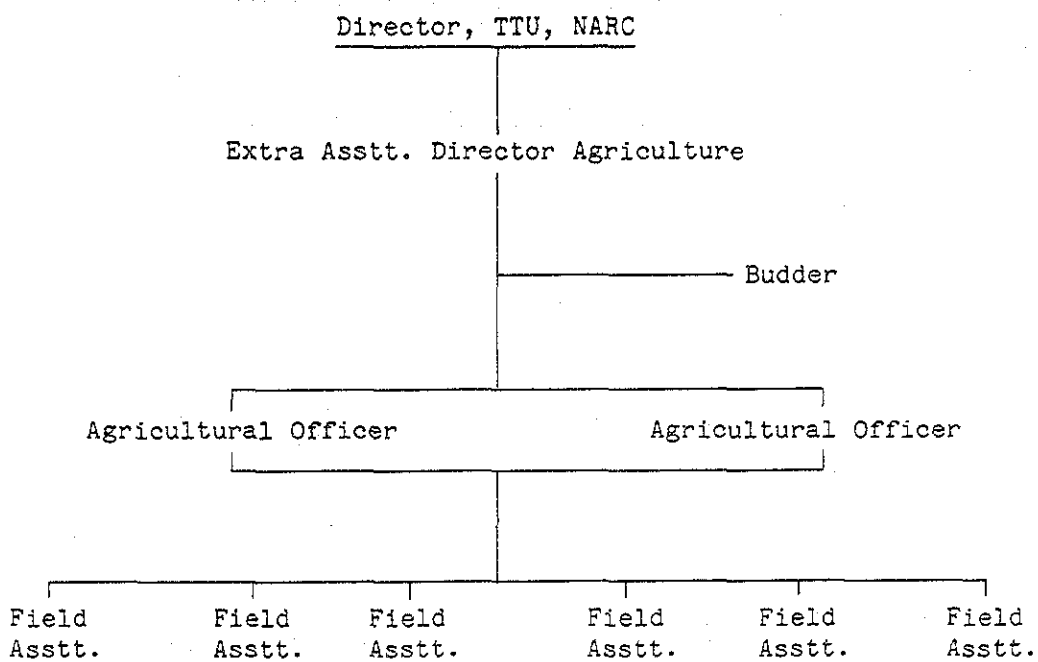


FIG. 5.10-2 ORGANIZATION SETUP OF DEPT. OF AGRICULTURE

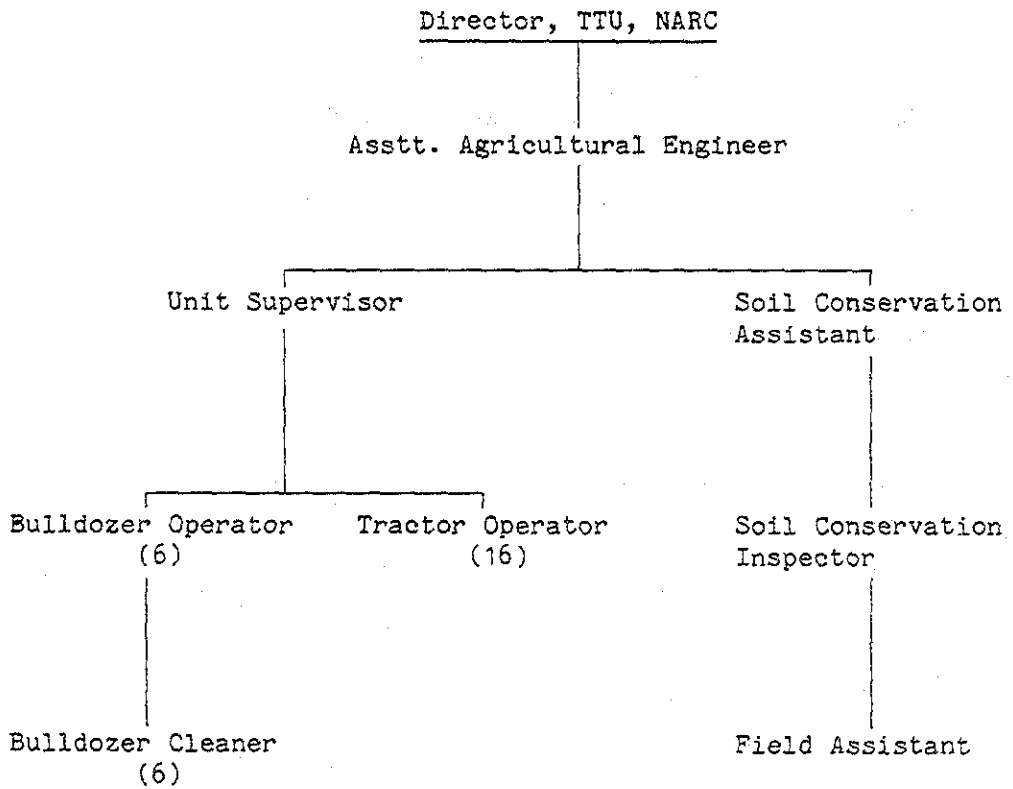


FIG. 5.10-3 **ORGANIZATION SETUP OF DEPT. OF SOIL CONSERVATION**

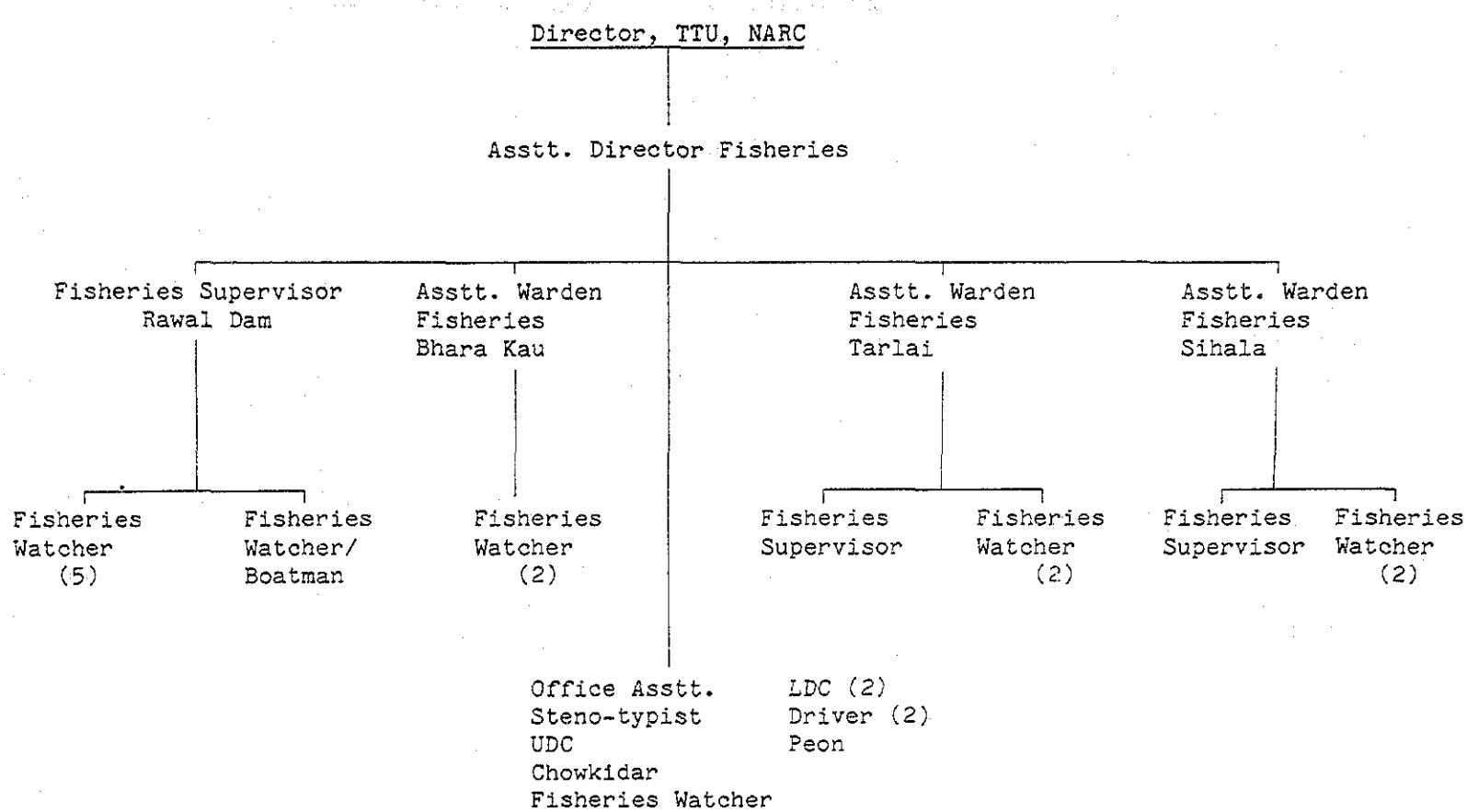


FIG. 5.10-4 ORGANIZATION SETUP OF DEPT. OF FISHERIES

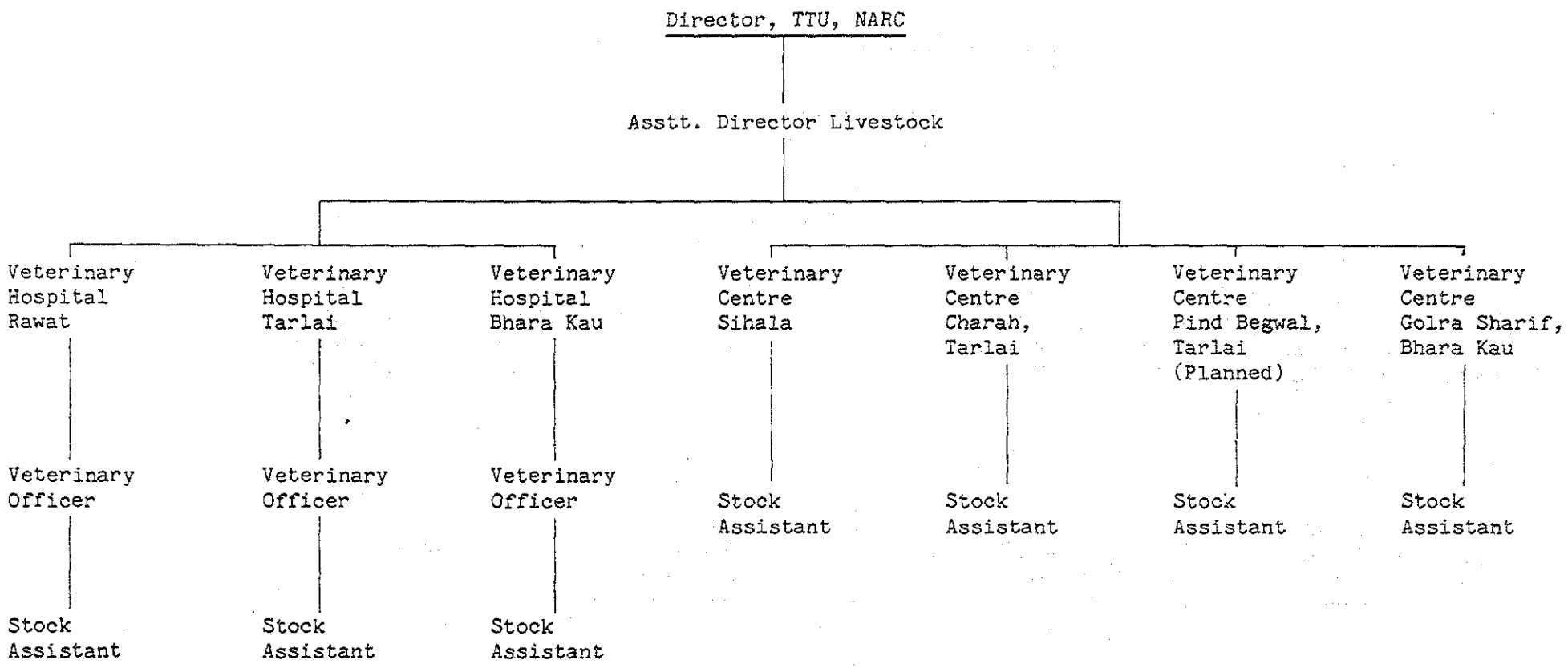


FIG. 5.10-5 **ORGANIZATION SETUP OF DEPT. OF LIVESTOCK**

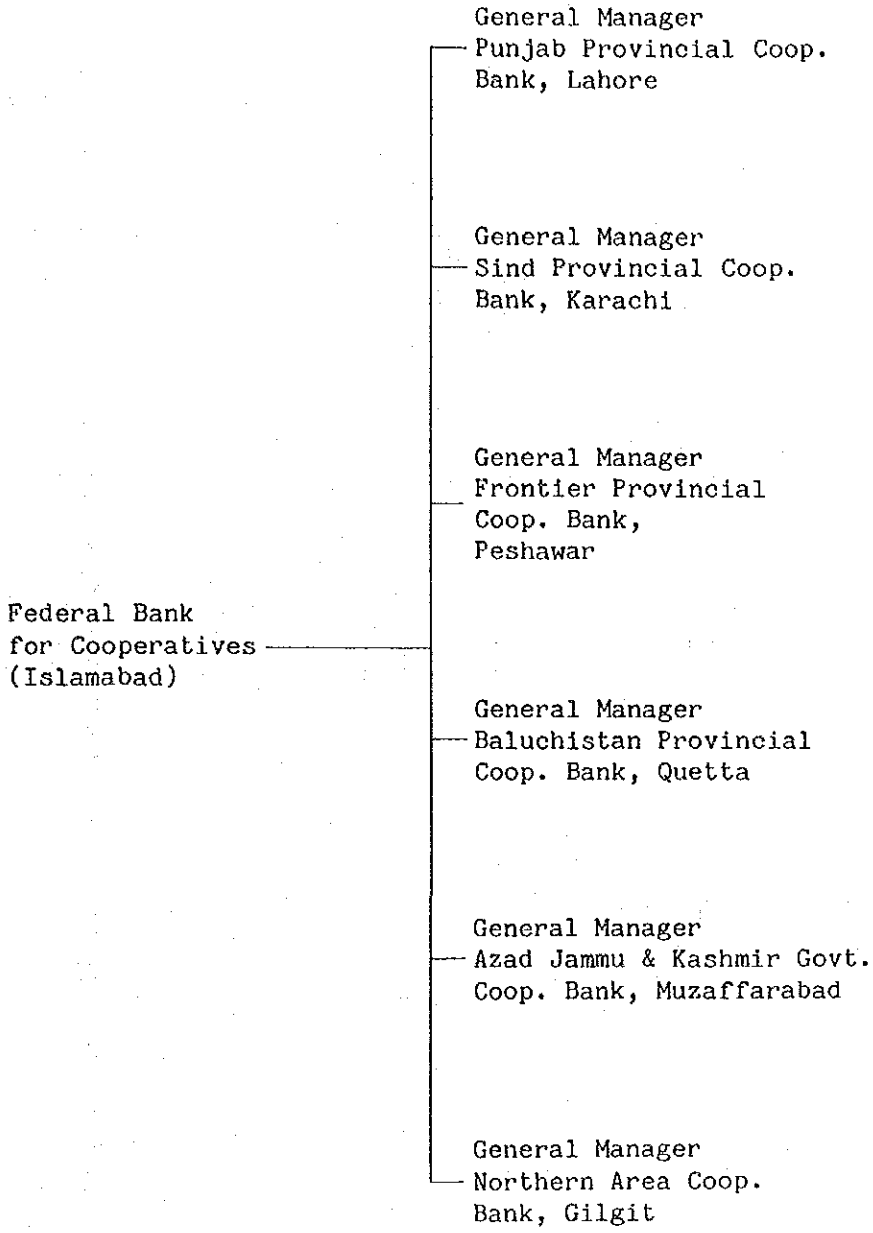


FIG. 5.10-6 ORGANIZATION OF FEDERAL & PROVINCIAL COOPERATIVE BANKS

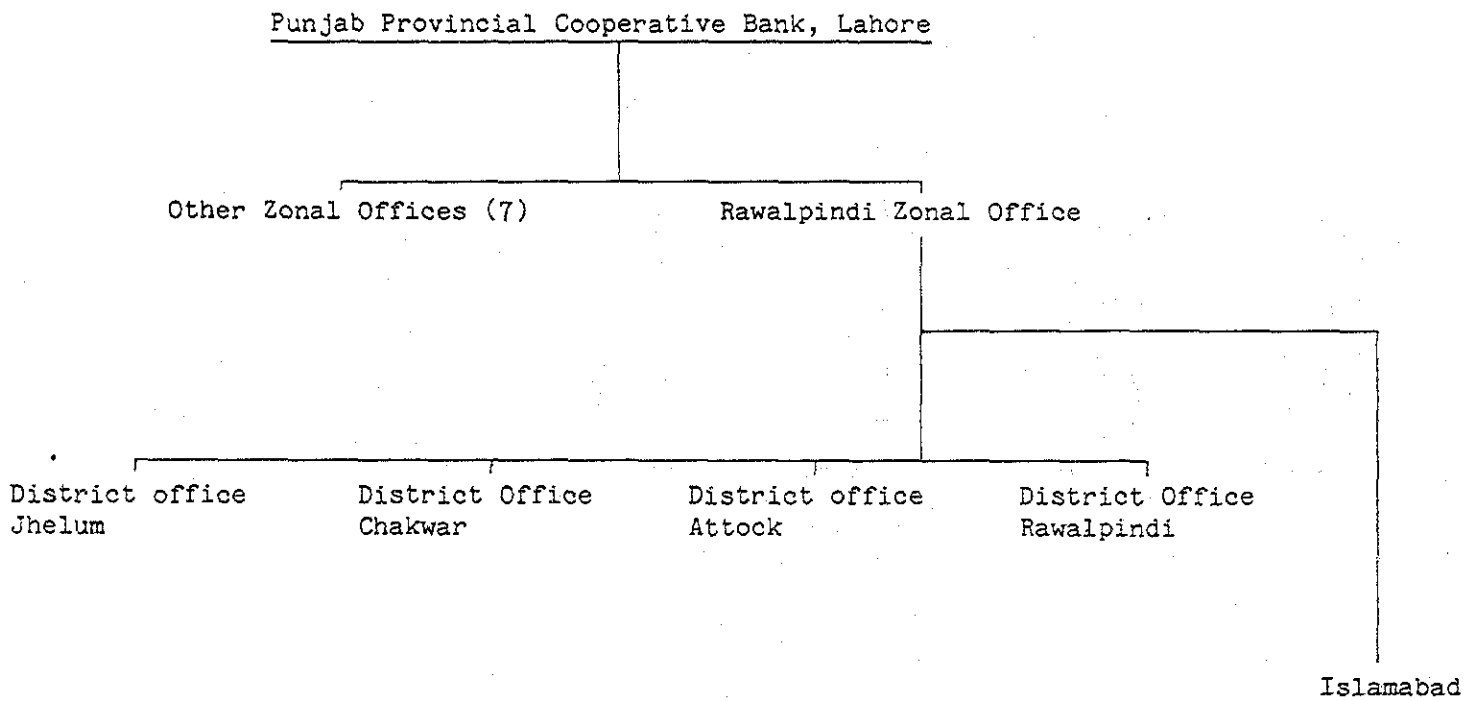


FIG. 5.10-7 **ORGANIZATION OF THE PUNJAB PROVINCIAL COOPERATIVE BANK**

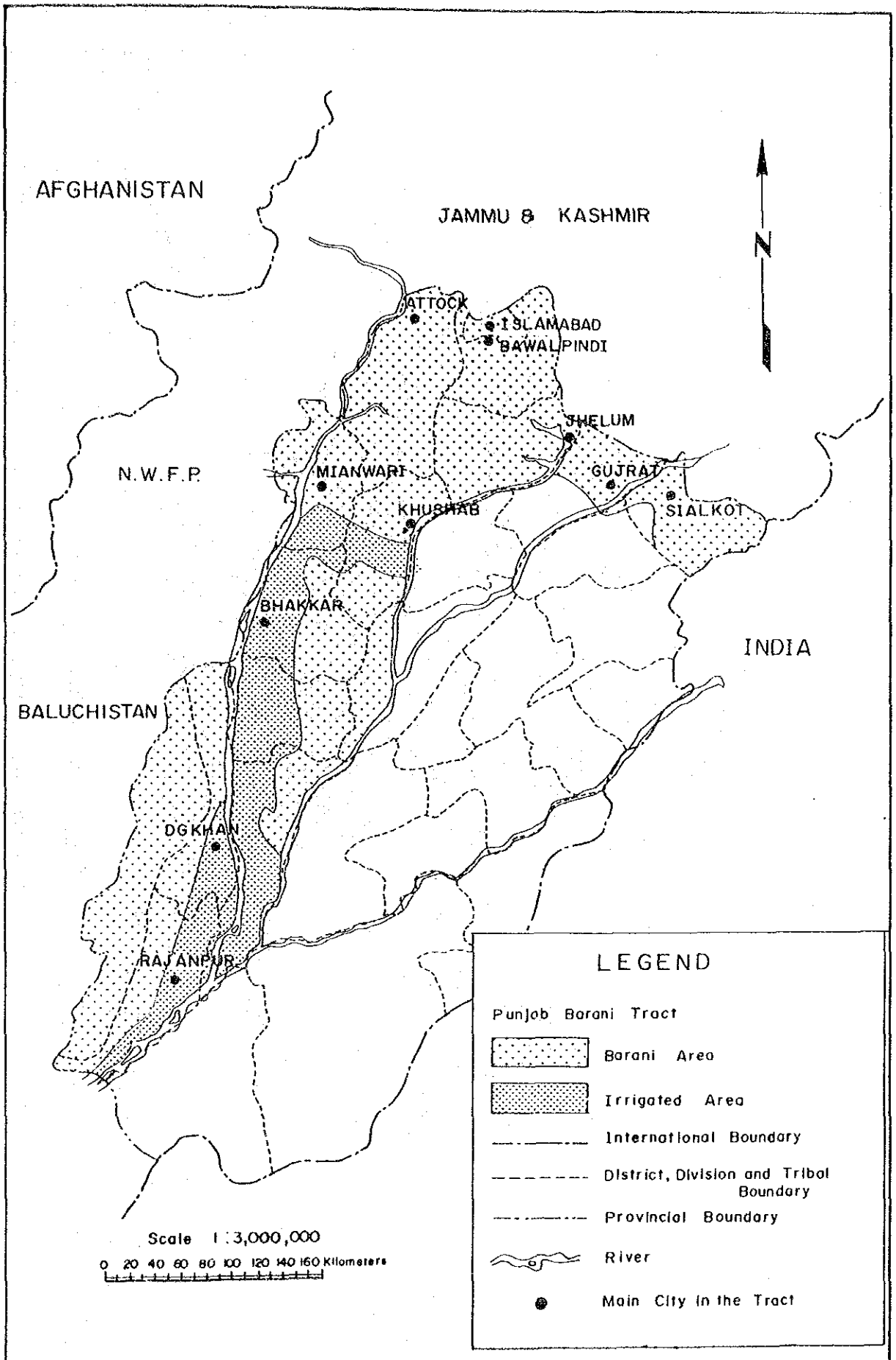


FIG. 6.1-1 **PUNJAB BARANI TRACT**

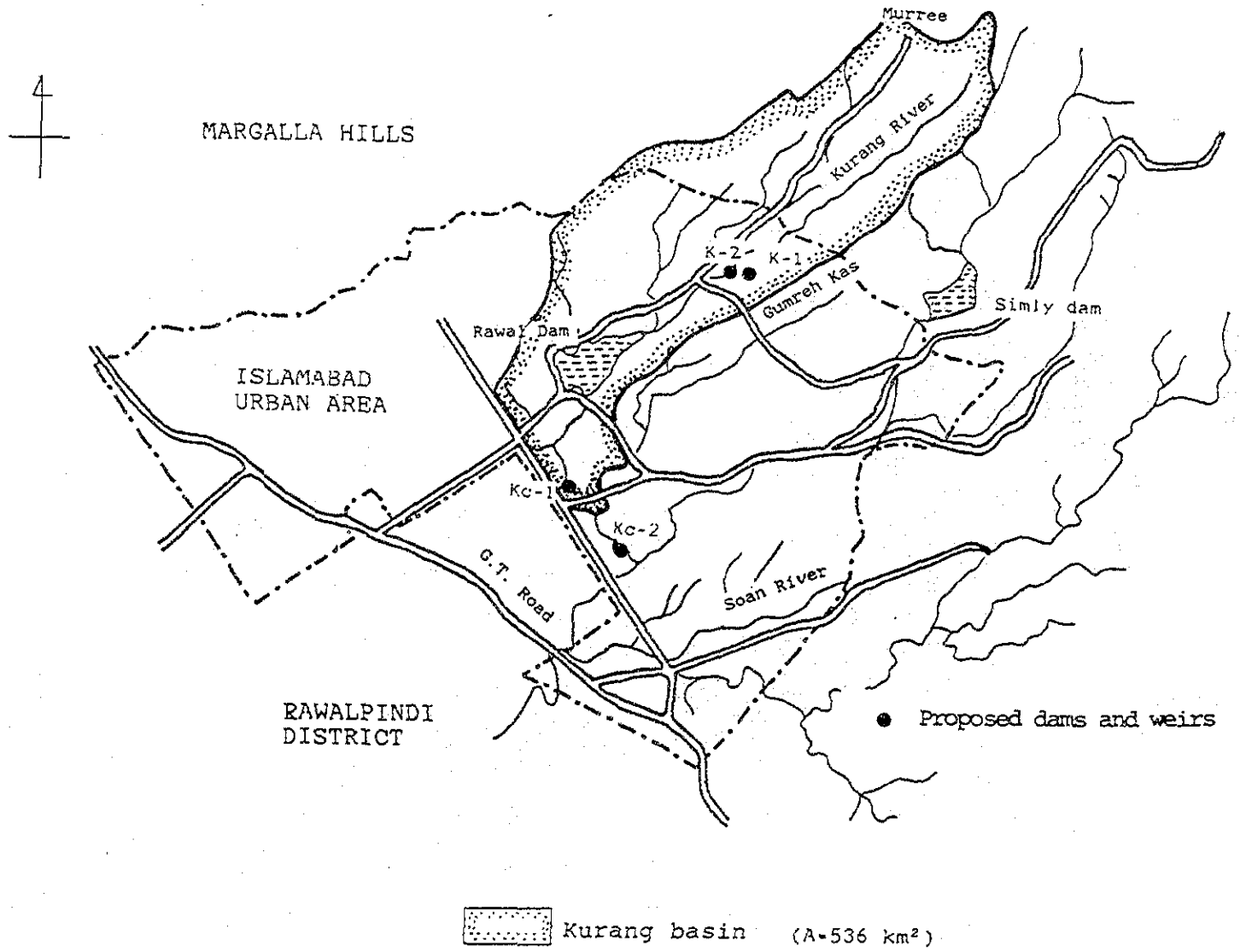


FIG. 9.2-1 LOCATION OF WATER RESOURCES DEVELOPMENT IN THE KURANG RIVER BASIN

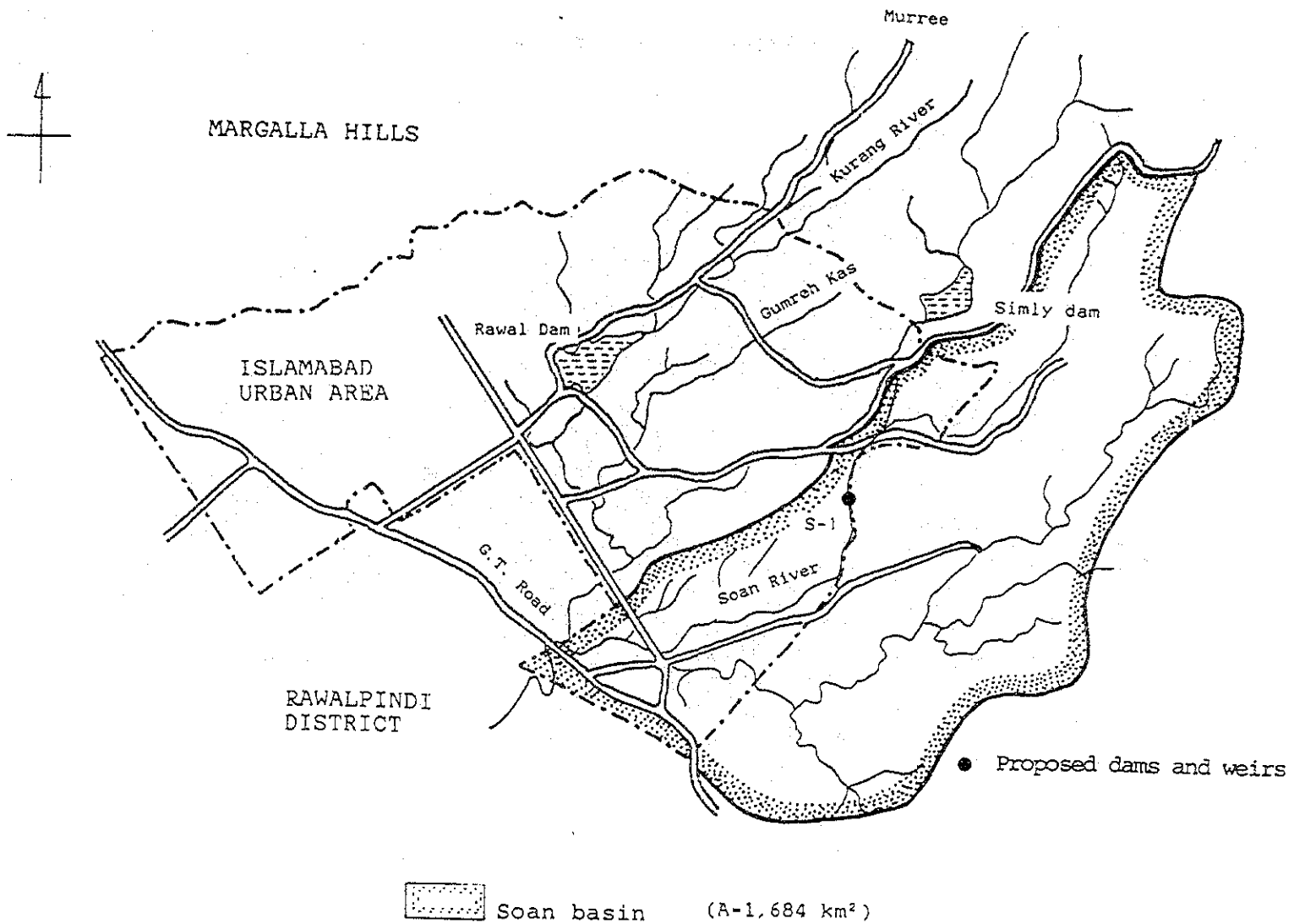


FIG. 9.2-2 LOCATION OF WATER RESOURCES DEVELOPMENT IN THE SOAN RIVER BASIN

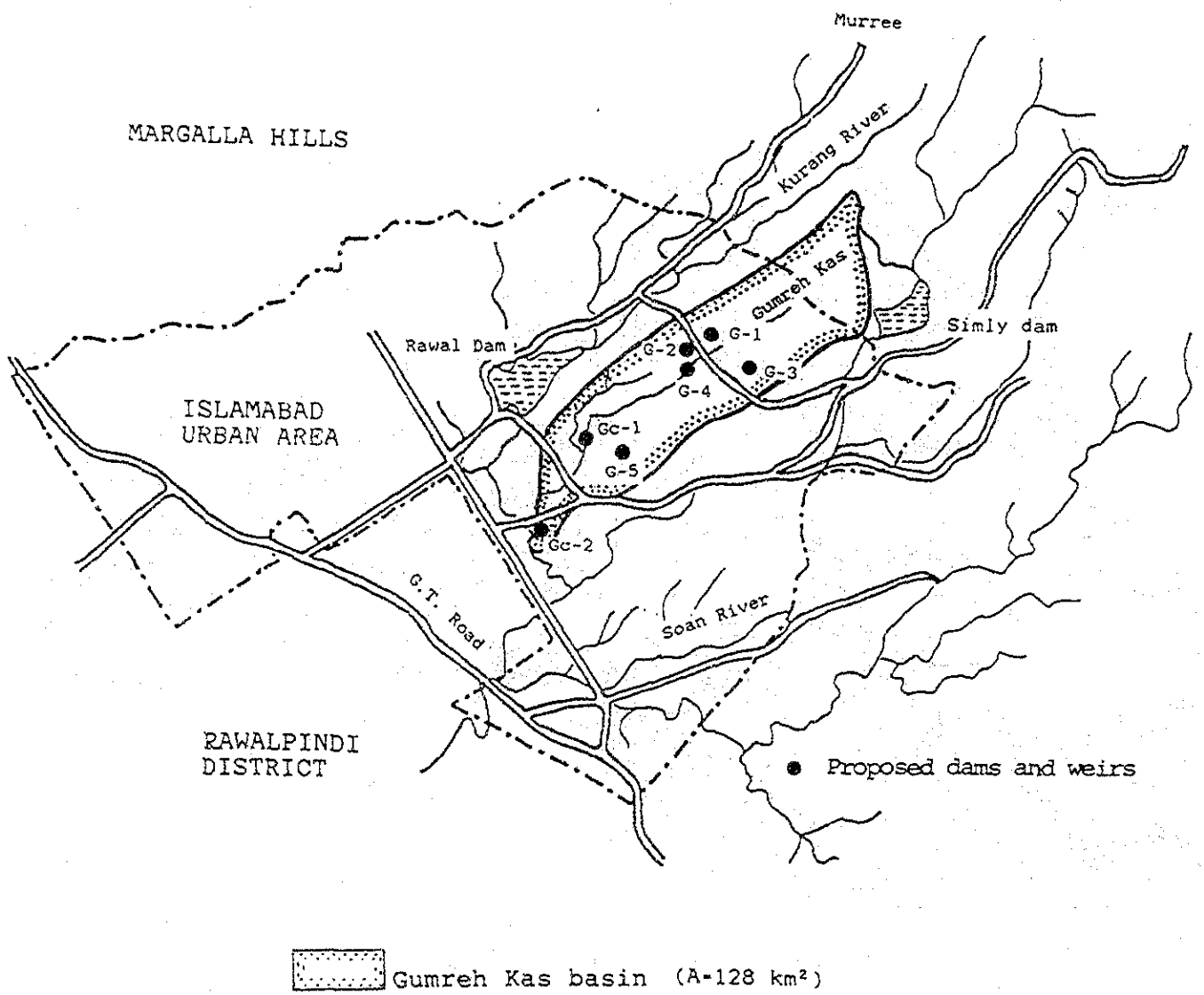


FIG. 9.2-3 LOCATION OF WATER RESOURCES DEVELOPMENT IN THE GUMREH KAS RIVER BASIN

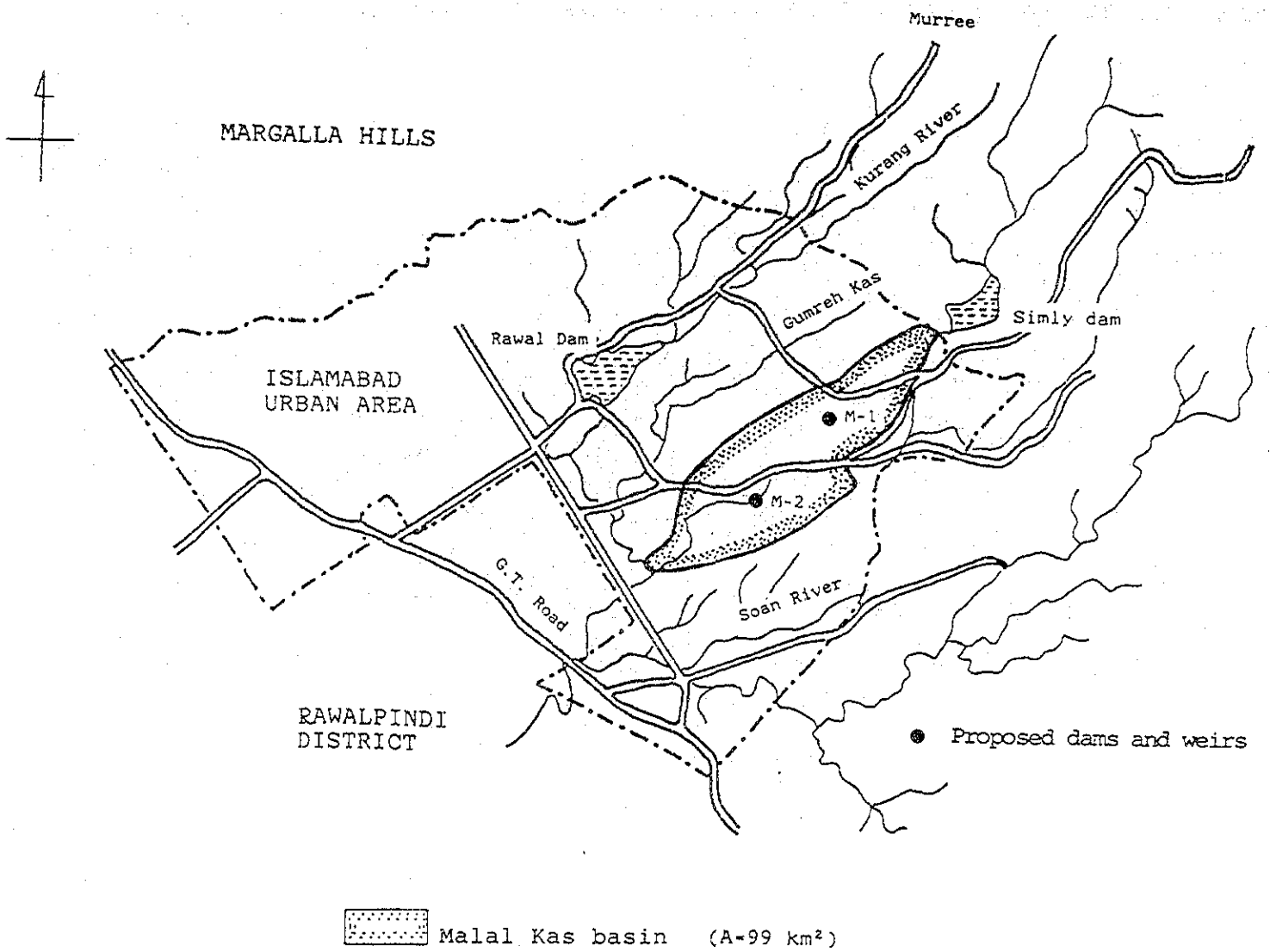
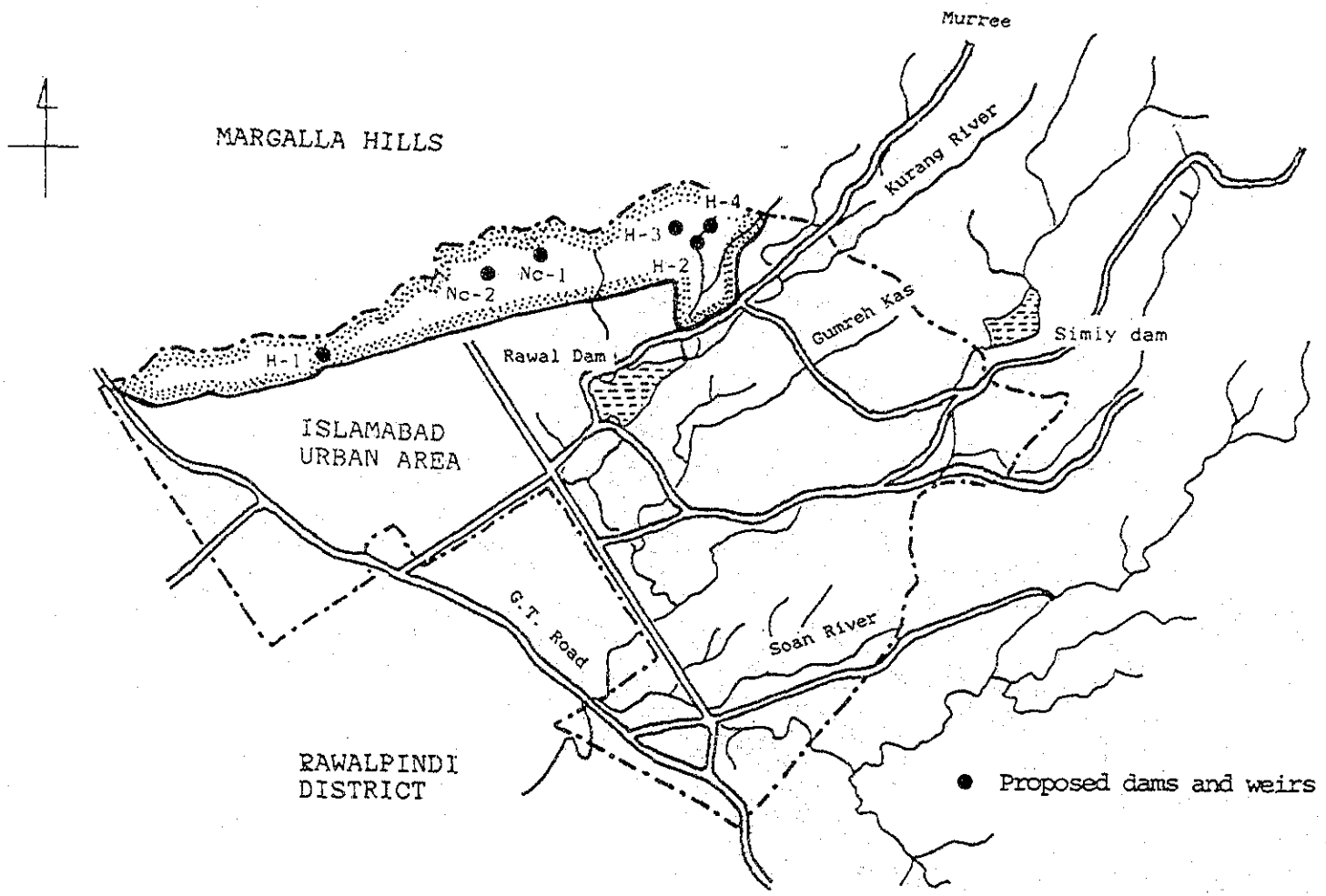


FIG. 9.2-4 LOCATION OF WATER RESOURCES DEVELOPMENT IN THE MALAL KAS RIVER BASIN



Hills

FIG. 9.2-5 LOCATION OF WATER RESOURCES DEVELOPMENT IN THE MOUNTAINOUS AND HILLY AREA

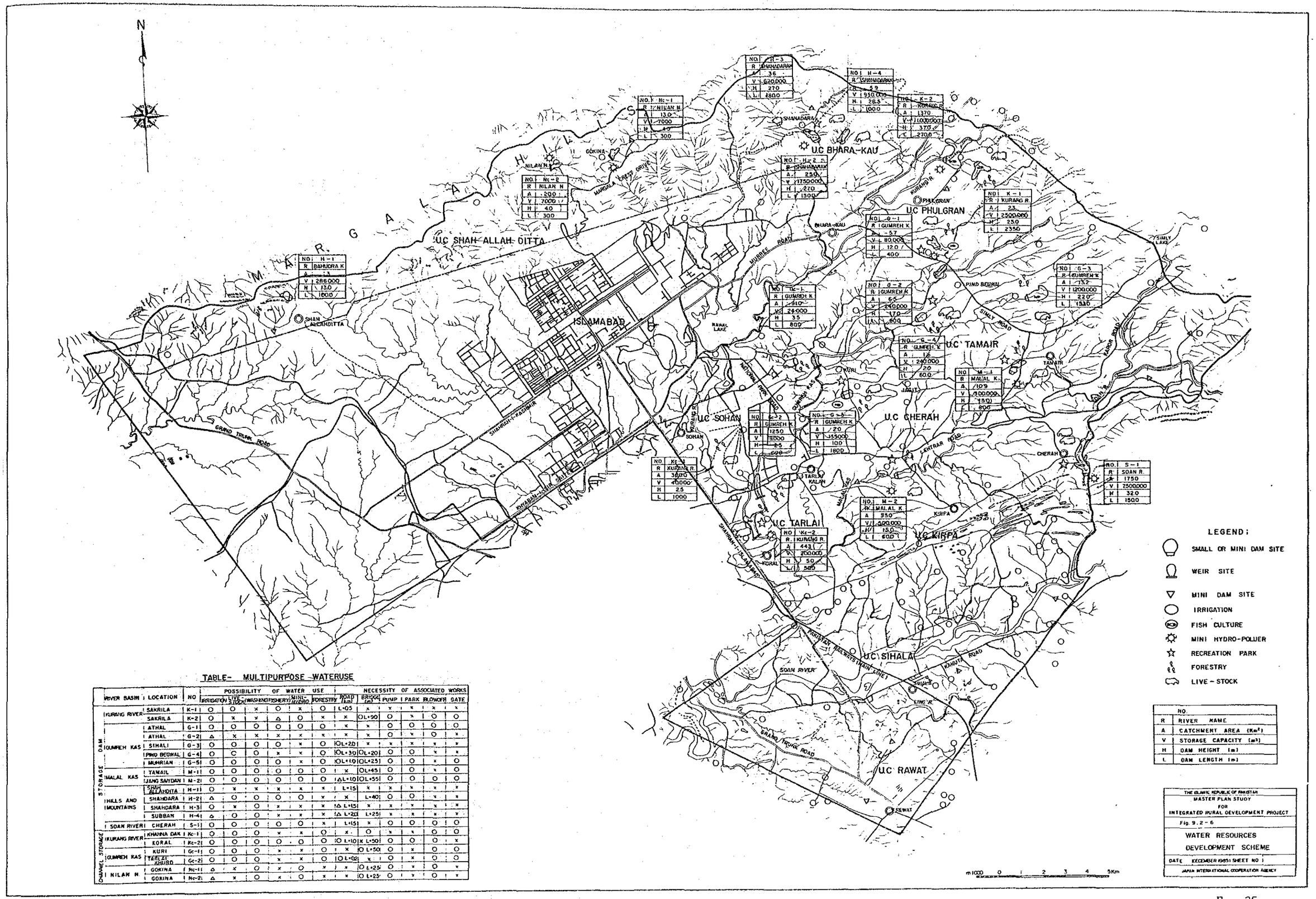


TABLE- MULTIPURPOSE -WATERUSE

	RIVER BASIN	LOCATION	NO	POSSIBILITY OF WATER USE: IRRIGATION	LIVE-STOCK	WASHING	FISHERY	MINI-HYDRO	FORESTRY	NECESSITY OF ASSOCIATED WORKS: ROAD (km)	BRIDGE (m)	PUMP	PARK	BLOWOFF	GATE
STORAGE DAM	KURANG RIVER	SAKRILA	K-1	O	O	×	O	×	O	L+05	×	×	×	×	×
		SAKRILA	K-2	O	×	×	△	O	×	×	L+90	O	×	O	O
	GUMREH KAS	ATHAL	G-1	O	O	O	O	O	O	×	×	O	O	O	O
		ATHAL	G-2	△	×	×	×	×	×	×	×	O	×	O	×
		SIHALI	G-3	O	O	O	O	×	O	L+20	×	×	×	×	×
		PIND BEGWAL	G-4	O	O	O	×	×	O	L+30	L+20	O	O	×	×
		MUHRIAN	G-5	O	O	O	O	×	O	L+10	L+25	O	O	×	O
	MALAL KAS	TAMAIL	M-1	O	O	O	O	O	O	×	L+45	O	O	×	O
		JANG SAYDAN	M-2	O	O	O	O	O	O	△ L+10	L+55	O	O	O	O
	HILLS AND MOUNTAINS	SHAH ALLAHDITA	H-1	O	×	×	×	×	×	L+15	×	×	×	×	×
		SHAHDARA	H-2	△	O	O	O	O	×	×	L+40	O	O	×	×
		SHAHDARA	H-3	O	×	O	×	×	×	△ L+15	×	×	×	×	×
		SUBBAN	H-4	△	O	O	×	×	×	△ L+20	L+25	×	×	×	×
	SOAN RIVER	CHERAH	S-1	O	O	O	O	O	×	L+15	×	O	O	O	O
CHANNEL STORAGE	KURANG RIVER	KHANNA DAK	Kc-1	O	O	O	×	×	O	×	O	×	×	O	O
		KORAL	Kc-2	O	O	O	O	O	O	O L+10	× L+50	O	O	O	×
	GUMREH KAS	KURI	Gc-1	O	O	O	×	×	O	×	O L+50	O	×	O	O
		TARLAI KHURD	Gc-2	O	O	O	×	×	O	O L+02	×	O	×	O	O
	NILAN N	GOKINA	Nc-1	△	×	O	×	O	×	×	O L+25	O	×	O	×
		GOKINA	Nc-2	△	×	O	×	O	×	×	O L+25	O	×	O	×

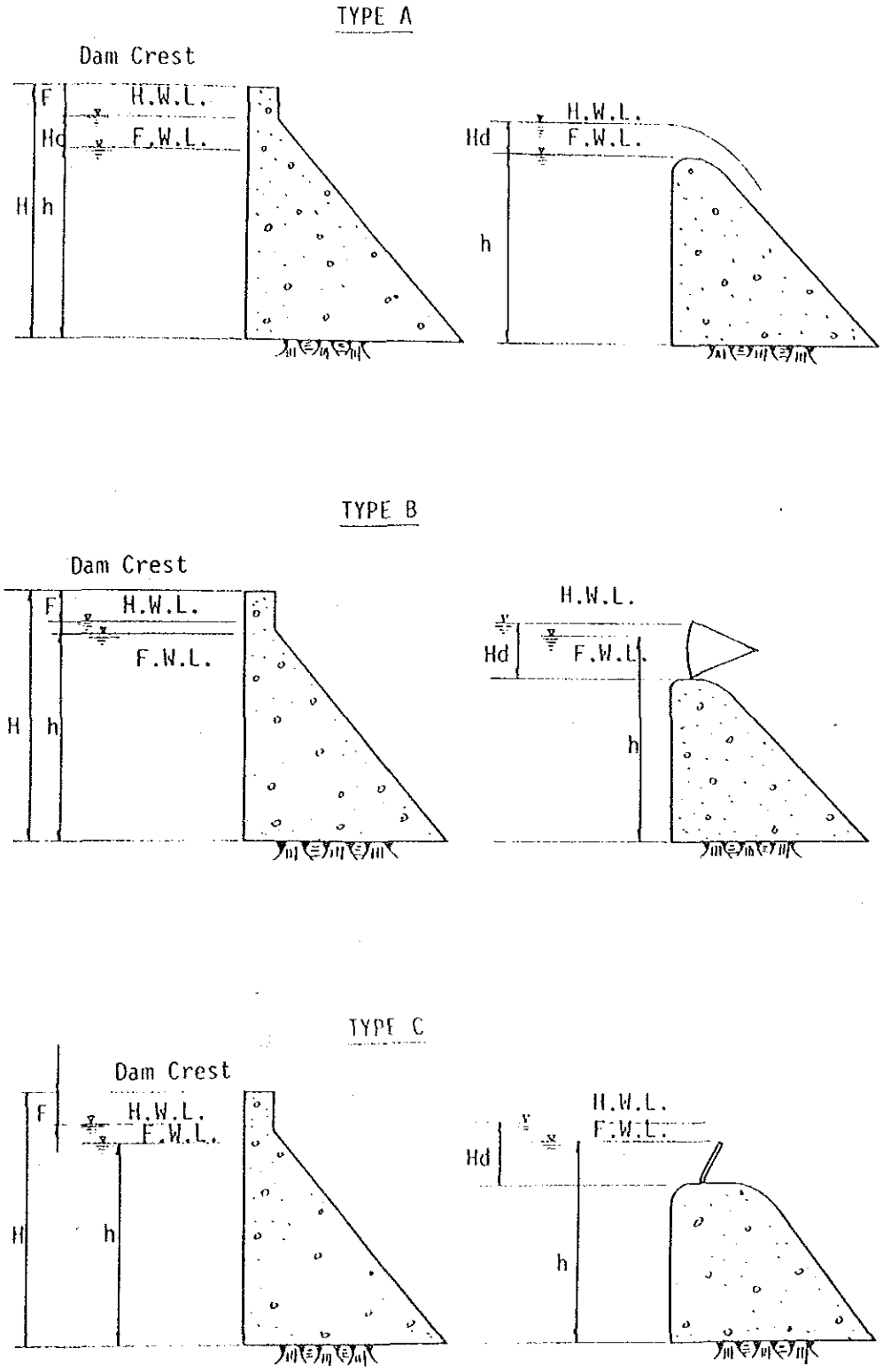


FIG. 9.2-7 DAM TYPE

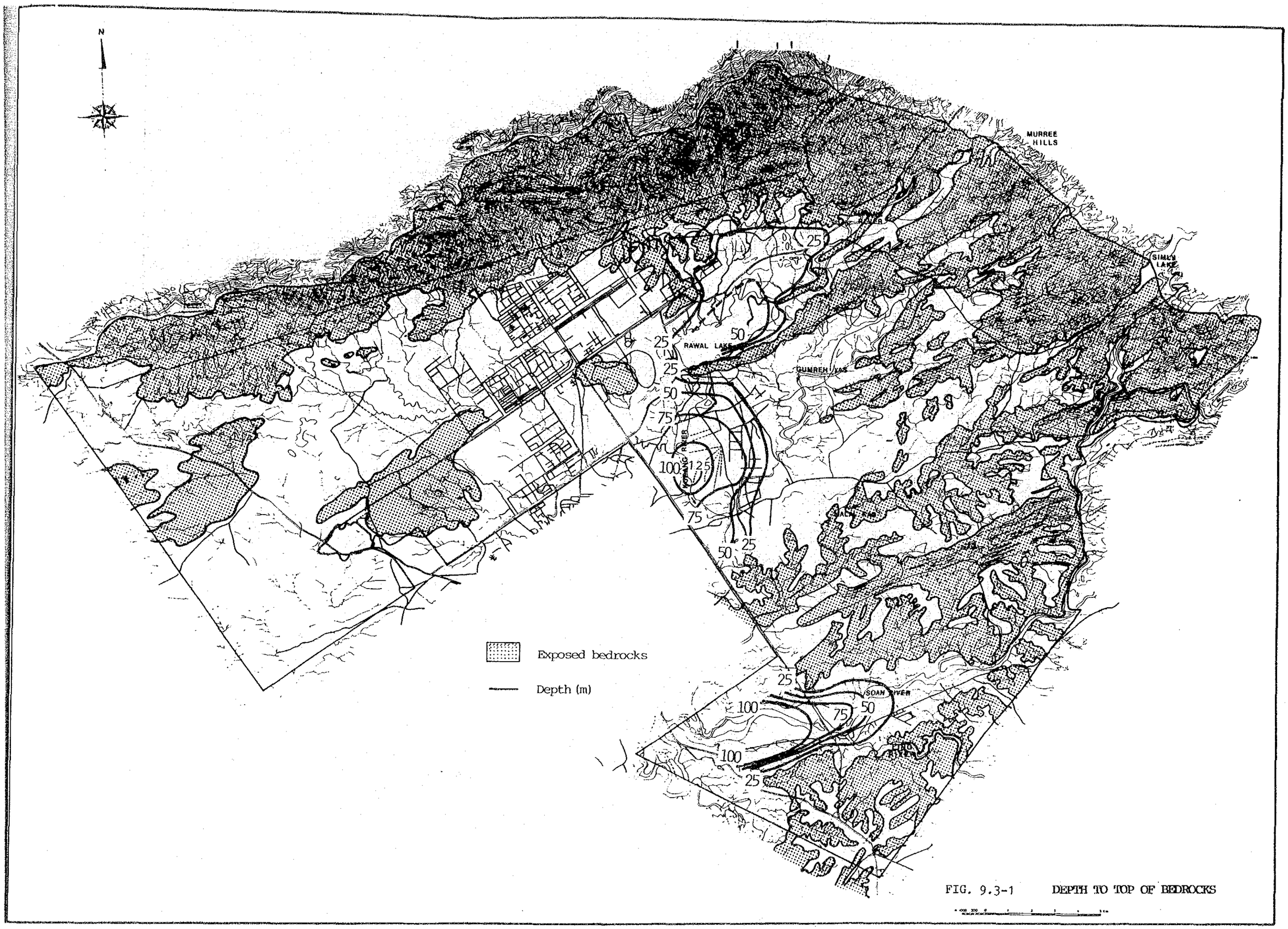


FIG. 9.3-1 DEPTH TO TOP OF BEDROCKS

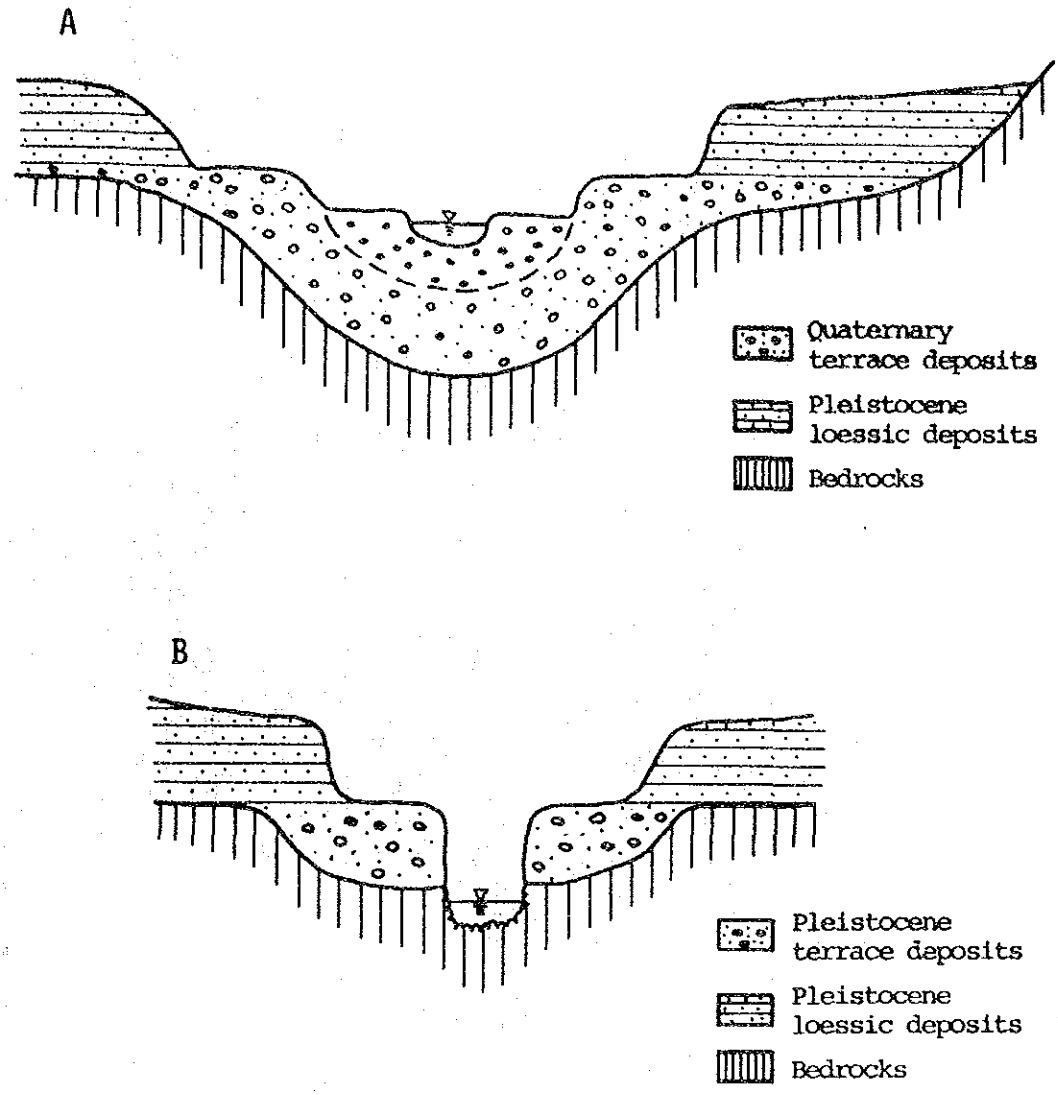


FIG. 9.3-2 RELATIONSHIP BETWEEN A RIVER AND GROUND WATER

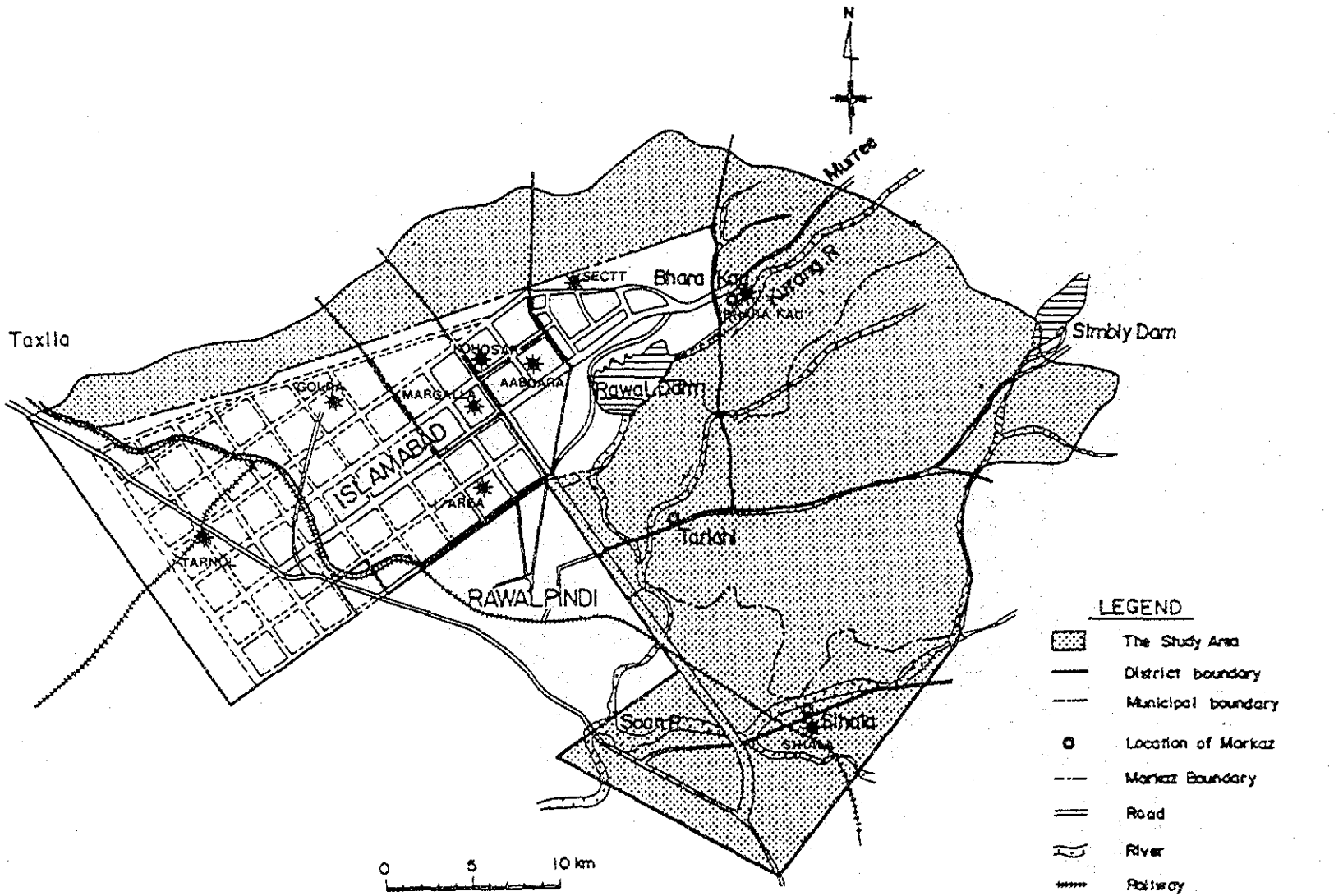


FIG. 11.4-1 LOCATION MAP OF POLICE STATIONS