

TABLES



Table 2.1 Domestic and Industrial Water Supply in the District and Major Towns (1/4)

Province	Pro. Capital	District	District and major towns	Sources	Stage	Design Capacity m ³ /day	Note
Tay Ninh	Tay Ninh	Tay Ninh and Hoa Thanh	Tay Ninh and Hoa Thanh	West canal of the Dau Tieng Reservoir	Existing	4,000	
				Groundwater (8 wells)	Extension plan	5,000	
				Groundwater (2 wells)	Existing	4,500	
				Groundwater (2 wells)	Existing	1,200	
				Groundwater (2 wells)	Planned	1,000	
				Groundwater (2 wells)	Existing	900	
				Groundwater (2 wells)	Planned	1,000	
				Groundwater (2 wells)	Existing	1,000	
				Groundwater (2 wells)	Planned	1,000	
				Groundwater (2 wells)	Planned	1,000	
				Groundwater (1 well)	Planned	500	
				Groundwater (1 well)	Planned	500	
				Groundwater (1 well)	Planned	500	
				Groundwater (2 wells)	Planned	1,000	
Song Be	Thu Dau Mot and Thuan An	Thu Dau Mot and Thuan An	Saigon River	Existing	7,500		
				Extension (1)	7,500		1996 (not committed yet) for Thuan An
				Extension (2)	25,000		
			Wells	Existing	5,000		
			Groundwater (4 wells)	Existing	3,700		
			Dong Nai River	Planned	20,000		Tan Ba new plant no water supply
			Wells	Existing	1,000		
			Cam Stream	Planned	5,000		
			Wells	Existing	360		no water supply at present
			Stream/groundwater	Planned	5,000		
			Song Be River	Planned	5,000		no water supply at present (maximum)
			Wells	Existing	500		no water supply at present
			The Son Reservoir	Planned	3,000		
			Stream Springs	Existing	700		to be abandoned
Dac Lac	B. Ma Thuot	Dak Nong	Dak Nong		Planned	1,000	
					Existing		
Dac Lac	B. Ma Thuot	Dak R'Lap	Dak R'Lap		Existing		
					Planned		

Table 2.1 Domestic and Industrial Water Supply in the District and Major Towns (2/4)

Province	Pro. Capital	District	District and major towns	Sources	Stage	Design Capacity m ³ /day	Note							
Lam Dong	Da Lat	Da Lat	Da Lat	Suoi Vang Reservoir	Existing Extension plan	27,000 42,000	by the year 2005							
				Thien Huong treatment plant Than Tho treatment plant	Existing Existing	6,000 4,000	no water supply no water supply no water supply							
				Groundwater (11 wells) Groundwater	Existing Planned	3,020 7,000	by the year 2005							
				Groundwater (3 wells) Groundwater (2 wells) Groundwater	Existing Existing Planned	2,280 1,040 2,160	by the year 2005 no water supply							
				Springs Da Dang Reservoir	Existing Planned	100 1,000	by the year 2005							
				Groundwater (4 wells) Thap Cham/ Da Nhim HPP New Thap Cham	Existing Existing Under-const. Extension	1,200 800 12,000 12,000	Rehabilitation for future use Rehabilitation for future use Commission in 1995 Year 2000 no water supply no water supply							
				Phu Hoi reservoir (Muong Man River) Quao reservoir (Quao R) Da Dung Weir (Dinh River)	Existing planned Existing Extension (1) Extension (2)	15,000 12,000 1,500 500 3,000	by the year 2000 by the year 2000 by the year 2010 no water supply no water supply no water supply							
				Ninh Thuan	Phan Rang	P.Rang-T.Cham, Dong Hai and Ninh Chu	P.Rang-T.Cham, Dong Hai and Ninh Chu							
								Ninh Son Ninh Phuoc						
								Binh Thuan	Phan Thiet	Phan Thiet	Phan Thiet			
Lagi														
Tan Lap Lac Tanh Vo Xu Ma Lam														
Ham Tan	Phan Thiet	Phan Thiet	Phan Thiet											
												Ham Thuan Nam Tanh Linh Duc Linh Ham Thuan Bac (to be continued)		

Table 2.1 Domestic and Industrial Water Supply in the District and Major Towns (3/4)

Province	Pro. Capital	District	District and major towns	Sources	Stage	Design Capacity m ³ /day	Note
Ba Ria-Vung Tau	Ba Ria	Bac Binh	Bac Binh and Phan Ri Cua	Xuong Quang pumping station (Luy River)	Existing	800	
		Tuy Phong Phu Quy	Lien Huong Phu Quy	Groundwater (5 wells)	Extension (1) Extension (2) Existing	1,600 2,600 600	By the year 1997 By the year 2000 no water supply
Dong Nai	Bien Hoa	Ba Ria - Vung Tau and Long Dat	Ba Ria town, Long Son Vung Tau, Long Dien, Long Hai, Phuoc Tinh, Dat Do and Phuoc Hai Phuoc Bui	Dinh River Groundwater (19 wells) Da Den Reservoir (Da Den R)	Existing Planned Existing Planned	20,000 10,000 13,000 100,000	year 1978 extension year 2000
		Xuyen Moc		Groundwater (wells) Phuoc Bui weir Phuoc Bui weir	Planned Planned Planned	1,000 2,000 2,000	by the year 2000 by the year 2000 by the year 2010
		Tan Thanh	Phu My	Groundwater (wells) Groundwater	Existing Planned	600 15,000	by the year 1997
		Chau Duc Bien Hoa	Ngai Giao Bien Hoa	Chau Pha and Suoi Sao Rivers Dong Nai River Springs Thien Tan (DNAI R.)	Planned Planned Planned Existing Under-const.	20,000 225,000 2,000 36,000 100,000 300,000	Construction commencement in 1996 by the year 2010 by the year 2000 commission in 1997
				Groundwater (2 wells)	Planned Existing	480	
				Groundwater (24 wells)	Existing	720	no water supply at present
				Groundwater (3 wells) Reservoir	Existing Planned	420 2,400	no water supply at present no water supply
				Groundwater (6 wells) Groundwater	Existing Planned	5,000 5,000	
				Groundwater (2 wells) Groundwater (1 wells)	Existing Existing	600 400	no water supply

Table 2.1 Domestic and Industrial Water Supply in the District and Major Towns (4/4)

Province	Pro. Capital	District	District and major towns	Sources	Stage	Design Capacity m ³ /day	Note
Ho Chi Minh City	HCMC	12 urban districts, Thu Duc district and parts of Binh Chanh and Nha Be	HochiMinh City, Thu Duc, Binh Chanh and Nha Be	Hoa An Intake (DNAI R.)	Existing	650,000	(first commission in 1966 with 450,000)
				Hoa An Intake (DNAI R.)	Extension/ Rehabilitation	100,000	committed in 1997
				Hoa An Intake (DNAI R.)	Extension Plan	350,000	year 2000
				Hoa An Intake (Dong Nai River)	Extension Plan	400,000	year 2010
				Binh An (Dong Nai River)	Under-const. Extension Plan	100,000	year 1997
				Groundwater(18 wells)	Existing	50,000	year 2000
				Phu Cuong Intake(SGON R)	Under-const	30,000	year 1997
				Phu Cuong Intake(SGON R)	Extension Plan	300,000	year 2000
				Phu Cuong Intake(SGON R)	Extension Plan	300,000	year 2010
				Groundwater (8 wells)	Existing	20,000	year 1993
				Groundwater (10 wells)	Planned	20,000	year 1995
				Groundwater (22 wells)	Planned	60,000	year 2000
Groundwater (3 wells)	Existing	2,880					
Groundwater (2 wells)	Planned	2,400	no water supply				
Long An	Tan An	Can Duoc, Tan Tru, Can Giuoc, Ben Luc, Duc Hoa, Hiep Hoa, Hau Nghia, Duc Hue, Thu Thua	Can Duoc, Tan Tru, Can Giuoc, Ben Luc, Duc Hoa, Hiep Hoa, Hau Nghia, Duc Hue, Thu Thua	Groundwater	Existing	1,000	
				Groundwater (3 wells)	Existing	240	year 1995
				Groundwater	Planned	1,000	
				Groundwater	Existing	120	
				Groundwater	Planned	1,000	
				Groundwater	Existing	1,200	
				Groundwater	Existing	200	
				Groundwater	Existing	300	no water supply
				Groundwater	Existing	120	
				Reservoir plus groundwater	Planned	1,000	
				Groundwater	Existing	960	
				Groundwater	Planned	1,000	

Table 2.2 Estimate of Growth Rates for Urban Population (1/3)

Province	District	District and Major Towns	Urban Population (1989)	Urban Population (1994)	Annual Increase Rate %	Notes
Tay Ninh			(1989)	(1994)		
	Tay Ninh	Tay Ninh	32,881	35,190	1.37	
	Hoa Thanh	Hoa Thanh	18,236	19,187	1.02	
	Trang Bang	Trang Bang	11,237	12,129	1.54	
	Go Dau	Go Dau	21,702	22,438	0.67	
	Ben Cau	Ben Cau	-	-	-	
	Chau Thanh	Chau Thanh	-	-	-	
	Duong Minh Chau	Duong Minh Chau	-	-	-	
	Tan Bien	Tan Bien	-	4,695	1.14	
	Tan Chau	Tan Chau	-	7,718	1.14	
			(84,056)	(88,944)		
Song Be			(1989)	(1994)		
	Thu Dau Mot	Thu Dau Mot	43,849	56,000	5.01	
	Thuan An	Di An	-	15,000	5.01	
		Lai Thieu	-	10,000	5.01	
	Tan Uyen	Tan Uyen	-	10,000	2.00	
	Ben Cat	Ben Cat	-	10,000	2.00	
	Dong Phu	Dong Phu	-	15,000	8.89	25,000 (year 2000)
	Binh Long	Binh Long	-	20,000	1.60	
	Phuoc Long	Phuoc Long	-	20,000	8.89	
	Loc Ninh	Loc Ninh	-	15,000	1.60	
	Bu Dang	Bu Dang	-	10,000	1.60	
			(43,849)	(56,000)		
Dac Lac			(1989)	(2000)		
	Dak Nong	Gia Nghia	3,964	8,302	6.95	2.44% in 2001 onwards
	Dak R'Lap	Dak R'Lap	-	-	-	
			(3,964)	(8,302)		
Lam Dong			(1989)	(1992)		
	Da Lat	Da Lat	102,583	103,558	0.32	
	Cat Tien	Cat Tien	5,306	6,554	7.30	
	Da Teh	Da Teh	8,253	9,763	5.76	
	Da Huoi	Da Huoi	7,634	7,835	0.87	
	Bao Lam	Bao Lam	29,671	34,365	5.02	
	Di Linh	Di Linh	11,406	12,830	4.00	
	Duc Trong	Duc Trong	25,464	28,063	3.29	

Table 2.2 Estimate of Growth Rates for Urban Population (2/3)

Province	District	District and Major Towns	Urban Population	Annual Increase Rate %	Notes	
	Don Duong	Don Duong	11,087	11,848	2.24	
	Lac Duong	Lac Duong	-	-	-	
	Lam Ha	Lam Ha	17,191	19,112	3.59	
			(218,595)	(233,928)		
Ninh Thuan			(1989)	(2000)		
	Phan Rang and Ninh Hai	P.Rang-T.Cham Ninh Chu	71,111	95,122	2.68	
				17,800	2.68	
		Dong Hai		23,000	2.68	
	Ninh Son	Ninh Son	-	-	-	
	Ninh Phuoc	Ninh Phuoc	-	-	-	
			(71,111)	(95,122)		
Binh Thuan			(1989)	(1995)		
	Phan Thiet	Phan Thiet	114,236	-	2.68	
	Ham Tan	Lagi	23,003	-	2.68	
	Ham Thuan Nam	Tan Lap	-	15,500	2.68	
	Tanh Linh	Lac Tanh	-	10,300	2.68	
	Duc Linh	Vo Xu	-	16,900	2.68	
	Ham Thuan Bac	Ma Lam	-	11,300	2.68	
	Bac Binh	Bac Binh	29,504	-	2.68	
		Phan Ri Cua	-	30,500	2.68	
	Tuy Phong	Lien Huong	21,565	-	2.68	
	Phu Quy	Phu Quy	-	-	-	
Ba Ria- Vung Tau	B.Ria-V.Tau	Vung Tau	(1989)	(2000)		
		- Dwellers	123,528	225,000	4.52 (5.60)	350,000 (year 2010)
		- Domestic Tourists		70,000	7.92	150,000 (year 2010)
		- Foreign Tourists		7,000	8.62	16,000 (year 2010)
	and Long Dat	Ba Ria	35,219	62,000	6.83 (5.28)	120,000 (year 2010)
		Long Son		20,000	4.81	32,000 (year 2010)
		Long Hai	-	25,000	3.42	35,000 (year 2010)
		Phuoc Tinh	-	20,000	2.66	26,000 (year 2010)
		Long Dien	34,450	28,000	2.54 (-)	36,000 (year 2010)
		Dat Do	-	28,000	2.54	36,000 (year 210)
		Phuoc Hai	-	15,000	3.90	22,000 (year 2010)

Table 2.2 Estimate of Growth Rates for Urban Population (3/3)

Province	District	District and Major Towns	Urban Population		Annual Increase Rate %	Notes
	Xuyen Moc	Phuoc Buu	-	12,000	5.24	20,000 (year 2010)
	Tan Thanh	Phu My		200,000	11.61	600,000 (year 2010)
	Chau Duc	Ngai Giao		15,000	1.84	18,000 (year 2010)
				(625,000)		(1,295,000)
Dong Nai			(1989)	(1995)		
	Bien Hoa	Bien Hoa	273,879	305,000	8.09 (1.81)	450,000 (year 2000) 700,000 (year 2010)
		Tam Phuoc			25.89	20,000 (year 2000) 200,000 (year 2010)
	Long Thanh	Long Thanh	18,044	22,000	6.4 (3.36)	30,000 (year 2000) 50,000 (year 2010)
	Nhon Trach	Nhon Trach	-	15,900	49.82	120,000 (year 2000) 500,000 (year 2010)
	Thong Nhat	Thong Nhat	-	13,000	9.00	20,000 (year 2000)
	Xuan Loc	Gia Ray	71,177	11,000	3.4 (-)	13,000 (year 2000)
	Long Khanh	Xuan Loc	-	46,000	2.48	52,000 (year 2000)
	Vinh Cuu	Vinh An	31,492	49,000	2.34	55,000 (year 2000)
	Tan Phu	Tan Phu	35,747	19,000	2.02 (-)	21,000 (year 2000)
	Dinh Quan	Dinh Quan	-	38,000	2.41	42,800 (year 2000)
				(518,900)		(651,800)
HCMC			(1989)	(1995)		
	17 districts		3,720,017	4,483,050	2.46 (3.16)	
	Cu Chi	Cu Chi	214,378	248,221	2.47	
			3,934,395	4,731,271		
Long An			(1989)	(1994)		
	Can Duoc	Can Duoc	10,509	9,500	2.89 (-)	
	Tan Tru	Tan Tru	-	4,500	2.89	
	Can Giuoc	Can Giuoc	9,617	8,500	2.89 (-)	
	Ben Luc	Ben Luc	15,593	18,000	2.91	
	Duc Hoa	Huu Nghia	29,530	18,000	4.04	
		Hiép Hoa		8,500	4.04	
		Duc Hoa		9,500	4.04	
	Duc Hue	Duc Hue	-	5,000	2.89	
	Thu Thua	Thu Thua	14,295	14,500	0.29	
			(59,418)	(68,500)		

Table 2.3 Proposed Industrial Development Zones in the Study Area

Name	Accumulated Development Area, ha		Unit Water Demand m ³ /ha/day
	2000	2010	
<u>Ho Chi Minh City</u>			
Tan Thuan	300	300	60
Linh Trung	60	60	60
Hiep Phuoc	200	800	60
Cat Lai	100	400	60
Bac Thu Duc	100	500	60
Tay Bac Cu Chi	-	300	50
Tan Qui Cu Chi	-	150	50
<u>Dong Nai Province</u>			
Bien Hoa I	310	310	50
Bien Hoa II	376	376	50
Amata	400	754	50
Ho Nai 3&4	200	600	50
Tam Phuoc	200	1,000	50
An Phuoc	100	900	50
Long Thanh- Nhon Trach	600	2,520	50
<u>Ba Ria-Vung Tau Province</u>			
Vedan	120	120	50
Northern Go Dau	236	236	50
Phu My-My Xuan	1,000	2,000	50
Thi Vai-Cai Mep Harbour	200	450	10
Long Huong & Long Son	200	400	50
Ben Dinh & Phuoc Long	200	540	50
<u>Song Be Province</u>			
An Binh	100	200	50
Thuan An	150	300	50

Table 2.4 Projected Urban Population (1/3)

Province	District	District and Major Towns	Urban Population		Annual Increase Rate (%)	Projected Population	
			Base Year	Number		2000	2015
Tay Ninh							
	Tay Ninh	Tay Ninh	1994	35,190	1.37	38,184	46,829
	Hoa Thanh	Hoa Thanh	1994	19,187	1.02	20,392	23,744
	Trang Bang	Trang Bang	1994	12,129	1.54	13,294	16,719
	Go Dau	Go Dau	1994	22,438	0.67	23,355	25,816
	Ben Cau	Ben Cau	-	-	-	-	-
	Chau Thanh	Chau Thanh	-	-	-	-	-
	Duong Minh Chau	Duong Minh Chau	1994	-	-	-	-
	Tan Bien	Tan Bien	1994	4,695	1.14	5,025	5,957
	Tan Chau	Tan Chau	1994	7,718	1.14	8,261	9,792
				(101,357)			
Song Be							
	Thu Dau Mot	Thu Dau Mot	1994	56,000	5.01	75,088	156,326
	Thuan An	Di An	1994	15,000	5.01	20,113	41,873
		Lai Thieu	1994	10,000	5.01	13,409	27,915
	Tan Uyen	Tan Uyen	1994	10,000	2.00	11,262	15,157
	Ben Cat	Ben Cat	1994	10,000	2.00	11,262	15,157
	Dong Phu	Dong Phu	1994	15,000	8.89	25,000	89,693
	Binh Long	Binh Long	1994	20,000	1.60	21,998	27,912
	Phuoc Long	Phuoc Long	1994	20,000	8.89	33,339	119,613
	Loc Ninh	Loc Ninh	1994	15,000	1.60	16,499	20,934
	Bu Dang	Bu Dang	1994	10,000	1.60	10,999	13,956
				(181,000)			
Dac Lac							
	Dak Nong	Gia Nghia	2000	8,302	2.44	8,302	11,919
	Dak R'Lap	Dak R'Lap	-	-	-	-	-
				(8,302)			
Lam Dong							
	Da Lat	Da Lat	1992	103,558	0.32	106,239	111,454
	Cat Tien	Cat Tien	1992	6,554	7.30	11,516	33,136
	Da Teh	Da Teh	1992	9,763	5.76	15,281	35,398
	Da Huoi	Da Huoi	1992	7,835	0.87	8,397	9,562
	Bao Lam	Bao Lam	1992	34,365	5.02	50,850	106,016
	Di Linh	Di Linh	1992	12,830	4.00	17,559	31,622
	Duc Trong	Duc Trong	1992	28,063	3.29	36,358	59,085
	Don Duong	Don Duong	1992	11,848	2.24	14,145	19,721
	Lac Duong	Lac Duong	-	-	-	-	-
	Lam Ha	Lam Ha	1992	19,112	3.59	25,342	43,015
				(233,928)			

Table 2.4 Projected Urban Population (2/3)

Province	District	District and Major Towns	Urban Population		Annual Increase Rate (%)	Projected Population	
			Base Year	Number		2000	2015
Ninh Thuan							
	Phan Rang and Ninh Hai	P.Rang-T.Cham	2000	95,122	2.68	95,122	141,439
		Ninh Chu	2000	17,800	2.68	17,800	26,467
		Dong Hai	2000	23,000	2.68	23,000	34,199
	Ninh Son	Ninh Son	-	-	-	-	-
	Ninh Phuoc	Ninh Phuoc	-	-	-	-	-
				(135,922)			
Binh Thuan							
	Phan Thiet	Phan Thiet	1989	114,236	2.68	152,808	227,214
	Ham Tan	Lagi	1989	23,003	2.68	30,770	45,753
	Ham Thuan Nam	Tan Lap	1995	15,500	2.68	17,691	26,306
	Tanh Linh	Lac Tanh	1995	10,300	2.68	11,756	17,481
	Duc Linh	Vo Xu	1995	16,900	2.68	19,289	28,682
	Ham Thuan Bac	Ma Lam	1995	11,300	2.68	12,898	19,178
	Bac Binh	Bac Binh	1989	29,504	2.68	39,466	58,683
		Phan Ri Cua	1995	30,500	2.68	34,812	51,763
	Tuy Phong	Lien Huong	1989	21,565	2.68	28,847	42,893
	Phu Quy	Phu Quy	-	-	-	-	-
				(272,808)			
Ba Ria-Vung Tau							
	B.Ria-V.Tau	Vung Tau					
		- Dwellers	2000	225,000	4.52	225,000	436,690
		- Domestic Tourists	2000	70,000	7.92	70,000	219,597
		- Foreign Tourists	2000	7,000	8.62	7,000	24,196
	and Long Dat	Ba Ria	2000	62,000	6.83	62,000	167,028
		Long Son	2000	20,000	4.81	20,000	40,464
		Long Hai	2000	25,000	3.42	25,000	41,401
		Phuoc Tinh	2000	20,000	2.66	20,000	29,652
		Long Dien	2000	28,000	2.54	28,000	40,790
		Dat Do	2000	28,000	2.54	28,000	40,790
		Phuoc Hai	2000	15,000	3.90	15,000	26,627
	Xuyen Moc	Phuoc Buu	2000	12,000	5.24	12,000	25,816
	Tan Thanh	Phu My	2000	200,000	11.61	200,000	1,038,907
	Chau Duc	Ngai Giao	2000	15,000	1.84	15,000	19,718
				(727,000)			

Table 2.4 Projected Urban Population (3/3)

Province	District	District and Major Towns	Urban Population		Annual Increase Rate (%)	Projected Population	
			Base Year	Number		2000	2015
Dong Nai							
	Bien Hoa	Bien Hoa	1995	305,000	8.09 (4.52) ¹⁾	450,000	873,381
		Tam Phuoc	2000	20,000	25.89	20,000	632,264
	Long Thanh	Long Thanh	1995	22,000	6.4 (5.24) ¹⁾	30,000	64,541
	Nhon Trach	Nhon Trach	1995	15,900	49.82 (15.34) ¹⁾	120,000	1,020,658
	Thong Nhat	Thong Nhat	1995	13,000	9.00	20,000	72,850
	Xuan Loc	Gia Ray	1995	11,000	3.40	13,000	21,466
	Long Khanh	Xuan Loc	1995	46,000	2.48	52,000	75,091
	Vinh Cuu	Vinh An	1995	49,000	2.34	55,000	77,812
	Tan Phu	Tan Phu	1995	19,000	2.02	21,000	28,346
	Dinh Quan	Dinh Quan	1995	38,000	2.41	42,800	61,176
				(538,900)			
HCMC							
	17 districts		1995	4,483,050	2.46	5,062,270	7,288,877
	Cu Chi	Cu Chi	1995	248,221	2.47	280,429	404,365
				(4,731,271)			
Long An							
	Can Duoc	Can Duoc	1994	9,500	2.89	11,271	17,281
	Tan Tru	Tan Tru	1994	4,500	2.89	5,339	8,186
	Can Giuoc	Can Giuoc	1994	8,500	2.89	10,085	15,462
	Ben Luc	Ben Luc	1994	18,000	2.91	21,381	32,876
	Duc Hoa	Huu Nghia	1994	18,000	4.04	22,828	41,350
		Hiep Hoa	1994	8,500	4.04	10,780	19,527
		Duc Hoa	1994	9,500	4.04	12,048	21,824
	Duc Hue	Duc Hue	1994	5,000	2.89	5,932	9,095
	Thu Thua	Thu Thua	1994	14,500	0.29	14,754	15,409
				(96,000)			

Note: 1) Population in the year 2015 is projected with an annual increase rate obtained by relying on the 2000 and 2010 projected population data as given in the parentheses.

Table 2.5 Conditions for Water Demand Projection (1/4)

Province	District	District and Major Town	Water Consumption Rate, l/day/person		Aerial Service Rate, %		Other Uses, %			Loss Rate %	
			At present	2000-2010	2010 onward	At present	2001 onward	Industrial	Commercial		Public
Tay Ninh	Tay Ninh	Tay Ninh	100	100	120	80	90	2	8	-	50
	Hoa Thanh	Hoa Thanh	100	100	120	80	90	2	8	-	50
	Trang Bang	Trang Bang	100	100	120	80	90	2	8	-	50
	Go Dau	Go Dau	100	100	120	80	90	2	8	-	50
	Ben Cau	Ben Cau	100	100	120	80	90	2	8	-	50
	Chau Thanh	Chau Thanh	100	100	120	80	90	2	8	-	50
	Duong Minh Chau	Duong Minh Chau	100	100	120	80	90	2	8	-	50
	Tan Bien	Tan Bien	100	100	120	80	90	2	8	-	50
	Tan Chau	Tan Chau	100	100	120	80	90	2	8	-	50
	Song Be	Thu Dau Mot	Thu Dau Mot	130	150	180	70	80	30	10	-
Thuan An		Di An	130	150	180	70	80	*1)	15	-	30
Tan Uyen		Lai Thieu	130	150	180	70	80	*1)	15	-	30
Ben Cat		Tan Uyen	100	100	120	70	70	20	5	-	30
Dong Phu		Ben Cat	100	100	120	70	70	30	5	-	30
Binh Long		Dong Phu	100	100	120	70	70	20	5	-	30
Phuoc Long		Binh Long	100	100	120	70	70	20	5	-	30
Loc Ninh		Phuoc Long	100	100	120	70	70	20	5	-	30
Bu Dang		Loc Ninh	100	100	120	70	70	20	5	-	30
		Bu Dang	100	100	120	70	70	20	5	-	30
Dac Lac	Dak Nong	Gia Nghia	130	130	130	70	80	25	12	10	40
	Dak R'Lap	Dak R'Lap		no urban area							

Note: 1) Industrial water demand is estimated based on the development plan of industrial estates given in Table 2.3.

Table 2.5 Conditions for Water Demand Projection (2/4)

Province	District	District and Major Town	Water Consumption Rate, l/day/person		Aerial Service Rate, %		Other Uses, %			Loss Rate %		
			At present	2000-2010	2010 onward	At present	2001 onward	Industrial	Commercial		Public	
Lam Dong	Da Lat	Da Lat	100	120	150	80	95	3	34	23	28	
	Cat Tien	Cat Tien	50	100	100	80	95	-	20	3	30	
	Da Teh	Da Teh	50	100	100	80	95	-	20	3	30	
	Da Huoi	Da Huoi	50	100	100	80	95	-	20	3	30	
	Bao Lam	Bao Lam	50	100	100	80	95	-	30	20	30	
	Di Linh	Di Linh	50	100	100	80	95	-	17	28	30	
	Duc Trong	Duc Trong	50	100	100	80	95	-	20	3	30	
	Don Duong	Don Duong	50	100	100	80	95	-	20	3	30	
	Lac Duong	Lac Duong	no urban area									
	Lam Ha	Lam Ha	50	100	100	80	95	-	20	3	30	
Ninh Thuan	Phan Rang	P.Rang-T.Cham	130	130	130	10	83	17	25	-	36	
	Ninh Hai	Ninh Chu	130	130	130	10	83	17	25	-	36	
	Ninh Son	Dong Hai	130	130	130	10	83	17	25	-	36	
	Ninh Phuoc	Ninh Son	no urban area									
		Ninh Phuoc	no urban area									
Binh Thuan	Phan Thiet	Phan Thiet	80	120	120	25	90	12	20	-	35	
	Ham Tan	Lagi	80	120	120	25	90	-	7	-	35	
	Ham Thuan Nam	Tan Lap	80	120	120	25	90	-	7	-	35	
	Tanh Linh	Lac Tanh	80	120	120	25	90	-	7	-	35	
	Duc Linh	Vo Xu	80	120	120	25	90	-	7	-	35	
	Ham Thuan Bac	Ma Lam	80	120	120	25	90	-	7	-	35	
	Bac Binh	Bac Binh	80	120	120	25	90	-	7	-	35	
		Phan Ri Cua	80	120	120	25	90	-	7	-	35	

Table 2.5 Conditions for Water Demand Projection (3/4)

Province	District	District and Major Town	Water Consumption Rate, l/day/person		Aerial Service Rate, %		Other Uses, %			Loss Rate %		
			At present	2000-2010	2010 onward	At present	2001 onward	Industrial	Commercial		Public	
Ba Ria-Vung Tau	Tuy Phong Phu Quy	Lien Khuong Phu Quy	80	120	120	25	90	-	7	-	35	
			no urban area									
	Ba Ria-Vung Tau	Vung Tau	Vung Tau ¹⁾	120	130	200	60	80	70	75	-	25
			Ba Ria	100	100	150	60	80	70	75	-	25
			Long Son	-	100	150	60	80	70	75	-	25
			Long Hai	100	100	150	60	80	70	75	-	25
			Phuoc Tinh	100	100	150	60	80	70	75	-	25
			Long Dien	100	100	150	60	80	70	75	-	25
			Dat Do	100	100	150	60	80	70	75	-	25
			Phuoc Hai	100	100	150	60	80	70	75	-	25
			Phuoc Bui	80	100	150	60	80	15	5	5	25
			Phu My	80	130	180	60	80	**2)	10	-	25
			Chau Duc	80	100	150	60	80	15	5	5	25
			Dong Nai	Bien Hoa	Bien Hoa	120	150	180	80	100	**2)	15
Tan Phuoc	-	130			180	60	80	**2)	10	-	25	
Long Thanh	-	130			180	60	80	15	15	-	25	
Nhon Trach	100	130			180	80	80	**2)	15	-	25	
Thong Nhat	100	120			120	80	80	15	5	5	30	
Xuan Loc	100	120			120	80	80	15	5	5	30	
Long Khanh	100	120			120	80	80	15	5	5	30	
Vinh Cuu	100	120			120	80	80	15	5	5	30	
Tan Phu	100	120			120	80	80	15	5	5	30	

Note: 1) Tourist demand in Vung Tau is estimated at 100 lit./day for domestic tourists and 300 lit./day for foreign tourists in the year 2000, while at 150 lit./day for domestic tourists and 500 lit./day for foreign tourists in the year 2015. It is noted that the aerial service rate is estimated at 1.0 for tourist demand.

2) Industrial water demand is estimated based on the development plan of industrial estates given in Table 2.3.

Table 2.5 Conditions for Water Demand Projection (4/4)

Province	District	District and Major Town	Water Consumption Rate, l/day/person		Aerial Service Rate, %		Other Uses, %			Loss Rate %	
			At present	2000-2010	2010 onward	At present	2001 onward	Industrial	Commercial		Public
HCMC	Dinh Quan	Dinh Quan	100	120	120	80	90	15	5	5	30
	17 Districts		150	150	150	56	78	22	16	34	38
Long An	Cu Chi	Cu Chi	100	100	100	50	50	*1)	25	-	30
	Can Duoc	Can Duoc	50	50	50	50	90	-	10	-	40
	Tan Tru	Tan Tru	50	50	50	50	90	-	10	-	40
	Can Giuoc	Can Giuoc	50	50	50	50	90	-	10	-	40
	Ben Luc	Ben Luc	50	50	50	50	90	-	10	-	40
	Duc Hoa	Huu Nghia	50	50	50	50	90	-	10	-	40
		Hiep Hoa	50	50	50	50	90	-	10	-	40
		Duc Hoa	50	50	50	50	90	-	10	-	40
		Duc Hue	50	50	50	50	90	-	10	-	40
		Thu Thua	Thu Thua	50	50	50	50	90	-	10	-

Note: 1) Industrial water demand is estimated based on that an area of 450 ha is developed as industrial estates (Tay Bac and Tan Qui) by the year 2010.

Table 2.6 Projected Water Demand of Urban Centres (1/3)

Province	District	District and Major Towns	Projected		Water Demand, m ³ /day					
			Population		2000			2015		
			2000	2015	Domestic	Others	Total	Domestic	Others	Total
Tay Ninh										
	Tay Ninh	Tay Ninh	38,184	46,829	4,582	458	5,040	7,586	759	8,345
	Hoa Thanh	Hoa Thanh	20,392	23,744	2,447	245	2,692	3,847	385	4,231
	Trang Bang	Trang Bang	13,294	16,719	1,595	160	1,755	2,708	271	2,979
	Go Dau	Go Dau	23,355	25,816	2,803	280	3,083	4,182	418	4,600
	Ben Cau	Ben Cau	-	-	-	-	-	-	-	-
	Chau Thanh	Chau Thanh	-	-	-	-	-	-	-	-
	Duong Minh Chau	Duong Minh Chau	-	-	-	-	-	-	-	-
	Tan Bien	Tan Bien	5,025	5,957	603	60	663	965	97	1,062
	Tan Chau	Tan Chau	8,261	9,792	991	99	1,090	1,586	159	1,745
					TOTAL			14,323		22,962
Song Be										
	Thu Dau Mot	Thu Dau Mot	75,088	156,326	10,250	4,100	14,349	29,264	11,706	40,970
	Thuan An	Di An	20,113	41,873	2,745	6,912	9,657	7,839	14,176	22,014
		Lai Thieu	13,409	27,915	1,830	10,025	11,855	5,226	20,284	25,510
	Tan Uyen	Tan Uyen	11,262	15,157	1,025	256	1,281	1,655	414	2,069
	Ben Cat	Ben Cat	11,262	15,157	1,025	359	1,383	1,655	579	2,234
	Dong Phu	Dong Phu	25,000	89,693	2,275	569	2,844	9,795	2,449	12,243
	Binh Long	Binh Long	21,998	27,912	2,002	500	2,502	3,048	762	3,810
	Phuoc Long	Phuoc Long	33,339	119,613	3,034	758	3,792	13,062	3,265	16,327
	Loc Ninh	Loc Ninh	16,499	20,934	1,501	375	1,877	2,286	572	2,858
	Bu Dang	Bu Dang	10,999	13,956	1,001	250	1,251	1,524	381	1,905
					TOTAL			50,792		129,940
Dac Lac										
	Dak Nong	Gia Nghia	8,302	11,919	1,058	497	1,555	1,735	816	2,551
	Dak R'Lap	Dak R'Lap	-	-	-	-	-	-	-	-
					TOTAL			1,555		2,551
Lam Dong										
	Da Lat	Da Lat	106,239	111,454	13,055	7,833	20,887	20,329	12,198	32,527
	Cat Tien	Cat Tien	11,516	33,136	1,198	275	1,473	4,092	941	5,034
	Da Teh	Da Teh	15,281	35,398	1,589	366	1,955	4,372	1,005	5,377
	Da Huoi	Da Huoi	8,397	9,562	873	201	1,074	1,181	272	1,453
	Bao Lam	Bao Lam	50,850	106,016	5,288	2,644	7,933	13,093	6,547	19,640
	Di Linh	Di Linh	17,559	31,622	1,826	822	2,648	3,905	1,757	5,663
	Duc Trong	Duc Trong	36,358	59,035	3,781	870	4,651	7,297	1,678	8,975
	Don Duong	Don Duong	14,145	19,721	1,471	338	1,809	2,436	560	2,996
	Lac Duong	Lac Duong	-	-	-	-	-	-	-	-
	Lam Ha	Lam Ha	25,342	43,015	2,636	606	3,242	5,312	1,222	6,534
					TOTAL			45,672		88,197

Table 2.6 Projected Water Demand of Urban Centres (2/3)

Province	District	District and Major Towns	Projected Population		Water Demand, m ³ /day					
			2000	2015	2000			2015		
					Domestic	Others	Total	Domestic	Others	Total
Ninh Thuan										
	Phan Rang and Ninh Hai	P.Rang-T.Cham Ninh Chu Dong Hai	95,122 17,800 23,000	141,439 26,467 34,199	1,682 315 407	706 132 171	2,388 447 577	20,755 3,884 5,019	8,717 1,631 2,108	29,473 5,515 7,126
	Ninh Son	Ninh Son	-	-	-	-	-	-	-	-
	Ninh Phuoc	Ninh Phuoc	-	-	-	-	-	-	-	-
							TOTAL	3,412		42,114
Binh Thuan										
	Phan Thiet	Phan Thiet	152,808	227,214	6,189	1,980	8,169	33,128	10,601	43,729
	Ham Tan	Lagi	30,770	45,753	1,246	87	1,333	6,671	467	7,138
	Ham Thuan Nam	Tan Lap	17,691	26,306	716	50	767	3,835	268	4,104
	Tanh Linh	Lac Tanh	11,756	17,481	476	33	509	2,549	178	2,727
	Duc Linh	Vo Xu	19,289	28,682	781	55	836	4,182	293	4,475
	Ham Thuan Bac	Ma Lam	12,898	19,178	522	37	559	2,796	196	2,992
	Bac Binh	Bac Binh	39,466	58,683	1,598	112	1,710	8,556	599	9,155
		Phan Ri Cua	34,812	51,763	1,410	99	1,509	7,547	528	8,075
	Tuy Phong	Lien Huong	28,847	42,893	1,168	82	1,250	6,254	438	6,691
	Phu Quy	Phu Quy	-	-	-	-	-	-	-	-
							TOTAL	16,642		89,085
Ba Ria-										
	Vung Tau	B.Ria-V.Tau								
		Vung Tau								
		- Dwellers	225,000	436,690	21,938	31,809	53,747	87,338	126,640	213,978
		- Domestic Tourists	70,000	219,597	8,750	-	8,750	41,175	-	41,175
		- Foreign Tourists	7,000	24,196	2,625	-	2,625	15,123	-	15,123
		Total	302,000	680,484	33,313	31,809	65,122	143,635	126,640	270,275
	and Long Dat	Ba Ria	62,000	167,028	4,650	6,743	11,393	25,054	36,329	61,383
		Long Son	20,000	40,464	1,500	2,175	3,675	6,070	8,801	14,871
		Long Hai	25,000	41,401	1,875	2,719	4,594	6,210	9,005	15,215
		Phuoc Tinh	20,000	29,652	1,500	2,175	3,675	4,448	6,449	10,897
		Long Dien	28,000	40,790	2,100	3,045	5,145	6,119	8,872	14,990
		Dat Do	28,000	40,790	2,100	3,045	5,145	6,119	8,872	14,990
		Phuoc Hai	15,000	26,627	1,125	1,631	2,756	3,994	5,791	9,785
	Xuyen Moc	Phuoc Bau	12,000	25,816	900	225	1,125	3,872	968	4,841
	Tan Thanh	Phu My	200,000	1,038,907	19,500	64,450	83,950	187,003	143,700	330,704
	Chau Duc	Ngai Giao	15,000	19,718	1,125	281	1,406	2,958	739	3,697
							TOTAL	187,986		751,648

Table 2.6 Projected Water Demand of Urban Centres (3/3)

Province	District	District and Major Towns	Projected Population		Water Demand, m ³ /day					
			2000	2015	2000			2015		
					Domestic	Others	Total	Domestic	Others	Total
Dong Nai										
	Bien Hoa	Bien Hoa	450,000	873,381	67,500	90,500	158,000	196,511	156,977	353,487
		Tam Phuoc	20,000	632,264	1,950	18,945	20,895	113,808	130,131	243,938
	Long Thanh	Long Thanh	30,000	64,541	2,925	878	3,803	11,617	3,485	15,103
	Nhon Trach	Nhon Trach	120,000	1,020,658	15,600	39,840	55,440	183,719	185,058	368,776
	Thong Nhat	Thong Nhat	20,000	72,850	2,496	624	3,120	9,092	2,273	11,365
	Xuan Loc	Gia Ray	13,000	21,466	1,622	406	2,028	2,679	670	3,349
	Long Khanh	Xuan Loc	52,000	75,091	6,490	1,622	8,112	9,371	2,343	11,714
	Vinh Cuu	Vinh An	55,000	77,812	6,864	1,716	8,580	9,711	2,428	12,139
	Tan Phu	Tan Phu	21,000	28,346	2,621	655	3,276	3,538	884	4,422
	Dinh Quan	Dinh Quan	42,800	61,176	5,341	1,335	6,677	7,635	1,909	9,543
						TOTAL	269,930			1,033,836
HCMC										
	17 districts	-	5,062,270	7,288,877	586,818	420,162	1,006,980	1,176,862	842,633	2,019,495
	Cu Chi	Cu Chi	280,429	404,365	18,228	4,557	22,785	26,284	35,821	62,105
						TOTAL	1,029,765			2,081,600
Long An										
	Can Duoc	Can Duoc	11,271	17,281	394	39	434	1,089	109	1,198
	Tan Tru	Tan Tru	5,339	8,186	187	19	206	516	52	567
	Can Giuoc	Can Giuoc	10,085	15,462	353	35	388	974	97	1,071
	Ben Luc	Ben Luc	21,381	32,876	748	75	823	2,071	207	2,278
	Duc Hoa	Huu Nghia	22,828	41,350	799	80	879	2,605	261	2,866
		Hiep Hoa	10,780	19,527	377	38	415	1,230	123	1,353
		Duc Hoa	12,048	21,824	422	42	464	1,375	137	1,512
	Duc Hue	Duc Hue	5,932	9,095	208	21	228	573	57	630
	Thu Thua	Thu Thua	14,754	15,409	516	52	568	971	97	1,068
						TOTAL	4,405			12,544
GRAND TOTAL							1,624,484			4,254,478

Table 2.7 Future Water Balance (1/3)

Province	District	District and Major Towns	Water Demand		Supply Capacity			Deficit	
			2000	2015	Existing	by 2000	by 2015	in 2000	in 2015
			(m ³ /day)						
Tay Ninh									
	Tay Ninh	Tay Ninh	5,040	8,345	9,700	6,000			
	Hoa Thanh	Hoa Thanh	2,692	4,231	-	-			
		Sub-Total	7,732	12,576	9,700	6,000		0	0
	Trang Bang	Trang Bang	1,755	2,979	900	1,000	-	0	1,079
	Go Dau	Go Dau	3,083	4,600	1,000	1,000	-	1,083	2,600
	Ben Cau	Ben Cau	-	-	-	1,000	-	0	0
	Chau Thanh	Chau Thanh	-	-	-	500	-	0	0
	Duong Minh Chau	Duong Minh Chau	-	-	-	500	-	0	0
	Tan Bien	Tan Bien	663	1,062	-	500	-	163	562
	Tan Chau	Tan Chau	1,090	1,745	-	1,000	-	90	745
		TOTAL						1,337	4,986
Song Be									
	Thu Dau Mot	Thu Dau Mot	14,349	40,970	12,500	7,500			
	Thuan An	Di An	9,657	22,014	3,700	25,000	20,000		
		Lai Thieu	11,855	25,510	16,200	32,500	20,000		
		Sub-Total	35,861	88,494	32,400	65,000	40,000	0	0
	Tan Uyen	Tan Uyen	1,281	2,069	-	-	-	1,281	2,069
	Ben Cat	Ben Cat	1,383	2,234	1,000	-	-	383	1,234
	Dong Phu	Dong Phu	2,844	12,243	-	5,000	-	0	7,243
	Binh Long	Binh Long	2,502	3,810	360	5,000	-	0	0
	Phuoc Long	Phuoc Long	3,792	16,327	-	500	-	3,292	15,827
	Loc Ninh	Loc Ninh	1,877	2,858	500	-	-	1,377	2,358
	Bu Dang	Bu Dang	1,251	1,905	-	3,000	-	0	0
		TOTAL						6,334	28,731
Dac Lac									
	Dak Nong	Gia Nghia	1,555	2,551	700	1,000	-	0	851
	Dak R'Lap	Dak R'Lap	-	-	-	-	-	0	0
		TOTAL						-	851
Lam Dong									
	Da Lat	Da Lat	20,887	32,527	37,000	-	42,000	0	0
	Cat Tien	Cat Tien	1,473	5,034	-	-	-	1,473	5,034
	Da Teh	Da Teh	1,955	5,377	-	-	-	1,955	5,377
	Da Huoi	Da Huoi	1,074	1,453	-	-	-	1,074	1,453
	Bao Lam	Bao Lam	7,933	19,640	3,020	-	7,000	4,913	9,620
	Di Linh	Di Linh	2,648	5,663	2,280	-	-	368	3,383
	Duc Trong	Duc Trong	4,651	8,975	1,040	-	2,160	3,611	5,775
	Don Duong	Don Duong	1,809	2,996	-	-	-	1,809	2,996
	Lac Duong	Lac Duong	-	-	100	-	-	0	0
	Lam Ha	Lam Ha	3,242	6,534	-	-	1,000	3,242	5,534
		TOTAL						18,445	39,171

Table 2.7 Future Water Balance (2/3)

Province	District	District and Major Towns	Water Demand		Supply Capacity			Deficit	
			2000	2015	Existing	by 2000	by 2015	in 2000	in 2015
			(m ³ /day)						
Ninh Thuan									
	Phan Rang and Ninh Hai	P.Rang-T.Cham Ninh Chu Dong Hai	2,388 447 577	29,473 5,515 7,126					
		Sub-Total	3,412	42,114	14,000	12,000	-	0	16,114
	Ninh Son	Ninh Son	-	-	-	-	-	0	0
	Ninh Phuoc	Ninh Phuoc	-	-	-	-	-	0	0
		TOTAL						-	16,114
Binh Thuan									
	Phan Thiet	Phan Thiet	8,169	43,729	15,000	12,000	-	0	16,729
	Ham Tan	Lagi	1,333	7,138	1,500	500	3,000	0	2,138
	Ham Thuan Nam	Tan Lap	767	4,104	-	-	-	767	4,104
	Tanh Linh	Lac Tanh	509	2,727	-	-	-	509	2,727
	Duc Linh	Vo Xu	836	4,475	-	-	-	836	4,475
	Ham Thuan Bac	Ma Lam	559	2,992	-	-	-	559	2,992
	Bac Binh	Bac Binh Phan Ri Cua	1,710 1,509	9,155 8,075					
		Sub-Total	3,219	17,230	-	-	-	3,219	17,230
	Tuy Phong	Lien Huong	1,250	6,691	600	-	-	650	6,091
	Phu Quy	Phu Quy	-	-	-	-	-	0	0
		TOTAL						6,540	56,485
Ba Ria-Vung Tau									
	Vung Tau	B.Ria-V.Tau Vung Tau							
		- Dwellers	53,747	213,978					
		- Domestic Tourists	8,750	41,175					
		- Foreign Tourists	2,625	15,123					
		Sub-Total	65,122	270,275					
	and Long Dat	Ba Ria Long Son Long Hai Phuoc Tinh Long Dien Dat Do Phuoc Hai	11,393 3,675 4,594 3,675 5,145 5,145 2,756	61,383 14,871 15,215 10,897 14,990 14,990 9,785					
		Sub-Total ¹⁾	101,504	412,407	33,000	110,000	-	0	269,407
	Xuyen Moc	Phuoc Bau	1,125	4,841	-	3,000	2,000	0	0
	Tan Thanh	Phu My	83,950	330,704	600	35,000	225,000	48,350	70,104
	Chau Duc	Ngai Giao	1,406	3,697	-	2,000	-	0	1,697
		TOTAL						48,350	341,208

Note: 1) Future water balance for Vung Tau, Ba Ria, Long Son, Long Hai, Phuoc Tinh, Long Dien, Dat Do and Phuoc Hai is calculated by treating as a water supply system.

Table 2.7 Future Water Balance (3/3)

Province	District	District and Major Towns	Water Demand		Supply Capacity			Deficit	
			2000	2015	Existing	by 2000	by 2015	in 2000	in 2015
			(m ³ /day)						
Dong Nai									
	Bien Hoa	Bien Hoa	158,000	353,487					
		Tam Phuoc	20,895	243,938					
		Sub-Total	178,895	597,426	36,480	100,000	300,000	42,415	160,946
	Long Thanh	Long Thanh	3,803	15,103	720	-	-	3,083	14,383
	Nhon Trach	Nhon Trach	55,440	368,776	-	-	-	55,440	368,776
	Thong Nhat	Thong Nhat	3,120	11,365	-	-	-	3,120	11,365
	Xuan Loc	Gia Ray	2,028	3,349	420	2,820	-	0	109
	Long Khanh	Xuan Loc	8,112	11,714	5,000	5,000	-	0	1,714
	Vinh Cuu	Vinh An	8,580	12,139	600	-	-	7,980	11,539
	Tan Phu	Tan Phu	3,276	4,422	400	-	-	2,876	4,022
	Dinh Quan	Dinh Quan	6,677	9,543	-	-	-	6,677	9,543
								TOTAL	121,590
									582,396
HCMC									
	17 districts	-	1,006,980	2,019,495	700,000	620,000	700,000	0	0
	Cu Chi	Cu Chi	22,785	62,105	2,000	2,400	-	18,385	57,705
								TOTAL	18,385
									57,705
Long An									
	Can Duoc	Can Duoc	434	1,198	1,000	-	-	0	198
	Tan Tru	Tan Tru	206	567	240	1,240	-	0	0
	Can Giuoc	Can Giuoc	388	1,071	120	1,120	-	0	0
	Ben Luc	Ben Luc	823	2,278	1,200	-	-	0	1,078
	Duc Hoa	Huu Nghia	879	2,866	300	-	-	579	2,566
		Hiep Hoa	415	1,353	-	-	-	415	1,353
		Duc Hoa	464	1,512	200	-	-	264	1,312
	Duc Hue	Duc Hue	228	630	120	1,000	-	0	0
	Thu Thua	Thu Thua	568	1,068	960	1,000	-	0	0
								TOTAL	1,258
									6,507
GRAND TOTAL								222,238	1,134,153

Table 2.8 Costs to Be Invested for Future Water Supply Development (1/3)

Province	District	District and Major Towns	Unit Price		Development Amount, m ³ /day		Investment Cost, thousand US\$	
			Water Source ¹⁾	US\$/m ³	by 2000	by 2015	by 2000	by 2015
Tay Ninh								
	Tay Ninh	Tay Ninh						
	Hoa Thanh	Hoa Thanh						
		Sub-Total	Surface	250	6,000	-	1,500	-
	Trang Bang	Trang Bang	Ground	500	1,000	1,100	500	550
	Go Dau	Go Dau	Ground	500	2,100	2,600	1,050	1,300
	Ben Cau	Ben Cau	Ground	500	1,000	-	500	-
	Chau Thanh	Chau Thanh	Ground	500	500	-	250	-
	Duong Minh Chau	Duong Minh Chau	Ground	500	500	-	250	-
	Tan Bien	Tan Bien	Ground	500	700	600	350	300
	Tan Chau	Tan Chau	Ground	500	1,100	800	550	400
						TOTAL	4,950	2,550
Song Be								
	Thu Dau Mot	Thu Dau Mot						
	Thuan An	Di An						
		Lai Thieu						
		Sub-Total	Surface	250	65,000	40,000	16,250	10,000
	Tan Uyen	Tan Uyen	Ground	500	1,300	2,100	650	1,050
	Ben Cat	Ben Cat	Ground	500	400	1,300	200	650
	Dong Phu	Dong Phu	Ground	700	5,000	7,300	3,500	5,110
	Binh Long	Binh Long	Surface	250	5,000	-	1,250	-
	Phuoc Long	Phuoc Long	Surface	250	3,800	16,000	950	4,000
	Loc Ninh	Loc Ninh	Ground	700	1,400	2,400	980	1,680
	Bu Dang	Bu Dang	Surface	250	3,000	-	750	-
						TOTAL	24,530	22,490
Dac Lac								
	Dak Nong	Gia Nghia	Surface	250	1,000	900	250	225
	Dak R'Lap	Dak R'Lap						
						TOTAL	250	225
Lam Dong								
	Da Lat	Da Lat	Surface	250	-	42,000	-	10,500
	Cat Tien	Cat Tien	Ground	1,000	1,500	5,100	1,500	5,100
	Da Teh	Da Teh	Ground	1,000	2,000	5,400	2,000	5,400
	Da Huoi	Da Huoi	Ground	1,000	1,100	1,500	1,100	1,500
	Bao Lam	Bao Lam	Ground	1,000	5,000	17,000	5,000	17,000
	Di Linh	Di Linh	Ground	1,000	400	3,400	400	3,400
	Duc Trong	Duc Trong	Ground	1,000	3,700	7,960	3,700	7,960
	Don Duong	Don Duong	Ground	1,000	1,800	3,000	1,800	3,000
	Lac Duong	Lac Duong	Surface	250	-	-	-	-
	Lam Ha	Lam Ha	Surface	250	3,300	6,600	825	1,650
						TOTAL	16,325	55,510

Note: 1) There are two types of water sources; one is the water source to rely on the surface water and the other is groundwater.

Table 2.8 Costs to Be Invested for Future Water Supply Development (2/3)

Province	District	District and Major Towns	Unit Price		Development Amount, m ³ /day		Investment Cost, thousand US\$	
			Water Source ¹⁾	US\$/m ³	by 2000	by 2015	by 2000	by 2015
Ninh Thuan								
	Phan Rang and Ninh Hai	P.Rang-T.Cham Ninh Chu Dong Hai						
		Sub-Total	Surface	250	12,000	16,500	3,000	4,125
	Ninh Son	Ninh Son	Ground	700	-	-	-	-
	Ninh Phuoc	Ninh Phuoc	Ground	700	-	-	-	-
							TOTAL	3,000 4,125
Binh Thuan								
	Phan Thiet	Phan Thiet	Surface	250	12,000	17,000	3,000	4,250
	Ham Tan	Lagi	Surface	250	500	5,200	125	1,300
	Ham Thuan Nam	Tan Lap	Ground	700	800	4,200	560	2,940
	Tanh Linh	Lac Tanh	Ground	700	500	2,800	350	1,960
	Duc Linh	Vo Xu	Ground	700	900	4,500	630	3,150
	Ham Thuan Bac	Ma Lam	Ground	700	600	3,000	420	2,100
	Bac Binh	Bac Binh			-	-	-	-
		Phan Ri Cua			-	-	-	-
		Sub-Total	Surface	250	3,300	18,000	825	4,500
	Tuy Phong	Lien Huong	Ground	700	700	6,100	490	4,270
	Phu Quy	Phu Quy	Ground	700	-	-	-	-
							TOTAL	6,400 24,470
Ba Ria-Vung Tau								
	B.Ria-V.Tau	Vung Tau - Dwellers - Domestic Tourists - Foreign Tourists						
	and Long Dat	Ba Ria Long Son Long Hai Phuoc Tinh Long Dien Dat Do Phuoc Hai						
		Sub-Total	Surface	250	110,000	270,000	27,500	67,500
	Xuyen Moc	Phuoc Bui	Surface	250	3,000	2,000	750	500
	Tan Thanh	Phu My	Surface	250	83,350	296,000	20,838	74,000
	Chau Duc	Ngai Giao	Surface	250	2,000	1,700	500	425
							TOTAL	49,588 142,425

Table 2.8 Costs to Be Invested for Future Water Supply Development (3/3)

Province	District	District and Major Towns	Unit Price		Development Amount, m ³ /day		Investment Cost, thousand US\$	
			Water Source ¹⁾	US\$/m ³	by 2000	by 2015	by 2000	by 2015
Dong Nai								
	Bien Hoa	Bien Hoa						
		Tam Phuoc						
		Sub-Total	Surface	250	142,500	461,000	35,625	115,250
	Long Thanh	Long Thanh	Surface	250	3,100	14,500	775	3,625
	Nhon Trach	Nhon Trach	Surface	250	56,000	369,000	14,000	92,250
	Thong Nhat	Thong Nhat	Ground	700	3,200	11,500	2,240	8,050
	Xuan Loc	Gia Ray	Surface	250	2,820	100	705	25
	Long Khanh	Xuan Loc	Ground	700	5,000	1,800	3,500	1,260
	Vinh Cuu	Vinh An	Ground	700	8,000	12,000	5,600	8,400
	Tan Phu	Tan Phu	Ground	700	2,900	4,100	2,030	2,870
	Dinh Quan	Dinh Quan	Ground	700	6,700	10,000	4,690	7,000
						TOTAL	69,165	238,730
HCMC								
	17 districts		Surface	250	620,000	700,000	155,000	175,000
	Cu Chi	Cu Chi	Surface	250	20,900	58,000	5,225	14,500
						TOTAL	160,225	189,500
Long An								
	Can Duoc	Can Duoc	Ground	500	-	200	-	100
	Tan Tru	Tan Tru	Ground	500	1,240	-	620	-
	Can Giuoc	Can Giuoc	Ground	500	1,120	-	560	-
	Ben Luc	Ben Luc	Ground	500	-	1,100	-	550
	Duc Hoa	Huu Nghia	Ground	500	600	2,600	300	1,300
		Hiep Hoa	Ground	500	500	1,400	250	700
		Duc Hoa	Ground	500	300	1,400	150	700
	Duc Hue	Duc Hue	Ground	500	1,000	-	500	-
	Thu Thua	Thu Thua	Ground	500	1,000	-	500	-
						TOTAL	2,880	3,350
GRAND TOTAL							337,313	683,375

Table 3.1 Water Supply Projects to Seek Water Sources to the Dong Nai River and the Saigon River in the Year 2015

Province	Town	Water Sources, m ³ /day		Notes
		Dong Nai River	Saigon River	
Song Be	Thu Dau Mot		15,000	
	Thuan An	20,000	25,000	
Ba Ria - Vung Tau	Ba Ria - Vung Tau -	252,000		Out of total demand of 410,000 m ³ /day, a capacity of 158,000 m ³ /day is sought to other sources.
	Long Son - Long Dien -			
	Long Hai - Phuoc Tinh -			
	Dat Do - Phuoc Hai			
	Go Dau - Phu My - Thi Vai	315,000		
Dong Nai	Bien Hoa - Ho Nai	350,000		Out of total demand of 530,000 m ³ /day, a capacity of 15,000 m ³ /day is sought to groundwater.
	Tam Phuoc - An Phuoc	240,000		
	Nhon Trach - Long Thanh	380,000		
Ho Chi Minh City	17 districts	1,630,000	900,000	Out of total demand of 2,000,000 m ³ /day, (300,000) a capacity of 70,000 m ³ /day is sought to groundwater.
		3,187,000	940,000	
			(340,000)	

Note: The figure in the parentheses shows the requirement of the Saigon River in case that the first stage of the Phu Cuong intake under construction is implemented.

Table 4.1 Reservoir Projects for Water Supply to the Areas along National Highway No. 51

Reservoir project	Development stage ¹⁾	Proposed supply centre ²⁾	Catchment area, km ²	Proposed FSL, m ³⁾	Proposed MOL, m ³⁾	Active Storage, million m ³	Development capacity, m ³ /day ⁴⁾
La Buong	M/P	Tam Phuoc	246	50.0	48.0	8.5	220,000
Song Ca-1	M/P	Nhon Trach	56	80.0	61.0	27.4	
Song Ca-2	M/P	Nhon Trach	49	60.0	52.0	10.4	270,000 ⁵⁾
Phuoc Thai	M/P	Phu My	90	20.0	16.0	9.0	120,000
Da Den	F/S	Vung Tau	127	40.0	27.0	56.7	250,000 ⁶⁾
Song Ray	Pre-F/S	Vung Tau	750	70.0	48.0	239.2	1,400,000

Notes: 1) Feasibility study for the Da Den has been completed by a local company, whilst pre-feasibility study for the Song Ray. Others are originally identified for irrigation, but further detailed studies have not been done yet.

2) The area to receive water supply from the proposed reservoir is selected based on the geographical condition, i.e. nearest to the demand centre, as well as provincial boundary. The Tam Phuoc area includes the An Phuoc area, whilst the Long Thanh for the Nhon Trach, and the Go Dau and Thi Vai for the Phu My. The Ba Ria-Vung Tau includes the nearby towns as well.

3) The proposed Full Supply Level, FSL, is tentatively selected so as that the reservoir can secure the maximum active storage. On the other hand, the proposed Minimum Operation Level, MOL, is determined by assuming the denudation rate of 1.0 mm/year/km².

4) Development capacity of the reservoir for water supply is estimated by giving right-of-way to irrigation in terms of water use. For the reservoir simulation, hydrological data with a drought once in 10 years are used. Furthermore, river maintenance flow besides the irrigation use is not taken into account in the simulation.

5) A development capacity of 270,000 m³/day is obtained as the result of the joint operation of the Song Ca-1 & 2 reservoirs.

6) The tentative development capacity is estimated under the condition that water level in the reservoir returns to FSL at the end of wet season in a 10-year drought.

Table 4.2 Water Requirements of Irrigation Schemes Lying Downstream of the Water Supply Reservoirs

Reservoir project	Irrigation project	Design irrigation area, ha	Water Requirement, m ³ /sec												
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
La Buong	Phuoc Tan	100	0.05	0.10	0.07	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.03
Song Ca	Suoi Ca	600	0.28	0.59	0.43	0.16	0.10	0.01	0.02	0.00	0.00	0.00	0.07	0.32	0.20
Phuoc Thai	No project	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Da Den	Song Dinh I	600	0.34	0.65	0.49	0.18	0.11	0.13	0.11	0.00	0.00	0.00	0.19	0.49	0.28
	Song Xoai	1,000	0.56	1.08	0.82	0.30	0.19	0.21	0.19	0.00	0.00	0.00	0.32	0.82	0.47
	Total	1,600	0.90	1.73	1.31	0.48	0.30	0.34	0.30	0.00	0.00	0.00	0.51	1.31	0.75
Song Ray	Song Ray	800	0.45	0.86	0.66	0.24	0.15	0.17	0.15	0.00	0.00	0.00	0.26	0.66	0.38

Table 4.3 Construction Costs for the Proposed Six Reservoir Projects for Water Supply along National Highway No. 51

Work Item	Unit	Unit Price (US\$)	La Buong Project		Song Ch. 1 Project		Song Ch. 2 Project		Phuoc Tai Project		Da Den Project		Song Ray Project	
			Work Quantity	Amount (,000 \$)	Work Quantity	Amount (,000 \$)	Work Quantity	Amount (,000 \$)	Work Quantity	Amount (,000 \$)	Work Quantity	Amount (,000 \$)	Work Quantity	Amount (,000 \$)
[A] Direct Cost				14,410	24,873	10,979	16,295	19,049	48,252					
[A.1] Preparatory Works				642	1,281	1,210	1,031	1,111	1,517					
Access road	km	100,000	2	200	500	8	800	5	500	5	500	1	100	
Power supply	km	14,600	2	29	73	8	117	5	73	5	73	1	15	
Other	ls		1	413	708	1	293	1	458	1	538	1	1,402	
[A.2] Civil Work				13,768	23,592	9,769	15,264	17,938	46,735					
1 Reservoir				191	695	191	407	442	930					
1-1 Care of River	ls		1	4,772	17,381	6,256	10,181	11,062	23,238					
1-2 Dam				4,772	17,381	4,777	10,181	11,062	23,238					
1-2-1 Main Dam				565	1,166	481	1,144	784	1,154					
Common excavation	m ³	5.5	99,000	541	0	87,500	481	481	541	142,600	784	209,900	1,154	
Rock excavation	m ³	16.0	0	0	0	0	0	0	0	34,700	555	41,700	667	
Embankment/concrete	m ³	9.4	305,410	2,871	1,180,230	2,923	6,140	6,140	2,345	112,680	1,059	249,510	2,345	
Embankment/filter	m ³	29.5	17,970	510	69,430	540	1,108	1,108	83,170	37,560	1,108	83,170	2,454	
Embankment/rock	m ³	10.9	35,930	392	138,850	399	838	838	1,450	600,960	6,550	1,330,720	14,505	
Grouting & others	ls		1	454	1,580	454	926	1,006	2,113	1	1,006	1	2,113	
1-2-2 Auxiliary Dam				0	0	1,489	0	0	0					
Common excavation	m ³	5.5	0	0	0	37,600	317	0	0	0	0	0	0	
Embankment/concrete	m ³	9.4	0	0	0	83,470	785	0	0	0	0	0	0	
Embankment/filter	m ³	29.5	0	0	0	4,910	145	0	0	0	0	0	0	
Embankment/rock	m ³	10.9	0	0	0	9,820	107	0	0	0	0	0	0	
Grouting & others	ls		0	0	0	135	0	0	0	0	0	0	0	
1-3 Spillway				4,958	1,868	1,557	2,367	3,102	9,884					
Common excavation	m ³	5.5	50,630	278	33,790	116	19,263	106	106	41,670	229	80,680	444	
Rock excavation	m ³	16.0	62,830	1,005	19,040	305	13,163	211	211	37,450	599	125,000	2,000	
Structural concrete	m ³	142.0	30,790	2,951	7,770	1,018	11,823	1,679	1,823	12,840	1,823	42,230	5,995	
Reinforcement/bar	ton	650.0	430	273	160	104	140	156	169	260	169	840	546	
Others	ls		1	451	170	142	215	282	899	1	282	1	899	
1-4 River Outlet				2,595	1,503	867	921	1,701	8,434					
Common excavation	m ³	5.5	29,450	162	17,040	67	7,953	44	44	18,360	101	49,430	272	
Rock excavation	m ³	16.0	34,000	544	32,770	524	16,752	268	268	34,150	546	186,510	2,984	
Structural concrete	m ³	142.0	9,360	1,329	4,160	591	2,410	342	342	4,820	684	26,830	3,810	
Reinforcement/bar	ton	650.0	190	124	80	52	50	33	33	100	65	540	351	
Intake gate	ton	10,000.0	20	200	10	100	15	150	150	15	150	25	250	
Others	ls		1	236	137	79	84	155	267	1	155	1	267	
1-5 Miscellaneous Works				1,252	2,145	888	1,388	1,631	4,249					
[B] Indirect Cost				4,566	6,763	3,186	4,743	7,520	18,053					
[B.1] Compensation Cost														
Reservoir inundation	km ²	400,000	4	1,400	2	800	3	1,200	8	3,200	8	3,200	18	7,200
[B.2] Administration Cost	ls		1	288	497	220	326	381	965	1	381	1	965	
[B.3] Engineering Fee	ls		1	1,153	1,990	878	1,304	1,524	3,860	1	1,524	1	3,860	
[B.4] Physical Contingency	ls		1	1,725	2,876	1,288	1,913	2,415	6,028	1	2,415	1	6,028	
[C] Total Construction Cost				18,976	31,636	14,165	21,038	26,569	66,305					

Table 4.4 Installation Programme of Water Supply Projects for Alternative I

Year	Demand Centre											
	Bien Hoa		Tam Phuoc		Nhon Trach		Phu My		Vung Tau			
	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day
1995	Existing	36,000			Existing	720	Existing	600	Existing		Existing	33,000
1996												
1997	Thien Tan I	100,000	Groundwater I	10,000	Groundwater I	20,000	Groundwater I	15,000	Dinh River	10,000		
1998			Groundwater II	10,000	Groundwater II	20,000	Chau Pha & Suoi Sao	20,000	Groundwater	15,000		
1999					Groundwater II	10,000	Groundwater II	10,000				
2000			Groundwater II	10,000			Da Den 1)	125,000	Da Den 1)	125,000		
2001												
2002	Thien Tan II	150,000	Thien Tan I 2)	100,000	Thien Tan I 2)	200,000						
2003												
2004												
2005												
2006									Song Ray 3)	200,000	Song Ray 3)	250,000
2007												
2008												
2009			Thien Tan II 4)	150,000	Thien Tan II 4)	150,000						
2010	Thien Tan III	150,000										
2011												
2012												
2013												
2014												
2015												
Total Supply		436,000		280,000		400,720		370,600				433,000
Demand in 2015		354,000		244,000		374,000		331,000				412,000

- Notes:
- 1) A development of 250,000 m³/day for the Da Den reservoir is shared by two demand centres, Phu My and Vung Tau.
 - 2) A pipeline with a conveyance capacity of 300,000 m³/day is developed for the Tam Phuoc and Nhon Trach demand centres.
 - 3) The Song Ray is developed with a scale of 450,000 m³/day of which 200,000 m³/day is for Phu My and 250,000 m³/day is for Vung Tau.
 - 4) Another pipeline with a conveyance capacity of 300,000 m³/day is developed for both of Phuoc and Nhon Trach demand centres.

Table 4.5 Installation Programme of Water Supply Projects for Alternative 2

Year	Demand Centre											
	Bien Hoa		Tam Phuoc		Nhon Trach		Phu My		Vung Tau			
	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day
1995	Existing	36,000			Existing	720	Existing	600	Existing		Existing	33,000
1996												
1997	Thien Tan I	100,000	Groundwater I	10,000	Groundwater I	20,000	Groundwater I	15,000	Dinh River	10,000		
1998			Groundwater II	10,000	Groundwater II	20,000	Chau Pha & Suoi Sao	20,000	Groundwater	15,000		
1999					Groundwater II	10,000	Groundwater II	10,000				
2000			Groundwater II	10,000			Da Den I)	125,000	Da Den I)	125,000		
2001												
2002	Thien Tan II	150,000	Thien Tan I ²⁾	100,000	Thien Tan I ²⁾	200,000						
2003												
2004												
2005												
2006							Thien Tan ³⁾	200,000	Thien Tan ³⁾	250,000		
2007												
2008												
2009			Thien Tan II ⁴⁾	150,000	Thien Tan II ⁴⁾	150,000						
2010	Thien Tan III	150,000										
2011												
2012												
2013												
2014												
2015												
Total Supply		436,000		280,000		400,720		370,600		433,000		
Demand in 2015		354,000		244,000		374,000		331,000		412,000		

Notes:

- 1) A development of 250,000 m³/day for the Da Den reservoir is shared by two demand centres, Phu My and Vung Tau.
- 2) A pipeline with a conveyance capacity of 300,000 m³/day is developed for the Tam Phuoc and Nhon Trach demand centres.
- 3) Another pipeline with a conveyance capacity of 450,000 m³/day is developed for the Phu My and Vung Tau demand centres.
- 4) The second pipeline for Tam Phuoc and Nhon Trach is placed with a conveyance capacity of 300,000 m³/day.

Table 4.6 Installation Programme of Water Supply Projects for Alternative 3

Year	Demand Centre											
	Bien Hoa		Tam Phuoc		Nhon Trach		Phu My		Vung Tau			
	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day	Project	Supply Capacity m ³ /day
1995	Existing	36,000			Existing	720	Existing	600	Existing		Existing	33,000
1996												
1997	Thien Tan I	100,000	Groundwater I	10,000	Groundwater I	20,000	Groundwater I	15,000	Dinh River	10,000		
1998			Groundwater II	10,000	Groundwater II	20,000	Chau Pha & Suoi Sao	20,000	Groundwater	15,000		
1999					Groundwater II	10,000	Groundwater II	10,000				
2000			Groundwater II	10,000			Da Den 1)	125,000	Da Den 1)	125,000		
2001												
2002	Thien Tan II	150,000	Thien Tan I ²⁾	100,000	Song Ca	270,000						
2003												
2004												
2005									Song Ray ³⁾	200,000	Song Ray ³⁾	250,000
2006												
2007												
2008												
2009												
2010												
2011												
2012												
2013												
2014												
2015												
Total Supply		436,000		280,000		400,720		370,600		433,000		
Demand in 2015		354,000		244,000		374,000		331,000		412,000		

- Notes:
- 1) A development of 250,000 m³/day for the Da Den reservoir is shared by two demand centres, Phu My and Vung Tau.
 - 2) A pipeline with a conveyance capacity of 250,000 m³/day is placed for the Tam Phuoc demand centre. Thus, the second stage development, i.e. Thien Tan II, is the construction of treatment plant.
 - 3) The Song Ray is developed with a scale of 450,000 m³/day, of which 200,000 m³/day is for Phu My and 250,000 m³/day is for Vung Tau.

Table 4.7 Construction Cost Required for Alternative 1

Projects	Groundwater		Treatment Plant		Pipeline			Dam				
	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Distance (km)	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Development supply capacity (m ³ /day)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Cost shared by demand centre ('000US\$)
Bien Hoa												
Thien Tan II	-	-	150,000	30,000	3.48	8	4,733	-	-	-	-	-
Thien Tan III	-	-	150,000	30,000	-	-	-	300,000	4,733	-	-	-
Tam Phuoc												
Groundwater I	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Groundwater II	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Groundwater III	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Thien Tan I	-	-	100,000	20,000	3.48	21	12,424	100,000	4,141	-	-	-
Thien Tan II	-	-	150,000	30,000	3.48	21	12,424	150,000	6,212	-	-	-
Nhon Trach												
Groundwater I	20,000	5,000	-	-	-	-	-	-	-	-	-	-
Groundwater II	20,000	5,000	-	-	-	-	-	-	-	-	-	-
Groundwater III	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Thien Tan I	-	-	200,000	40,000	3.48	21	12,424	200,000	8,282	-	-	-
-	-	-	200,000	40,000	2.32	9	3,550	200,000	3,550	-	-	-
Thien Tan II	-	-	150,000	30,000	3.48	21	12,424	150,000	6,212	-	-	-
-	-	-	150,000	30,000	1.74	9	2,662	150,000	2,662	-	-	-
Phu My												
Groundwater I	15,000	3,750	-	-	-	-	-	-	-	-	-	-
Groundwater II	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Da Den	-	-	125,000	25,000	2.90	1	493	125,000	247	250,000	125,000	13,285
-	-	-	125,000	25,000	1.45	5	1,233	125,000	1,233	-	-	-
Song Ray	-	-	200,000	40,000	5.21	27	23,914	75,000	3,986	1,400,000	200,000	9,473
-	-	-	200,000	40,000	2.32	5	1,972	200,000	1,972	-	-	-
Vung Tau												
Groundwater	15,000	3,750	-	-	-	-	-	-	-	-	-	-
Da Den	-	-	125,000	25,000	2.90	1	493	125,000	247	250,000	125,000	13,285
-	-	-	125,000	25,000	1.45	12	2,958	125,000	2,958	-	-	-
Song Ray	-	-	250,000	50,000	5.21	27	23,914	375,000	19,928	1,400,000	250,000	11,841
-	-	-	250,000	50,000	2.32	5	1,972	200,000	1,972	-	-	-

Table 4.8 Construction Cost Required for Alternative 2

Projects	Groundwater			Treatment Plant		Pipeline				Dam		
	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Water supply capacity (m ³ /day)	Water supply capacity (m ³ /sec)	Distance (km)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Cost shared by demand centre ('000US\$)	Development supply capacity (m ³ /day)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Cost shared by demand centre ('000US\$)
Bien Hoa												
Thien Tan II	-	-	150,000	3.48	8	4,733	300,000	4,733	-	-	-	-
Thien Tan III	-	-	150,000	-	-	-	-	-	-	-	-	-
Tam Phuoc												
Groundwater I	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Groundwater II	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Groundwater III	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Thien Tan I	-	-	100,000	3.48	21	12,424	100,000	4,141	-	-	-	-
Thien Tan II	-	-	150,000	3.48	21	12,424	150,000	6,212	-	-	-	-
Nhon Trach												
Groundwater I	20,000	5,000	-	-	-	-	-	-	-	-	-	-
Groundwater II	20,000	5,000	-	-	-	-	-	-	-	-	-	-
Groundwater III	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Thien Tan I	-	-	200,000	3.48	21	12,424	200,000	8,282	-	-	-	-
Thien Tan II	-	-	150,000	3.48	21	12,424	150,000	6,212	-	-	-	-
Thien Tan II	-	-	150,000	1.74	9	2,662	150,000	2,662	-	-	-	-
Phu My												
Groundwater I	15,000	3,750	-	-	-	-	-	-	-	-	-	-
Groundwater II	10,000	2,500	-	-	-	-	-	-	-	-	-	-
Da Den	-	-	125,000	2.90	1	493	125,000	247	250,000	26,570	125,000	13,285
Thien Tan	-	-	200,000	1.45	5	1,233	125,000	1,233	-	-	-	-
Thien Tan	-	-	200,000	5.21	45	39,857	200,000	17,714	-	-	-	-
Vung Tau												
Groundwater	15,000	3,750	-	-	-	-	-	-	-	-	-	-
Da Den	-	-	125,000	2.90	1	493	125,000	247	250,000	26,570	125,000	13,285
Thien Tan	-	-	250,000	1.45	12	2,958	125,000	2,958	-	-	-	-
Thien Tan	-	-	250,000	5.21	45	39,857	250,000	22,143	-	-	-	-
Thien Tan	-	-	250,000	2.90	23	11,339	250,000	11,339	-	-	-	-

Table 4.9 Construction Cost Required for Alternative 3

Projects	Name	Year	Groundwater		Treatment Plant		Pipeline			Dam				
			Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Distance (km)	Water supply capacity (m ³ /day)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Development supply capacity (m ³ /day)	Total construction cost ('000US\$)	Shared capacity (m ³ /day)	Cost shared by demand centre ('000US\$)
Bien Hoa														
	Thien Tan II	2002	-	30,000	150,000	300,000	3.48	8	4,733	-	-	-	-	-
	Thien Tan III	2010	-	30,000	150,000	-	-	-	-	-	-	-	-	-
Tam Phuoc														
	Groundwater I	1997	10,000	2,500	-	-	-	-	-	-	-	-	-	-
	Groundwater II	1998	10,000	2,500	-	-	-	-	-	-	-	-	-	-
	Groundwater III	2000	10,000	2,500	-	-	-	-	-	-	-	-	-	-
	Thien Tan I	2002	-	20,000	100,000	250,000	2.90	21	10,353	250,000	10,353	-	-	-
	Thien Tan II	2009	-	30,000	150,000	-	-	-	-	-	-	-	-	-
Nhon Trach														
	Groundwater I	1997	20,000	5,000	-	-	-	-	-	-	-	-	-	-
	Groundwater II	1998	20,000	5,000	-	-	-	-	-	-	-	-	-	-
	Groundwater III	1999	10,000	2,500	-	-	-	-	-	-	-	-	-	-
	Song Ca	2002	-	54,000	270,000	270,000	3.13	17	9,046	270,000	9,046	-	-	45,810
	La Buong	2009	-	16,000	80,000	80,000	0.93	12	1,897	80,000	1,897	-	-	18,980
Phu My														
	Groundwater I	1997	15,000	3,750	-	-	-	-	-	-	-	-	-	-
	Groundwater II	1999	10,000	2,500	-	-	-	-	-	-	-	-	-	-
	Da Den	2000	-	25,000	125,000	250,000	2.90	1	493	125,000	247	250,000	125,000	13,285
	Song Ray	2006	-	40,000	200,000	450,000	5.21	27	23,914	75,000	3,986	1,400,000	200,000	9,473
Vung Tau														
	Groundwater	1998	15,000	3,750	-	-	-	-	-	-	-	-	-	-
	Da Den	2000	-	25,000	125,000	250,000	2.90	1	493	125,000	247	250,000	125,000	13,285
	Song Ray	2006	-	50,000	250,000	450,000	5.21	27	23,914	375,000	19,928	1,400,000	250,000	11,841

Table 4.10 Benefits Estimated for Respective Demand Centres (1/2)

Year	Demand Centre																
	Bich Hoa				Taru Phuoc				Nhon Trach								
	Total water demand (m ³ /day)	Existing supply capacity (m ³ /day)	Effective 1) water demand (m ³ /day)	Supply capacity by new projects (m ³ /day)	Sold water volume (m ³ /day)	Benefit ('000US\$)	Total water demand (m ³ /day)	Existing supply capacity (m ³ /day)	Effective 1) water demand (m ³ /day)	Supply capacity by new projects (m ³ /day)	Sold water volume (m ³ /day)	Benefit ('000US\$)					
1 1996	104,000	36,000	68,000	0	0	0	4,000	0	4,000	0	0	0	16,000	720	15,280	0	0
2 1997	117,500	136,000	0	0	0	0	8,250	0	8,250	0	0	0	26,750	720	26,030	0	0
3 1998	131,000	136,000	0	0	0	0	12,500	0	12,500	10,000	10,000	548	37,500	720	36,780	20,000	1,095
4 1999	144,500	136,000	8,500	0	0	0	16,750	0	16,750	20,000	16,750	917	48,250	720	47,530	40,000	2,190
5 2000	158,000	136,000	22,000	0	0	0	21,000	0	21,000	20,000	20,000	1,095	59,000	720	58,280	50,000	2,738
6 2001	168,000	136,000	32,000	0	0	0	30,400	0	30,400	30,000	30,000	1,643	76,000	720	75,280	50,000	2,738
7 2002	178,000	136,000	42,000	0	0	0	39,800	0	39,800	30,000	30,000	1,643	93,000	720	92,280	50,000	2,738
8 2003	188,000	136,000	52,000	150,000	52,000	2,847	49,200	0	49,200	130,000	49,200	2,694	110,000	720	109,280	250,000	5,983
9 2004	198,000	136,000	62,000	150,000	62,000	3,395	58,600	0	58,600	130,000	58,600	3,208	127,000	720	126,280	250,000	6,914
10 2005	208,000	136,000	72,000	150,000	72,000	3,942	68,000	0	68,000	130,000	68,000	3,723	144,000	720	143,280	250,000	7,845
11 2006	221,200	136,000	85,200	150,000	85,200	4,665	83,200	0	83,200	130,000	83,200	4,555	161,200	720	160,480	250,000	8,786
12 2007	234,400	136,000	98,400	150,000	98,400	5,387	98,400	0	98,400	130,000	98,400	5,387	178,400	720	177,680	250,000	9,728
13 2008	247,600	136,000	111,600	150,000	111,600	6,110	113,600	0	113,600	130,000	113,600	6,220	195,600	720	194,880	250,000	10,670
14 2009	260,800	136,000	124,800	150,000	124,800	6,833	128,800	0	128,800	130,000	128,800	7,052	212,800	720	212,080	250,000	11,611
15 2010	274,000	136,000	138,000	150,000	138,000	7,556	144,000	0	144,000	280,000	144,000	7,884	230,000	720	229,280	400,000	12,553
16 2011	290,000	136,000	154,000	300,000	154,000	8,432	164,000	0	164,000	280,000	164,000	8,979	260,800	720	260,080	400,000	14,239
17 2012	306,000	136,000	170,000	300,000	170,000	9,308	184,000	0	184,000	280,000	184,000	10,074	291,600	720	290,880	400,000	15,926
18 2013	322,000	136,000	186,000	300,000	186,000	10,184	204,000	0	204,000	280,000	204,000	11,169	322,400	720	321,680	400,000	17,612
19 2014	338,000	136,000	202,000	300,000	202,000	11,060	224,000	0	224,000	280,000	224,000	12,264	353,200	720	352,480	400,000	19,298
20 2015	354,000	136,000	218,000	300,000	218,000	11,936	244,000	0	244,000	280,000	244,000	13,359	384,000	720	383,280	400,000	20,985
50 2045	354,000	136,000	218,000	300,000	218,000	11,936	244,000	0	244,000	280,000	244,000	13,359	384,000	720	383,280	400,000	20,985

Notes : 1) Effective water demand is the one to be met by the newly developed projects.

2) Benefit calculation is based on the average tariff derived from the revenue for HCMC water supply system, US\$ 0.15/m³, and sold water volume.

Table 4.10 Benefits Estimated for Respective Demand Centres (2/2)

Year	Demand Centre														Total Benefit ('000US\$)
	Phu My							Vung Tau							
	Total water demand (m ³ /day)	Existing supply capacity (m ³ /day)	Effective 1) water demand (m ³ /day)	Supply capacity by new projects (m ³ /day)	Sold water volume (m ³ /day)	Benefit ('000US\$)	2)	Total water demand (m ³ /day)	Existing supply capacity (m ³ /day)	Effective 1) water demand (m ³ /day)	Supply capacity by new projects (m ³ /day)	Sold water volume (m ³ /day)	Benefit ('000US\$)	2)	
1 1996	30,000	600	29,400	0	0	0	0	44,000	33,000	11,000	0	0	0	0	
2 1997	43,500	600	42,900	0	0	0	0	58,500	43,000	15,500	0	0	0	0	
3 1998	57,000	20,600	36,400	15,000	15,000	821	821	73,000	43,000	30,000	0	0	0	2,464	
4 1999	70,500	20,600	49,900	15,000	15,000	821	821	87,500	43,000	44,500	15,000	15,000	821	4,749	
5 2000	84,000	20,600	63,400	25,000	25,000	1,569	1,569	102,000	43,000	59,000	15,000	15,000	821	6,025	
6 2001	93,600	20,600	73,000	150,000	73,000	3,997	3,997	137,600	43,000	94,600	140,000	94,600	5,179	13,557	
7 2002	103,200	20,600	82,600	150,000	82,600	4,522	4,522	173,200	43,000	130,200	140,000	130,200	7,128	16,031	
8 2003	112,800	20,600	92,200	150,000	92,200	5,048	5,048	208,800	43,000	165,800	140,000	140,000	7,665	24,237	
9 2004	122,400	20,600	101,800	150,000	101,800	5,574	5,574	244,400	43,000	201,400	140,000	140,000	7,665	26,756	
10 2005	132,000	20,600	111,400	150,000	111,400	6,099	6,099	280,000	43,000	237,000	140,000	140,000	7,665	29,274	
11 2006	152,800	20,600	132,200	150,000	132,200	7,238	7,238	281,600	43,000	238,600	140,000	140,000	7,665	32,909	
12 2007	173,600	20,600	153,000	350,000	153,000	8,377	8,377	283,200	43,000	240,200	390,000	240,200	13,151	42,030	
13 2008	194,400	20,600	173,800	350,000	173,800	9,516	9,516	284,800	43,000	241,800	390,000	241,800	13,239	45,755	
14 2009	215,200	20,600	194,600	350,000	194,600	10,654	10,654	286,400	43,000	243,400	390,000	243,400	13,326	49,476	
15 2010	236,000	20,600	215,400	350,000	215,400	11,793	11,793	288,000	43,000	245,000	390,000	245,000	13,414	53,200	
16 2011	255,000	20,600	234,400	350,000	234,400	12,833	12,833	312,800	43,000	269,800	390,000	269,800	14,772	59,255	
17 2012	274,000	20,600	253,400	350,000	253,400	13,874	13,874	337,600	43,000	294,600	390,000	294,600	16,129	65,311	
18 2013	293,000	20,600	272,400	350,000	272,400	14,914	14,914	362,400	43,000	319,400	390,000	319,400	17,487	71,366	
19 2014	312,000	20,600	291,400	350,000	291,400	15,954	15,954	387,200	43,000	344,200	390,000	344,200	18,845	77,421	
20 2015	331,000	20,600	310,400	350,000	310,400	16,994	16,994	412,000	43,000	369,000	390,000	369,000	20,203	83,477	
20 2045	331,000	20,600	310,400	350,000	310,400	16,994	16,994	412,000	43,000	369,000	390,000	369,000	20,203	83,477	

Notes : 1) Effective water demand is the one to be met by the newly developed projects.

2) Benefit calculation is based on the average tariff derived from the revenue for HCMC water supply system, US\$ 0.15/m³, and sold water volume.

Table 5.1 Performance of Rural Water Supply in the Study Area (1/3)

Province	District	Population in Rural Area		Number of water sources	Number of Beneficiaries	Performance Rate %
		1,989	1,994			
Tay Ninh	Tay Ninh	4,210	4,805	46	5,520	100.0
	Trang Bang	108,322	123,636	62	7,440	6.0
	Go Dau	93,495	106,713	64	7,680	7.2
	Ben Cau	49,413	56,399	48	5,760	12.2
	Chau Thanh	100,978	115,254	97	11,640	10.1
	Hoa Thanh	163,095	186,153	83	9,960	5.4
	Duong Minh Chau	74,779	85,351	75	9,000	10.5
	Tan Bien	56,599	64,601	66	7,920	12.3
	Tan Chau	57,938	66,129	57	6,840	10.3
			809,041	598	71,760	8.9
Song Be	Thu Dau Mot	71,203	81,270	59	7,080	8.7
	Thuan An	135,491	154,646	103	12,360	8.0
	Tan Uyen	106,824	121,927	96	11,520	9.4
	Ben Cat	150,347	171,603	134	16,080	9.4
	Dong Phu	87,505	99,876	-	-	0.0
	Binh Long	136,202	155,458	101	12,120	7.8
	Phuoc Long	96,424	110,056	-	-	0.0
	Loc Ninh	80,324	91,680	-	-	0.0
	Bu Dang	29,497	33,667	-	-	0.0
			1,020,183	493	59,160	5.8
Dac Lac	Dak Nong		14,985	-	-	0.0
	Dak R'Lap		22,330	20	2,400	10.7
			37,315	20	2,400	6.4

Notes: (1) An annual increase rate of population is estimated as 2.68 %.
(2) The number of beneficiaries is estimated at 120 persons for a water source.

Table 5.1 Performance of Rural Water Supply in the Study Area (2/3)

Province	District	1989	1994	Number of water sources	Number of Beneficiaries	Performance Rate %
Lam Dong	Da Lat	13,376	15,276	1	120	0.8
	Cat Tien	20,627	23,543	-	-	0.0
	Da Teh	26,245	29,955	74	8,880	29.6
	Da Huoi	14,406	16,443	62	7,440	45.2
	Bao Lam	98,916	112,900	20	2,400	2.1
	Di Linh	63,601	72,593	76	9,120	12.6
	Duc Trong	74,088	84,562	100	12,000	14.2
	Don Duong	49,117	56,061	80	9,600	17.1
	Lac Duong	17,974	20,515	23	2,760	13.5
	Lam Ha	42,279	<u>48,256</u>	<u>128</u>	<u>15,360</u>	<u>31.8</u>
			480,095	564	67,680	14.1
Ninh Thuan	P.Rang-T.Cham	59,526	67,942	571	68,520	100.0
	Ninh Son	61,889	70,639	369	44,280	62.7
	Ninh Hai	76,329	87,120	346	41,520	47.7
	Ninh Phuoc	120,114	<u>137,095</u>	<u>673</u>	<u>80,760</u>	<u>58.9</u>
			362,796	1,959	235,080	64.8
Binh Thuan	Phan Thiet	36,363	41,504	490	58,800	100.0
	Ham Tan	84,106	95,997	257	30,840	32.1
	Ham Thuan Nam	62,434	71,261	441	52,920	74.3
	Tanh Linh	65,489	74,748	313	37,560	50.2
	Duc Linh	86,740	99,003	249	29,880	30.2
	Ham Thuan Bac	109,455	124,929	649	77,880	62.3
	Bac Binh	87,714	100,115	603	72,360	72.3
	Tuy Phong	45,635	52,087	350	42,000	80.6
	Phu Quy	14,000	<u>15,979</u>	<u>58</u>	<u>6,960</u>	<u>43.6</u>
			675,623	3,410	409,200	60.6
Ba Ria-Vung Tau	Ba Ria-Vung Tau	219,427	250,449	38	25,560	10.2
	Tan Thanh			173		
	Chau Duc			2		
	Long Dat	77,370	88,308	300	36,000	40.8
	Xuyen Moc	87,063	<u>99,372</u>	<u>142</u>	<u>17,040</u>	<u>17.1</u>
			438,129	655	78,600	17.9

Table 5.1 Performance of Rural Water Supply in the Study Area (3/3)

Province	District	Population in Rural Area		Number of Water Sources	Number of Beneficiaries	Performance Rate %
		1989	1994			
Dong Nai	Bien Hoa	39,937	45,583	42	5,040	11.0
	Long Thanh	225,786	257,707	250	30,000	11.6
	Thong Nhat	252,000	287,627	11	1,320	0.5
	Xuan Loc	317,572	362,470	11	2,520	0.7
	Long Khanh			10		
	Vinh An	51,082	58,304	4	480	0.8
	Tan Phu	246,622	281,489	4	960	0.3
	Dinh Quan			4		
			1,293,180	332	40,320	3.1
Ho Chi Minh	District 8			52		
	District 11			5		
	Binh Thanh			24		
	Tan Binh			133		
	Go Vap			128		
	Cu Chi			784		
	Hoc Mon			1,011		
	Binh Chanh			728		
	Nha Be			189		
	Thu Duc			789		
	Can Gio			106		
		1,128,256	1,287,766	3,949	473,880	36.8
Long An	Can Duoc	59,795	68,249	157	18,840	27.6
	Tan Tru	27,194	31,039	153	18,360	59.2
	Can Giuoc	59,795	68,249	105	12,600	18.5
	Ben Luc	35,722	40,722	274	32,880	80.7
	Duc Hoa	48,043	54,835	2,444	293,280	100.0
	Duc Hue	23,556	26,886	233	27,960	100.0
	Thu Thua	21,328	24,343	98	11,760	48.3
			314,323	3,464	415,680	100.0
Total in the Study Area			6,718,451	15,448	1,853,760	27.6

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (1/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS ¹⁾	Number of people requiring RWS	Number of RWS projects needed
<u>Tay Ninh Province</u>							
Duong Minh Chau	Phan	5,828	9,007	0	0	9,007	6
Chau Thanh	Hao Duoc	15,958	24,664	0	0	24,664	16
Trang Bang	An Hoa	18,455	28,523	0	0	28,523	19
	Don Thuan	13,165	20,347	0	0	20,347	14
	Gia Loc	15,426	23,842	0	0	23,842	16
	Gia Binh	9,728	15,035	0	0	15,035	10
	Loc Hung	16,269	25,145	0	0	25,145	17
	An Tinh	16,831	26,013	0	0	26,013	17
Tan Chau	Tan Ha	3,616	5,589	0	0	5,589	4
							119
<u>Song Be Province</u>							
Bu Dang	Duc Lieu	4,750	7,341	0	0	7,341	5
	Tho Son	3,850	5,950	0	0	5,950	4
	Nghia Trung	6,493	10,035	0	0	10,035	7
Loc Ninh	Thien Hung	7,938	12,269	0	0	12,269	8
	Thanh Hoa	7,557	11,680	0	0	11,680	8
	Loc Hiep	6,094	9,419	0	0	9,419	6
	Loc Quang	4,203	6,496	0	0	6,496	4
Phuoc Long	Long Tan	4,734	7,317	0	0	7,317	5
	Binh Phuoc	12,082	18,673	0	0	18,673	12
	Phuoc Tinh	6,869	10,616	0	0	10,616	7
	Long Hoa	12,083	18,675	0	0	18,675	12
							78
<u>Dac Lac Province</u>							
Dac Nong	Gia Nghia ³⁾	7,621	11,779	0	0	11,779	8
	Dak Rung	1,685	2,604	0	0	2,604	2
	Quang Son	1,698	2,624	0	0	2,624	2
	Quang Thanh	1,943	3,003	0	0	3,003	2

- Notes: 1) The number of beneficiaries for the rural water supply projects carried out by UNICEF's programme is 120 persons per water source except for 200 persons/water source for Long An province.
- 2) The number of beneficiaries for the rural water supply projects with a small distribution proposed in this study is 1,500 persons/project.
- 3) For Gia Nghia which is the district town of Dac Nong, Dac Lac province, population only in the rural area is given.

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (2/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Dak R'Lap	Quang Khe	1,987	3,071	0	0	3,071	2
	Dac B Lao	1,505	2,326	0	0	2,326	2
	Dak Nia	1,498	2,315	0	0	2,315	2
	Truong Xuan	1,615	2,496	0	0	2,496	2
	Dac R Mang ⁴⁾	1,042	1,610	1	1,500	110	0
	Dac Ha	630	974	0	0	974	1
	Kien Duc	4,322	6,680	8	960	5,720	4
	Quang Truc	1,158	1,790	0	0	1,790	1
	Quang Tin	2,491	3,850	0	0	3,850	3
	Quang Tan	2,304	3,561	0	0	3,561	2
	Nhan Co	3,501	5,411	0	0	5,411	4
	Dak Tit	2,500	3,864	12	1,440	2,424	2
	Dao Nghia	3,984	6,157	0	0	6,157	4
Dak Sin	1,569	2,425	0	0	2,425	2	
Dac Buk So	1,195	1,847	0	0	1,847	1	
							46
5)							
<u>Lam Dong Province</u>							
Da Huoi	Da Ploa	2,491	3,850	3	360	3,490	2
	Da Ton	1,220	1,886	1	120	1,766	1
	Madagui	2,895	4,474	3	360	4,114	3
	Madaqui town	6,483	10,020	8	960	9,060	6
	Da Oai	3,543	5,476	4	480	4,996	3
	Da M'Ri town	3,186	4,924	4	480	4,444	3
	Da M'Ri	830	1,283	1	120	1,163	1
	Ha Lam	3,215	4,969	4	480	4,489	3
Da Te	Da Lay	2,749	4,249	2	240	4,009	3
	Huong Lam	1,795	2,774	1	120	2,654	2
	An Nhon	3,297	5,096	3	360	4,736	3
	Da Teh town	12,804	19,789	10	1,200	18,589	12

Notes: 4) A rural water supply project with a small distribution system is implemented for the whole area of Dac R Mang.

5) The performance rate of rural water supply projects in Lam Dong province is given in percentage by district, so the number of water sources is assumed to be proportional to the number of people in communes.

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (3/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Cat Tien	Da Kho	4,056	6,269	3	360	5,909	4
	Trieu Hai	4,103	6,341	3	360	5,981	4
	Quang Tri	2,418	3,737	2	240	3,497	2
	Ha Dong	1,716	2,652	1	120	2,532	2
	My Duc	3,194	4,936	3	360	4,576	3
	Quoc Oai	2,979	4,604	2	240	4,364	3
	Quang Ngai	1,330	2,056	1	120	1,936	1
	Phu My	3,545	5,479	2	240	5,239	3
	Tu Nghia	1,295	2,001	0	0	2,001	1
	Dong Nai town	8,300	12,828	4	480	12,348	8
	Duc Pho	2,448	3,784	1	120	3,664	2
	Phuoc Cat-1	6,283	9,711	3	360	9,351	6
	Phuoc Cat-2	3,295	5,093	2	240	4,853	3
	Gia Vien	4,440	6,862	2	240	6,622	4
	Nam Ninh	2,178	3,366	1	120	3,246	2
Tien Hoan	2,330	3,601	1	120	3,481	2	
My Lam	1,045	1,615	0	0	1,615	1	
							93
<u>Ninh Thuan Province</u>							
Ninh Phuoc	Phuoc Ha	1,954	3,020	6	720	2,300	2
	Phuoc Huu	11,367	17,568	58	6,960	10,608	7
	Phuoc Thai	8,181	12,644	28	3,360	9,284	6
	Phuoc Hai	11,981	18,517	17	2,040	16,477	11
Ninh Hai	Phuoc Chien	3,092	4,779	11	1,320	3,459	2
	Loi Hai	7,591	11,732	19	2,280	9,452	6
	P. Khang	1,575	2,434	0	0	2,434	2
	Tan Hai	9,040	13,972	29	3,480	10,492	7
	Cong Hai	5,517	8,527	23	2,760	5,767	4
							47

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (4/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Binh Thuan Province ⁶⁾							
Tuy Phong	Chi Cong	13,739	21,234	23	2,739	18,495	12
	Hoa Minh	4,450	6,878	4	450	6,428	4
	Hoa Phu	4,280	6,615	2	280	6,335	4
Bac Binh	Binh Tan	5,394	8,337	3	394	7,943	5
	Song Luy	9,430	14,575	12	1,430	13,145	9
	Phan Hoa	5,780	8,933	7	780	8,153	5
	Hong Thai	9,896	15,295	16	1,896	13,399	9
Ham Thuan Bac	Luong Son	10,982	16,973	33	3,982	12,991	9
	Hong Son	8,977	13,874	4	477	13,397	9
	Ham Chinh	9,651	14,916	18	2,151	12,765	9
	Thuan Minh	4,620	7,140	1	120	7,020	5
	Ham Tri	6,332	9,786	7	832	8,954	6
	Ham Phu	9,203	14,224	2	203	14,021	9
	Thuan Hoa	3,794	5,864	2	294	5,570	4
Ham Thuan Nam	Ham My	11,790	18,222	22	2,590	15,632	10
	Muong Man	5,526	8,541	9	1,126	7,415	5
	Ham Cuong	6,181	9,553	5	581	8,972	6
	Ham Kiem	6,009	9,287	7	809	8,478	6
Ham Tan	Tan Lap	14,163	21,890	35	4,163	17,727	12
	Tan Ha	5,294	8,182	6	694	7,488	5
	Tan Nghia	12,883	19,911	27	3,283	16,628	11
	Song My	7,603	11,751	3	403	11,348	8
	Tan Thang	9,470	14,636	4	470	14,166	9
	Tan Minh	9,329	14,418	6	729	13,689	9
	Tan Hai	13,989	21,621	17	1,989	19,632	13

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Notes: 6) The number of people requiring rural water supply projects in 1994 is given as the information from Binh Thuan province, so the number of water sources and beneficiaries is reversely estimated as the balance between population in 1994 and the number of people requiring rural water supply.

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (5/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Ba Ria-Vung Tau Province							
Tan Thanh	Hac Dinh	8,547	13,210	0	0	13,210	9
	Song Xoai	4,498	6,952	0	0	6,952	5
	Chau Pha	7,553	11,674	0	0	11,674	8
	Toc Tien	2,324	3,592	0	0	3,592	2
Chau Duc	Binh Be	8,742	13,511	0	0	13,511	9
	Suoi Nghe	12,147	18,774	0	0	18,774	13
	Xuan Son	16,967	26,223	0	0	26,223	17
	Binh Gia	14,118	21,820	0	0	21,820	15
	Quang Thanh	8,206	12,683	0	0	12,683	8
	Nghia Thanh	10,594	16,374	0	0	16,374	11
	Ngai Giao	16,846	26,036	0	0	26,036	17
Long Dat	Long Hai	26,761	41,361	0	0	41,361	28
	Phuoc Thanh	6,886	10,643	0	0	10,643	7
	Phuoc Long Tho	13,410	20,726	0	0	20,726	14
	Phuoc Tinh	18,446	28,509	0	0	28,509	19
Xuyen Moc	Bau Lam	12,128	18,744	0	0	18,744	12
	Hoa Binh	12,485	19,296	0	0	19,296	13
	Phuoc Tan	14,847	22,947	0	0	22,947	15
	Hoa Hoi	9,835	15,201	0	0	15,201	10
	Hoa Hiep	6,755	10,440	0	0	10,440	7
							239
Dong Nai Province							
Tan Phu	Phu Binh	9,054	13,993	2	240	13,753	9
	Phu Thinh	7,268	11,233	2	240	10,993	7
	Phu Loc	9,068	14,015	0	0	14,015	9
	Phu Thanh	10,964	16,945	0	0	16,945	11
	Phu Lap	7,256	11,215	0	0	11,215	7
	Tai Lai	7,361	11,377	0	0	11,377	8
	Phu Lam	14,062	21,734	0	0	21,734	14
	Phu Dien	8,952	13,836	0	0	13,836	9
	Nam Cat Tien	6,182	9,555	0	0	9,555	6
	Nui Tuong	5,226	8,077	0	0	8,077	5

Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (6/7)

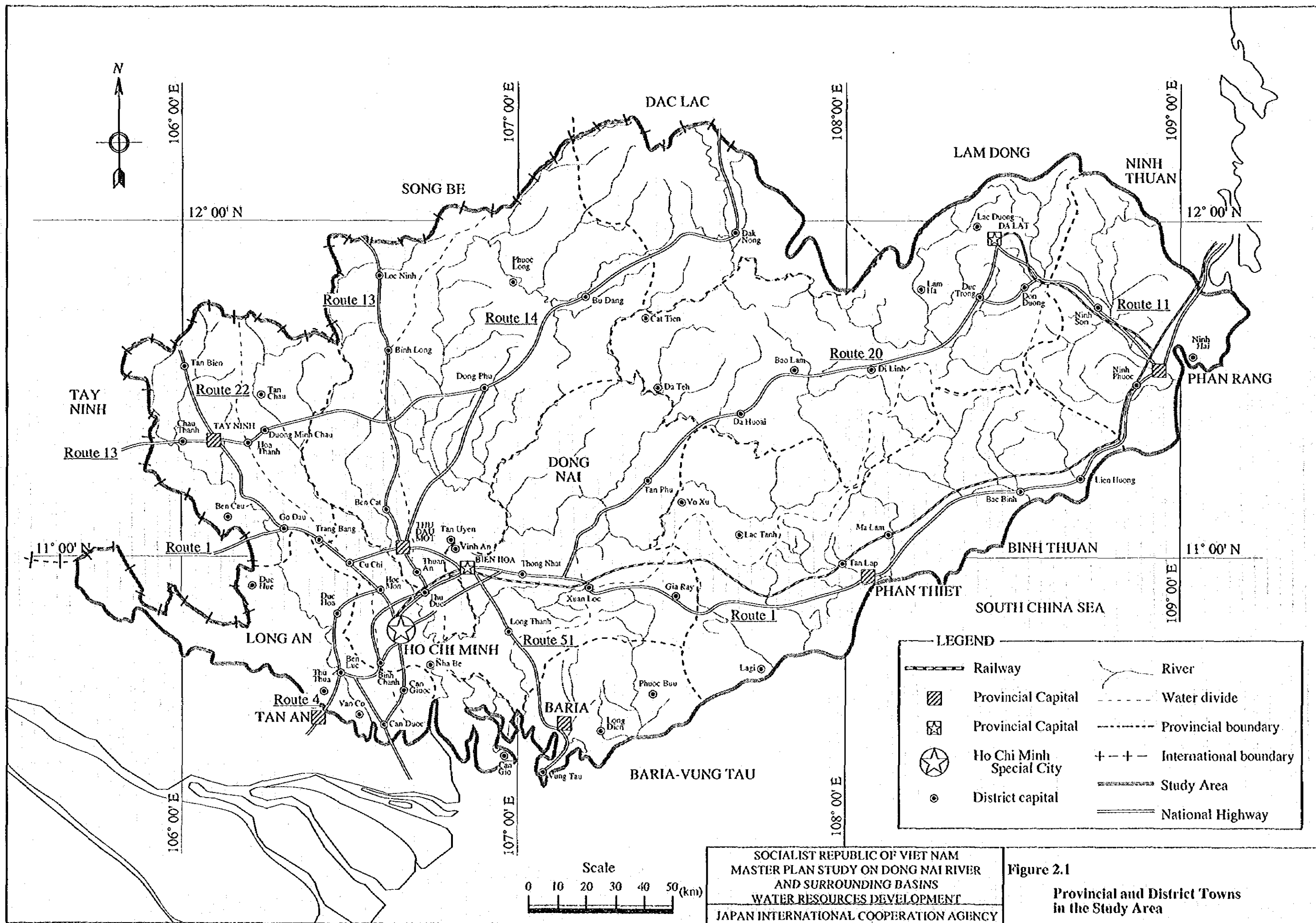
District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Dinh Cuan	Phu Tuc	12,265	18,956	2	240	18,716	12
	Tuc Trung	8,927	13,797	2	240	13,557	9
	Suoi Nho	10,068	15,561	0	0	15,561	10
	Phu Ngoc	15,104	23,344	0	0	23,344	16
	La Nga	10,986	16,979	0	0	16,979	11
	Thanh Son	20,118	31,093	0	0	31,093	21
	Gia Canh	13,616	21,044	0	0	21,044	14
	Phu Loi	11,398	17,616	0	0	17,616	12
							190
<u>Long An Province</u>							
Tan Tru	An Nhut Tan	5,510	8,516	1	200	8,316	6
	Binh Trinh Dong	5,571	8,610	1	200	8,410	6
	Tan Phuoc Tay	5,945	9,188	1	200	8,988	6
	Nhut Ninh	6,878	10,630	4	800	9,830	7
	My Binh	3,420	5,286	3	600	4,686	3
Can Duoc	Long Dinh	9,429	14,573	0	0	14,573	10
	Long Son	8,157	12,607	0	0	12,607	8
	Phuoc Tuy	8,060	12,457	0	0	12,457	8
	Tan Trach	10,019	15,485	0	0	15,485	10
	Long Cang	5,049	7,803	0	0	7,803	5
Can Giuoc	Phuoc Vinh Tay	7,572	11,703	0	0	11,703	8
	Tan Tap	12,447	19,237	0	0	19,237	13
	Vinh Dong	6,275	9,698	0	0	9,698	6
	Long Thuong	7,408	11,449	0	0	11,449	8
	Phuoc Lai	9,569	14,789	1	200	14,589	10
Thu Thua	Long Thanh	3,229	4,991	0	0	4,991	3
	Long Thuan	3,999	6,181	0	0	6,181	4
	Tan Thanh	4,376	6,763	0	0	6,763	5
	My Lac	6,544	10,114	0	0	10,114	7
	My An	6,631	10,249	0	0	10,249	7

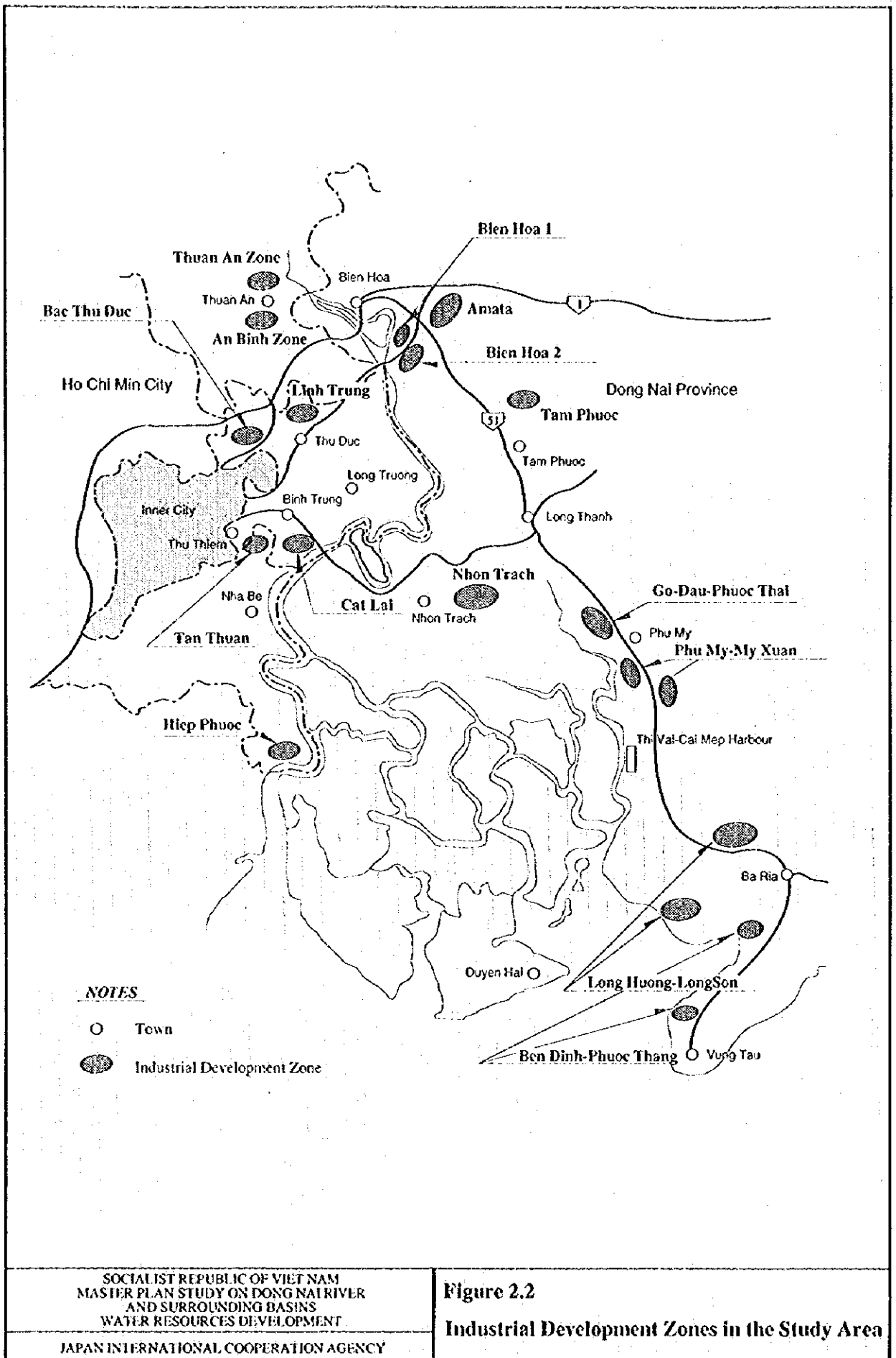
Table 5.2 Communes Requiring Rural Water Supply (RWS) Projects Urgently (7/7)

District	Commune	Population in 1994	Population in 2015	Number of water sources	Number of beneficiaries with RWS	Number of people requiring RWS	Number of RWS projects needed
Ben Luc	Thanh Hoa	4,161	6,431	0	0	6,431	4
	Luong Hoa	8,458	13,072	1	200	12,872	9
	Long Hiep	11,263	17,408	2	400	17,008	11
	Thanh Loi	6,767	10,459	2	400	10,059	7
	Binh Duc	4,661	7,204	2	400	6,804	5
Duc Hue	My Thanh Bac	7,501	11,593	0	0	11,593	8
	Binh Hoa Nam	5,855	9,049	0	0	9,049	6
	Binh Hoa Hung ⁷⁾						
	Binh Hoa Bac	7,902	12,213	1	200	12,013	8
	Binh Thanh	4,065	6,283	1	200	6,083	4
							202
Grand Total							1,207

Notes: 7) A new village

FIGURES





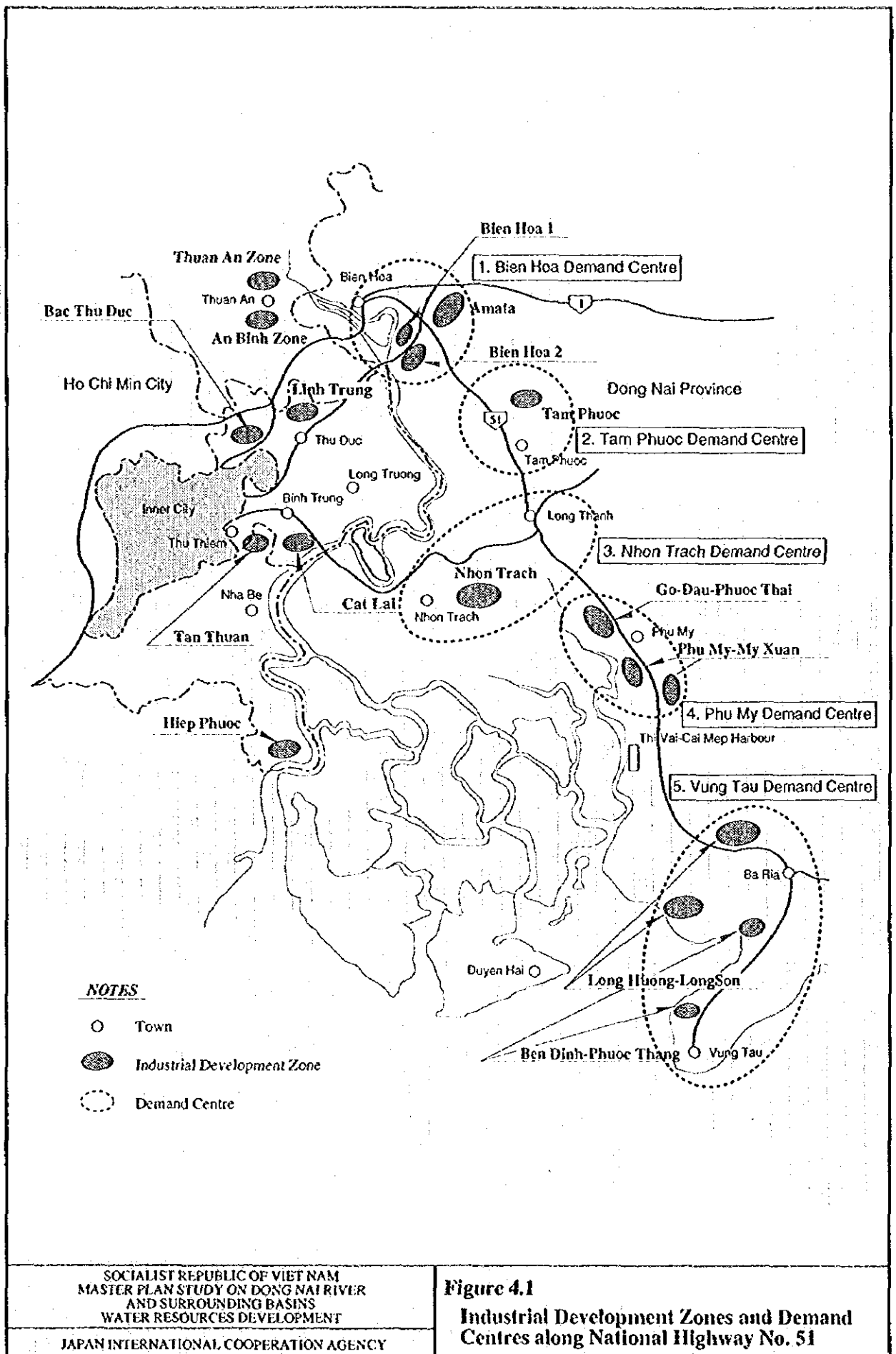
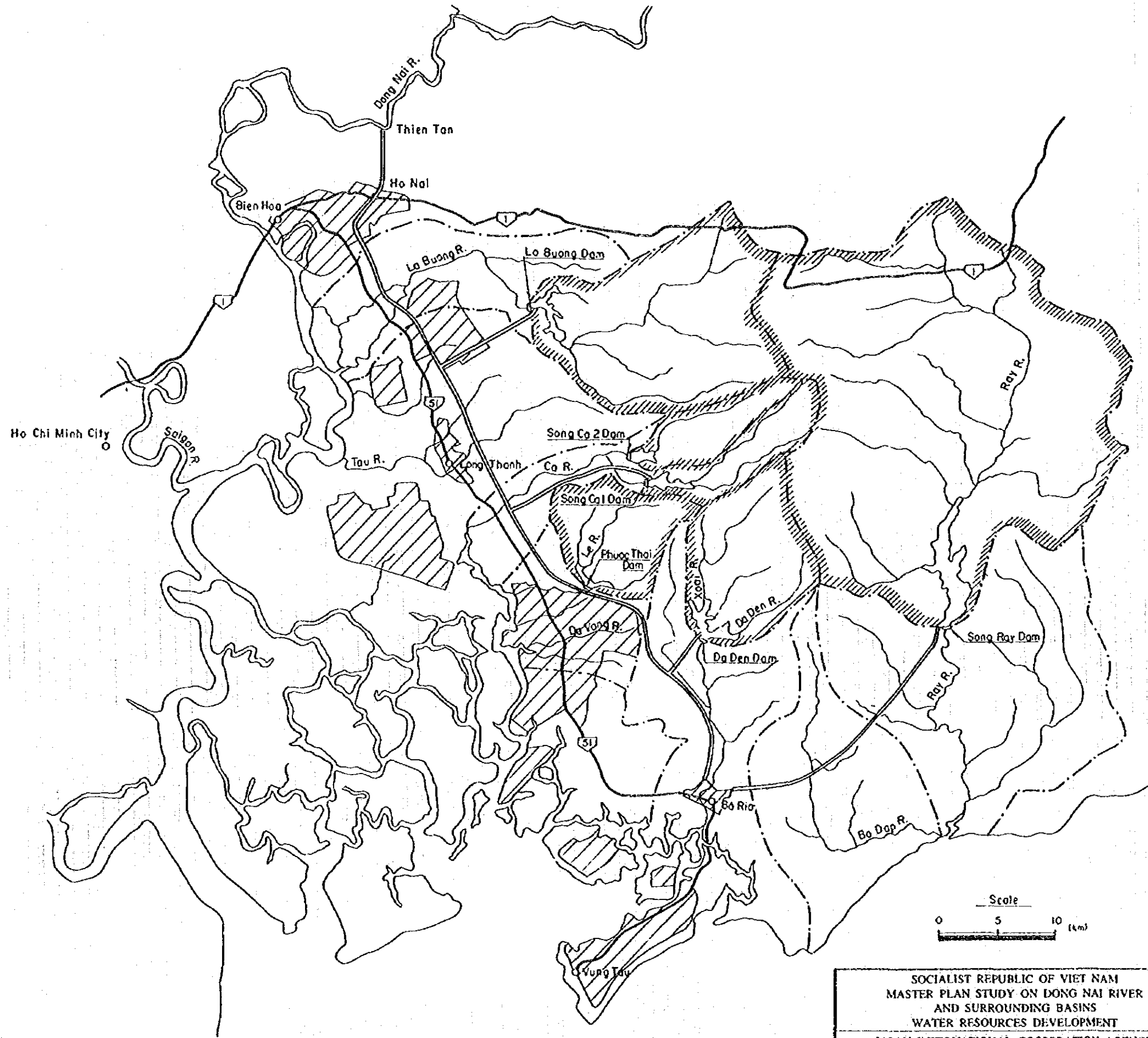
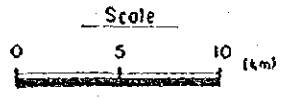


Figure 4.1
Industrial Development Zones and Demand Centres along National Highway No. 51



Legend

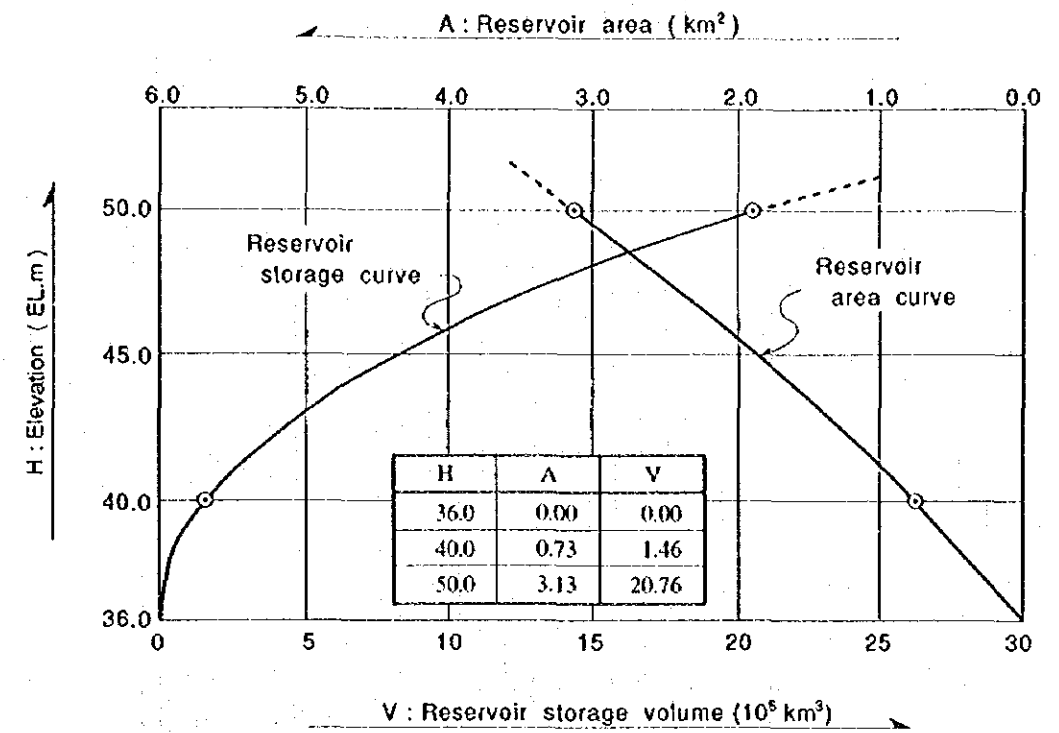
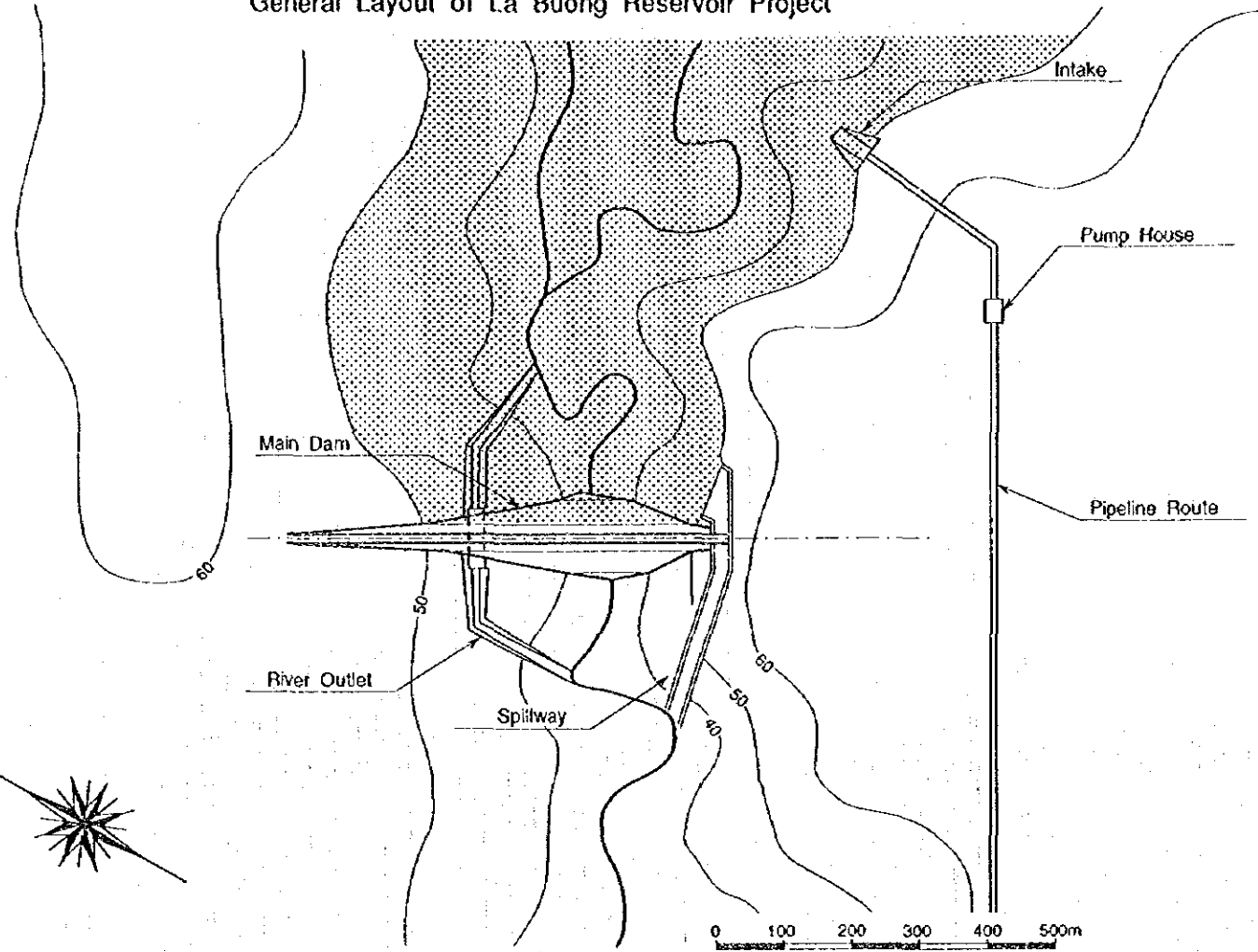
	Catchment Area
	Beneficiary Area
	Dam and Reservoir
	River
	Water Divide
	National Highway
	Pipeline Route
	Town



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 AND SURROUNDING BASINS
 WATER RESOURCES DEVELOPMENT
 JAPAN INTERNATIONAL COOPERATION AGENCY

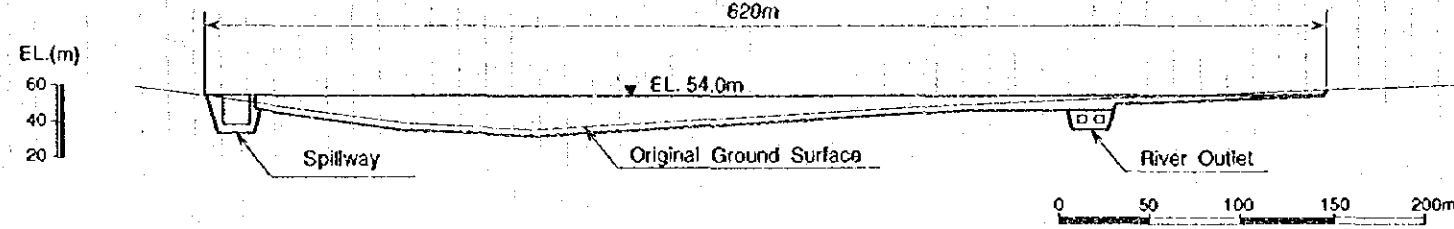
Figure 4.2
 River Catchments and Reservoir Projects
 in the Area along National Highway No.51

General Layout of La Buong Reservoir Project

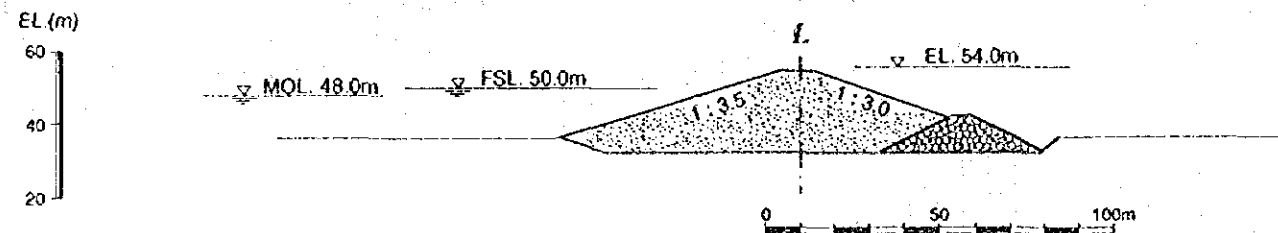


Reservoir Storage Volume Curve and Reservoir Area Curve

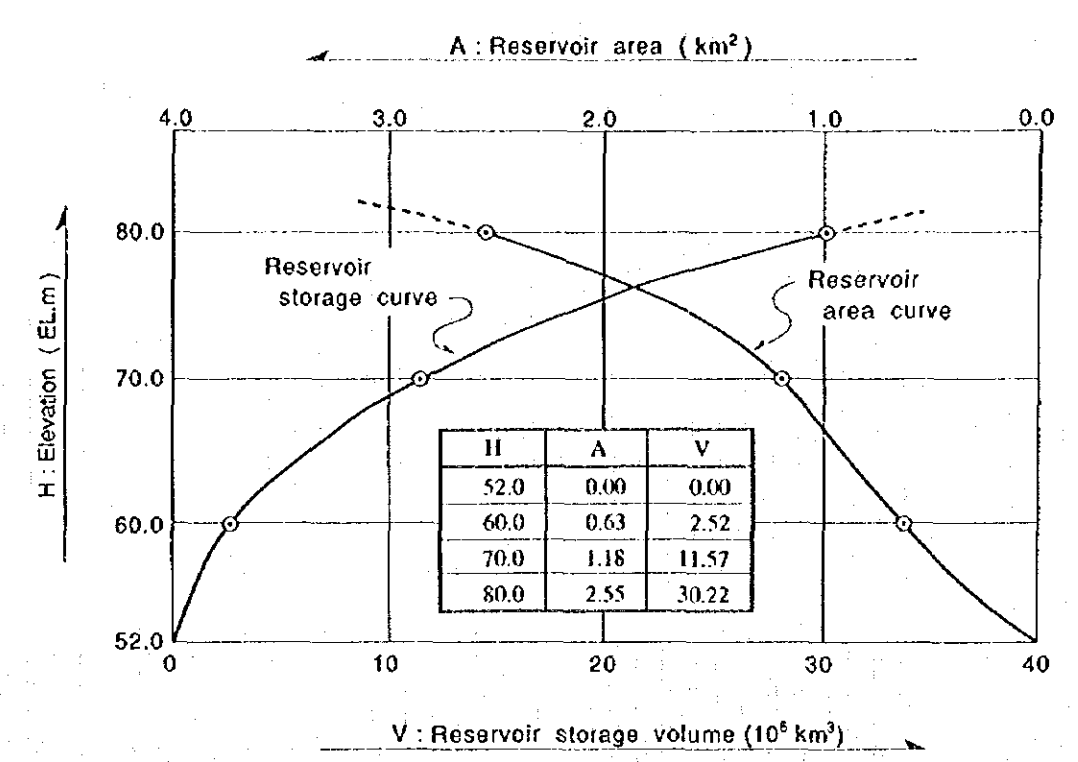
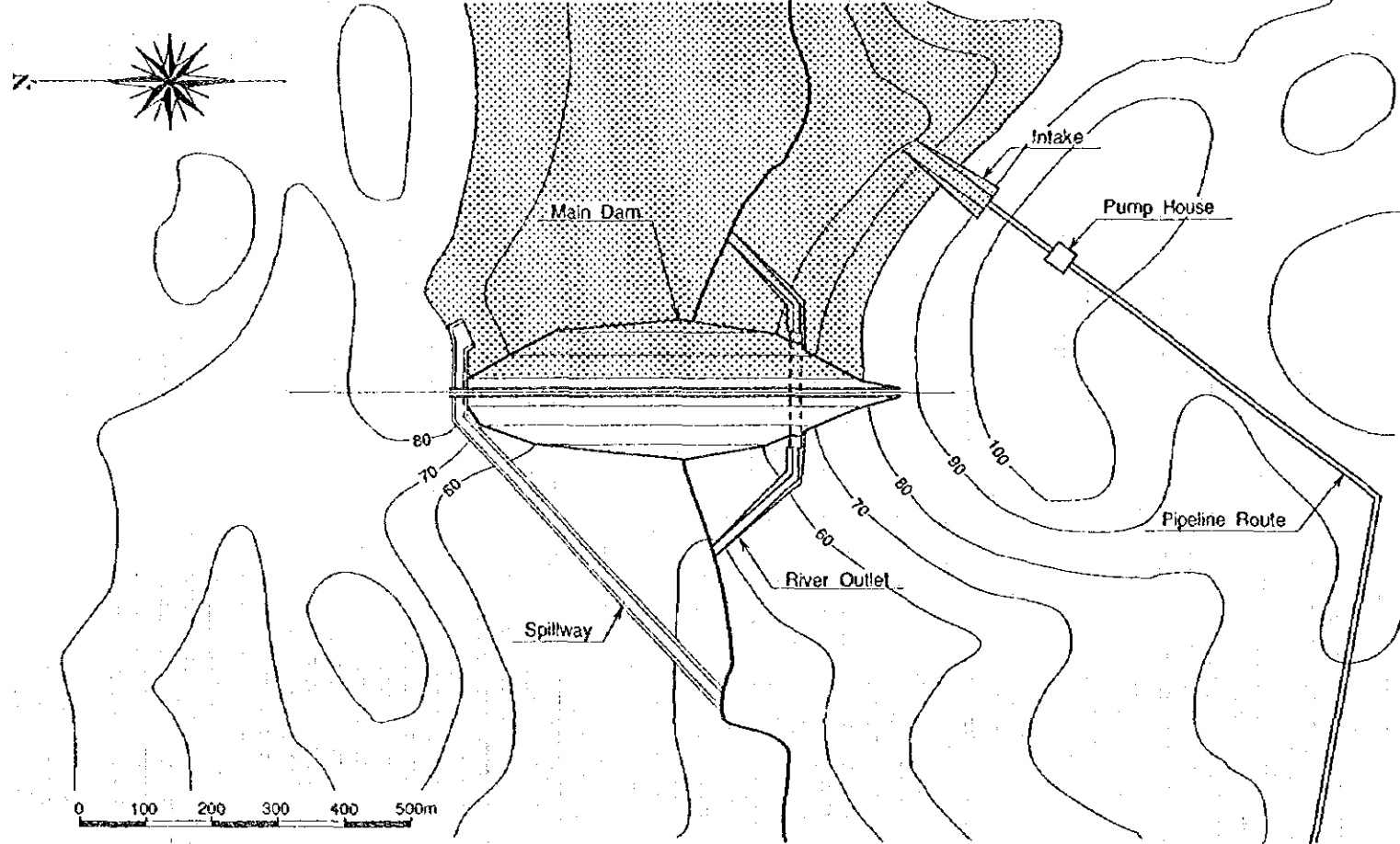
Upstream Elevation of Main Dam



Typical Section of Main Dam

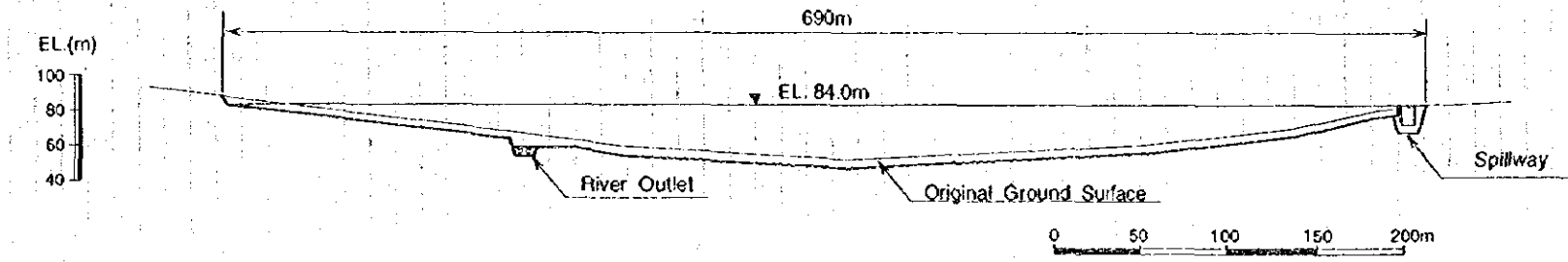


General Layout of Song Ca-1 Reservoir Project

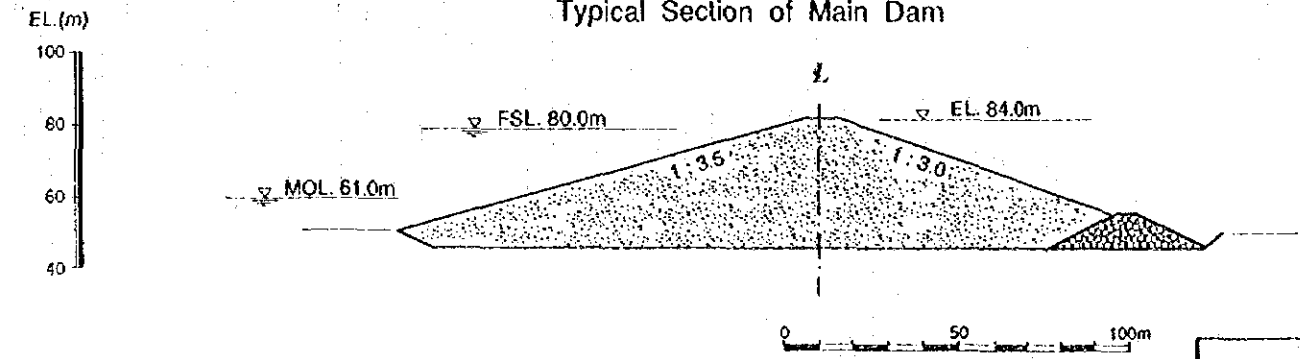


Reservoir Storage Volume Curve and Reservoir Area Curve

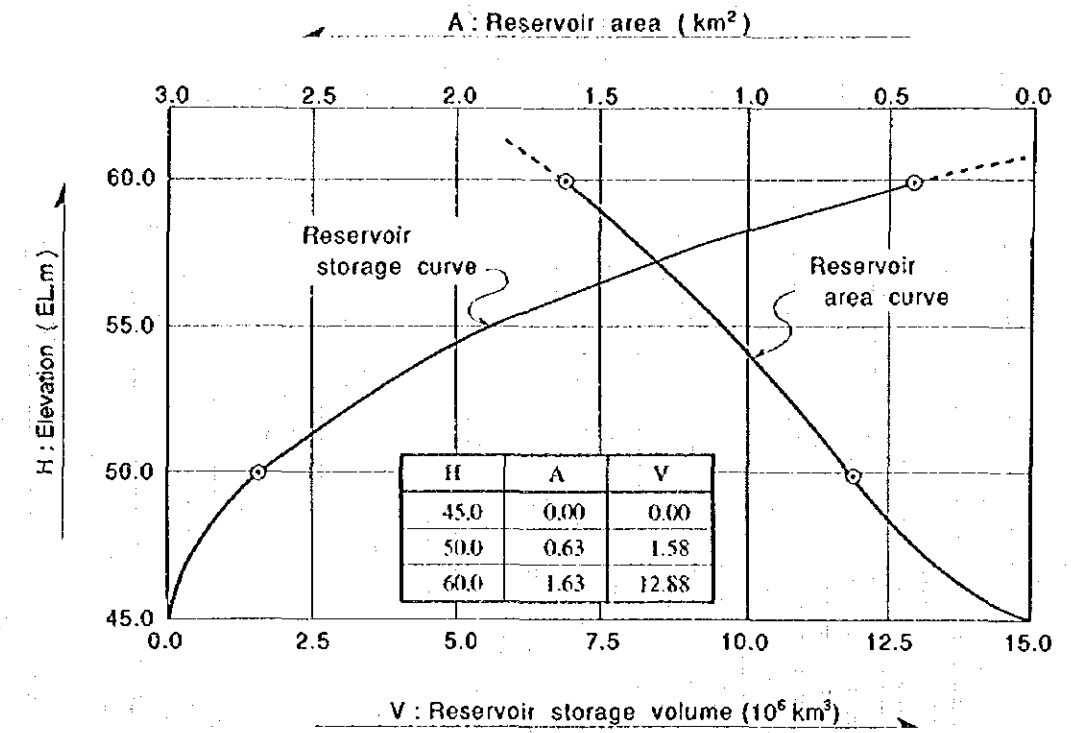
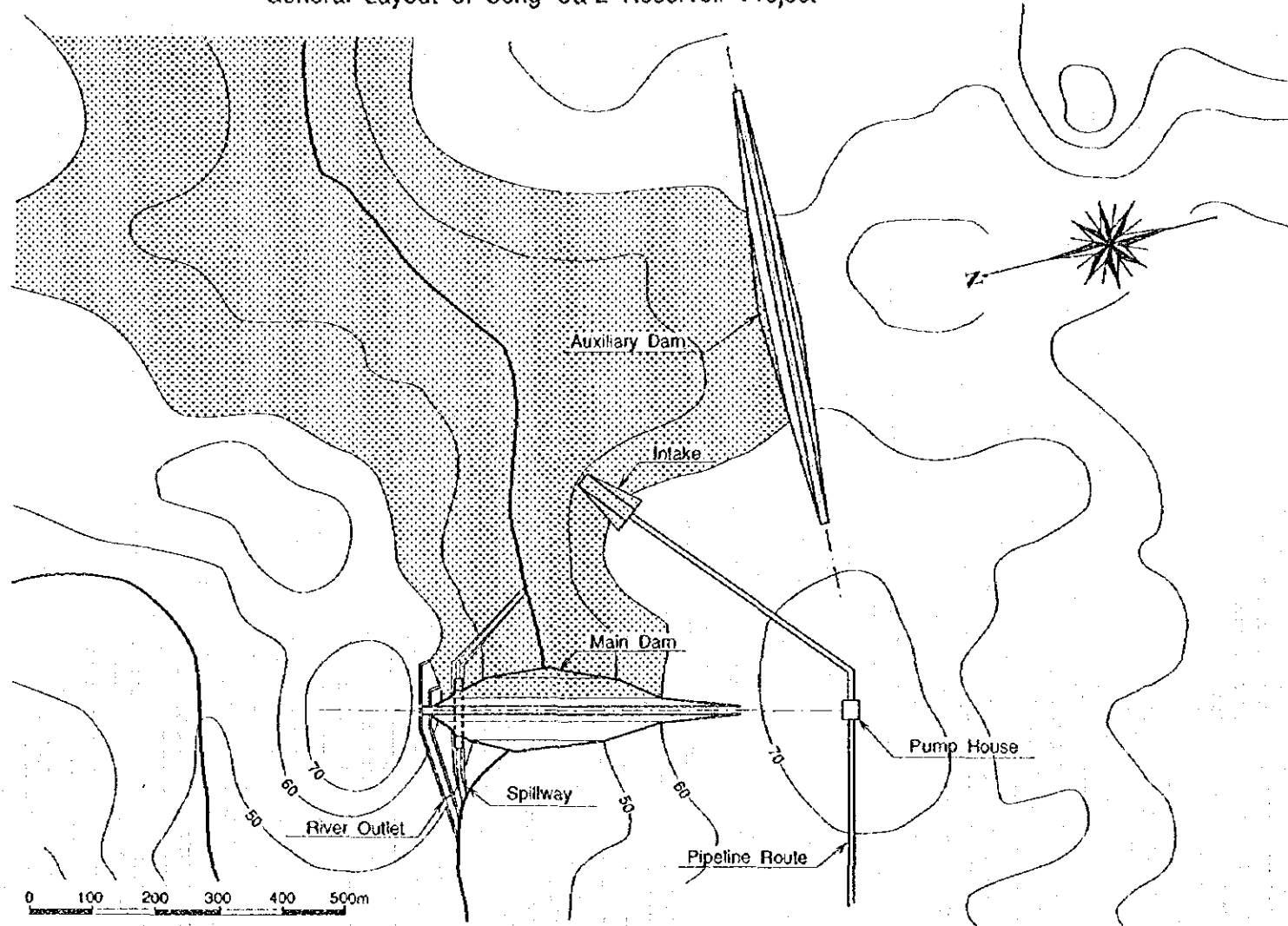
Upstream Elevation of Main Dam



Typical Section of Main Dam

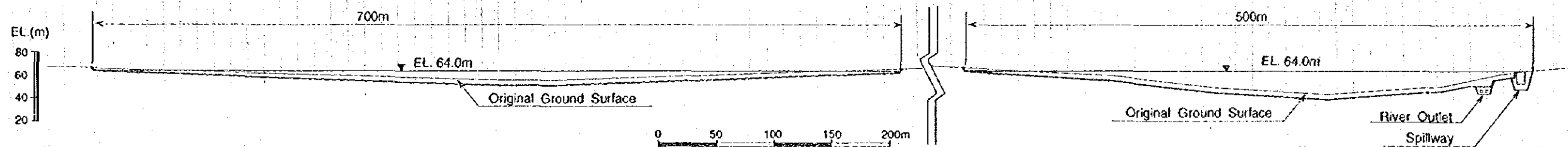


General Layout of Song Ca-2 Reservoir Project

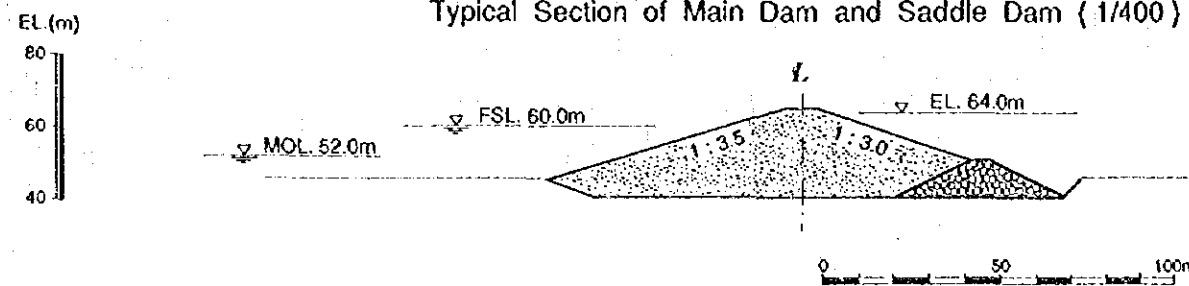


Reservoir Storage Volume Curve and Reservoir Area Curve

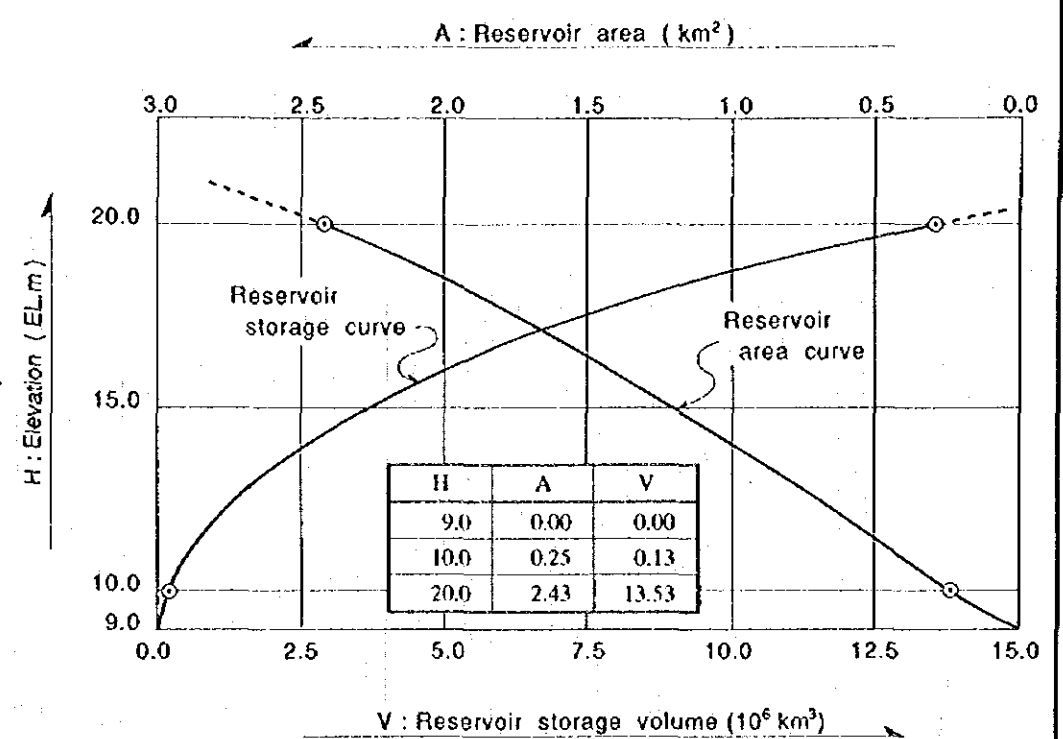
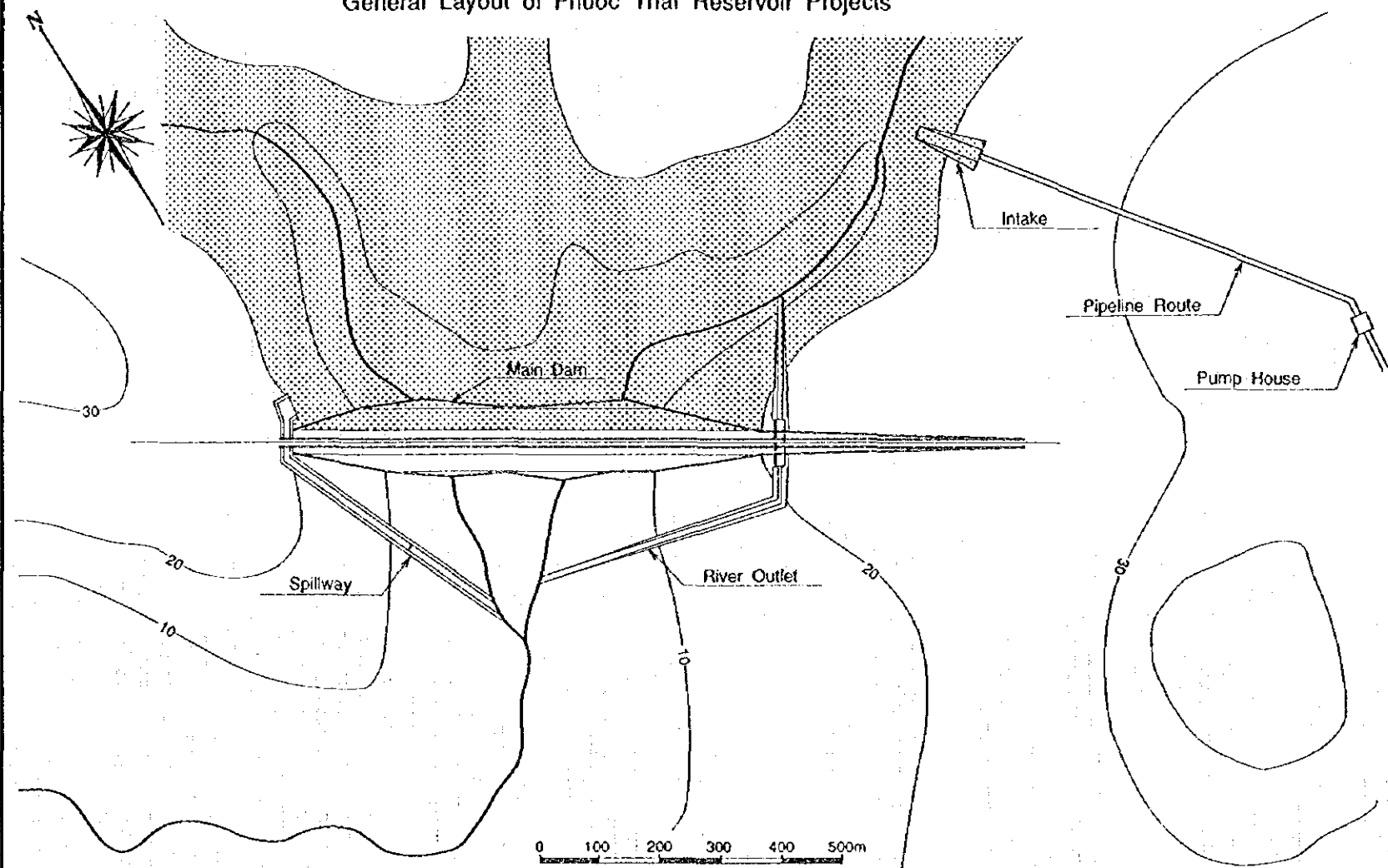
Upstream Elevation of Main Dam and Saddle Dam



Typical Section of Main Dam and Saddle Dam (1/400)

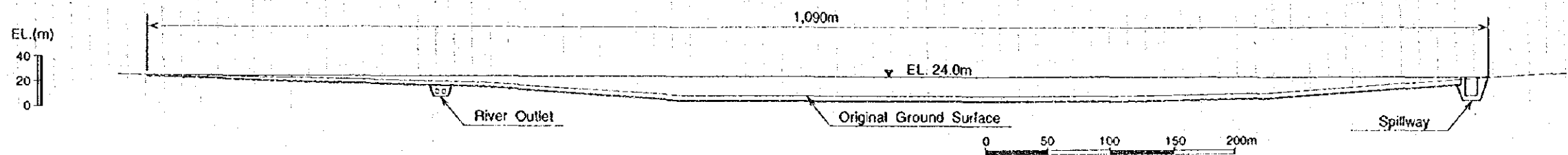


General Layout of Phuoc Thai Reservoir Projects

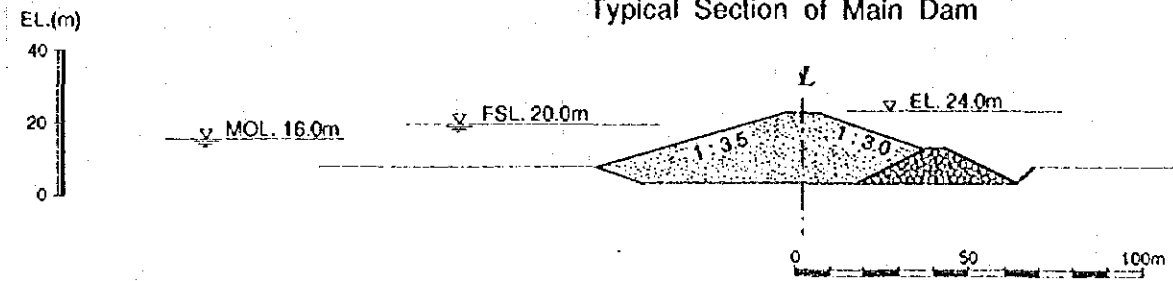


Reservoir Storage Volume Curve and Reservoir Area Curve

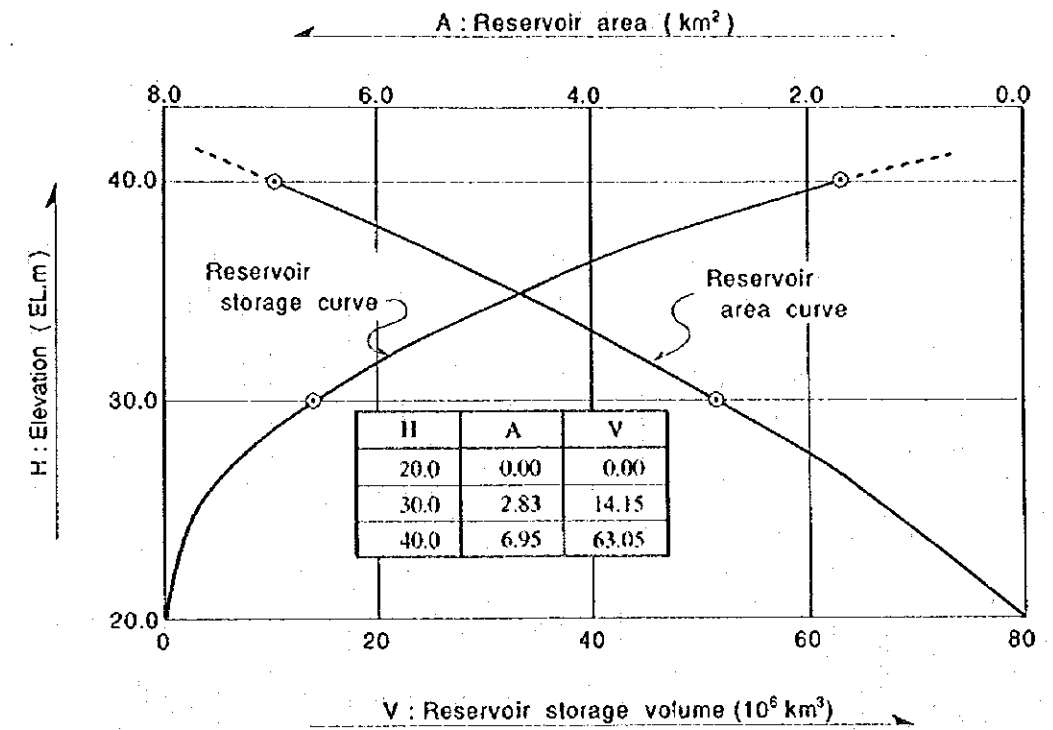
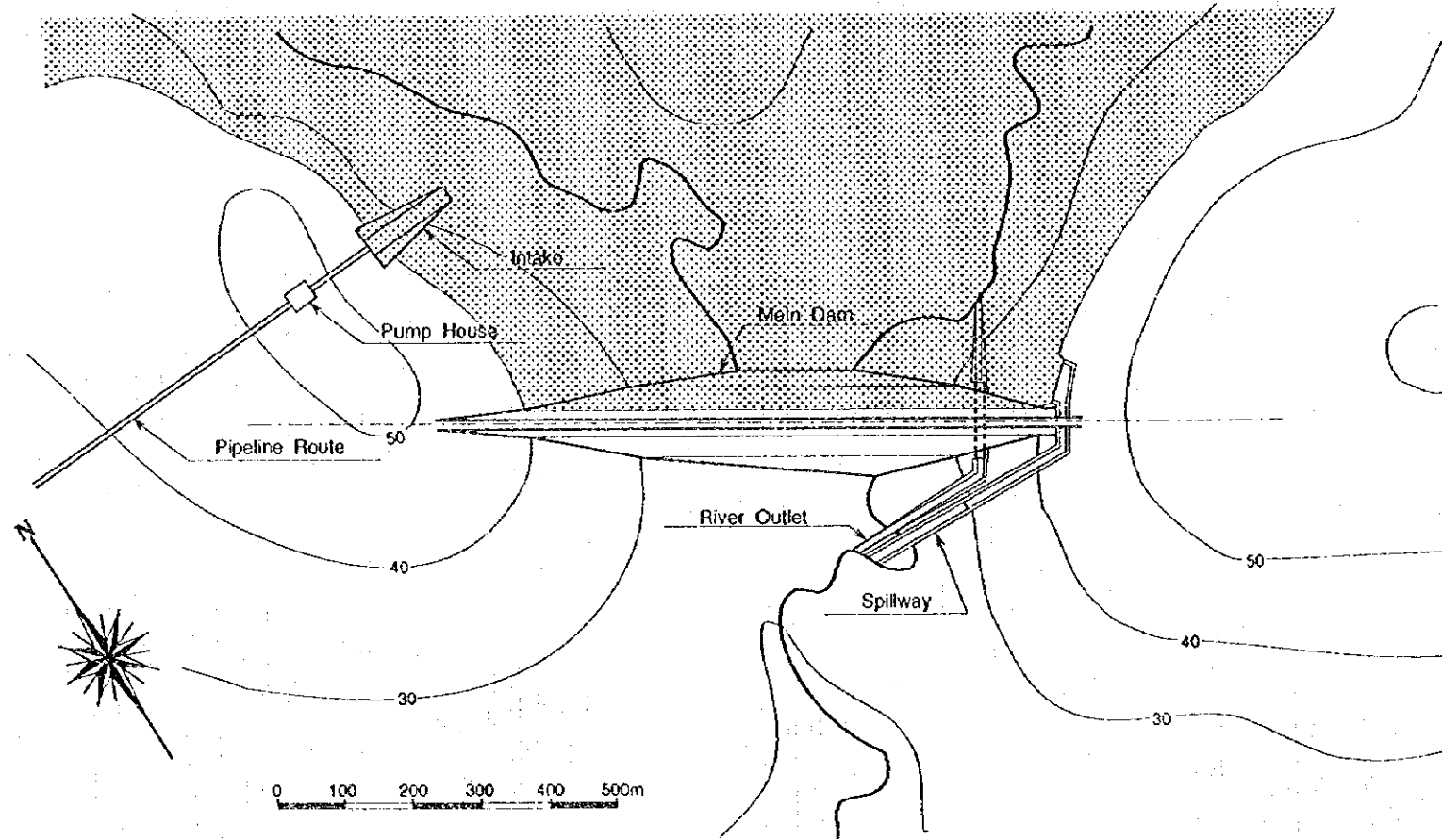
Upstream Elevation of Main Dam



Typical Section of Main Dam

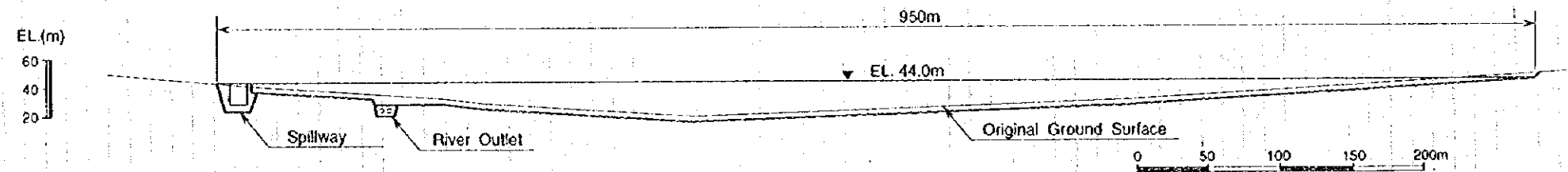


General Layout of Da Den Reservoir Project

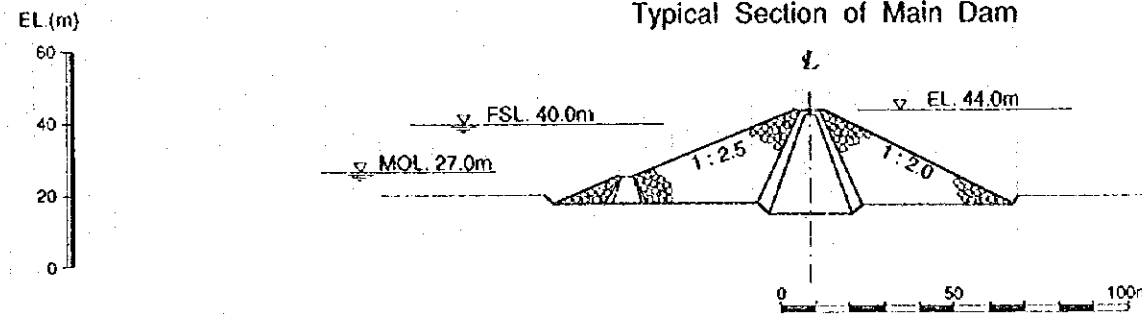


Reservoir Storage Volume Curve and Reservoir Area Curve

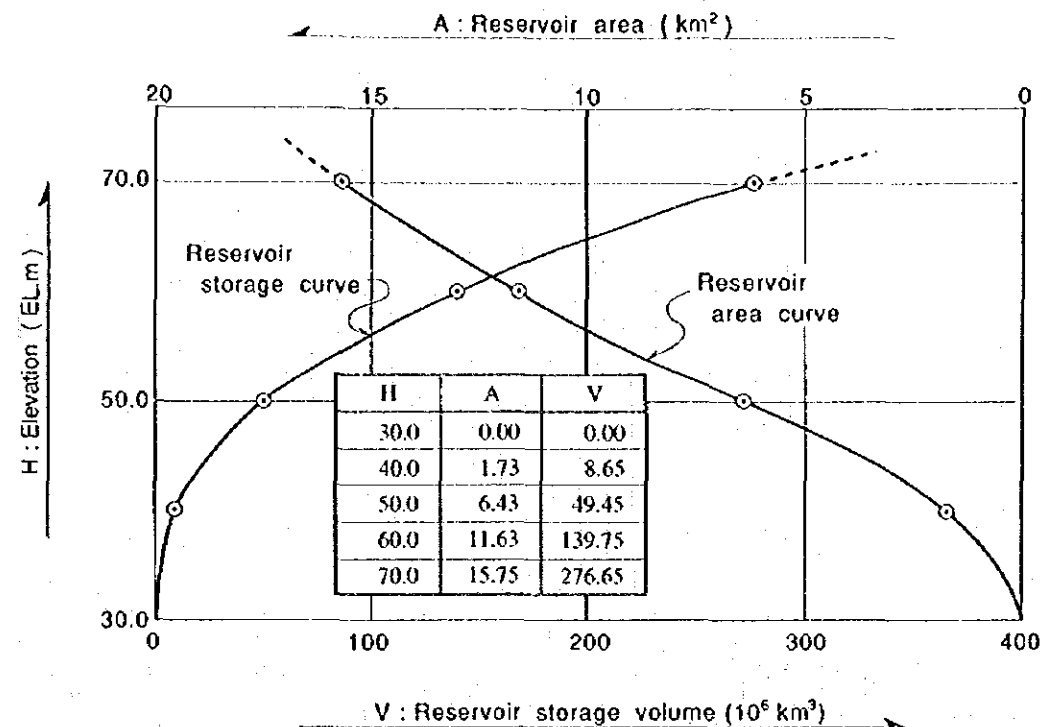
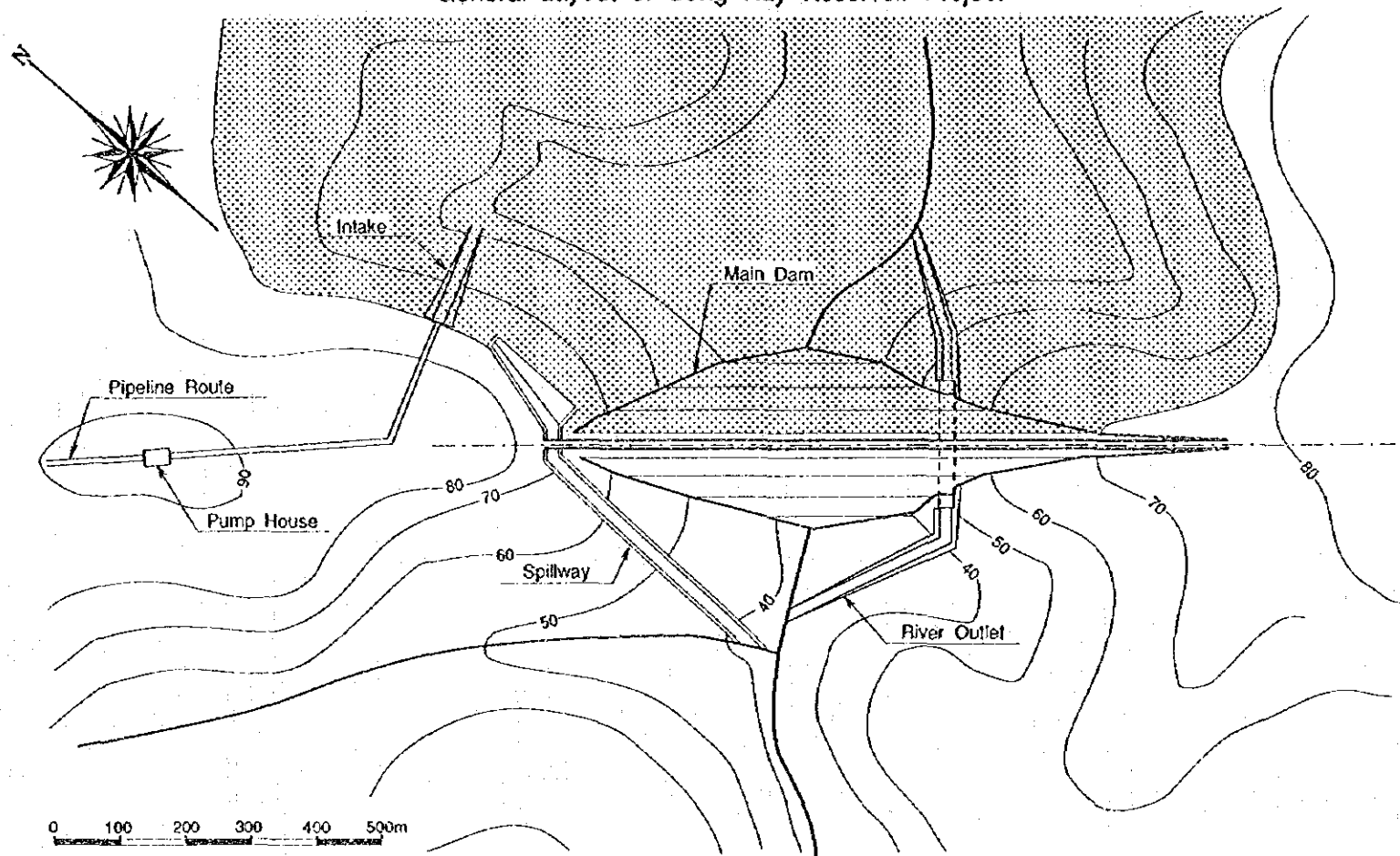
Upstream Elevation of Main Dam



Typical Section of Main Dam

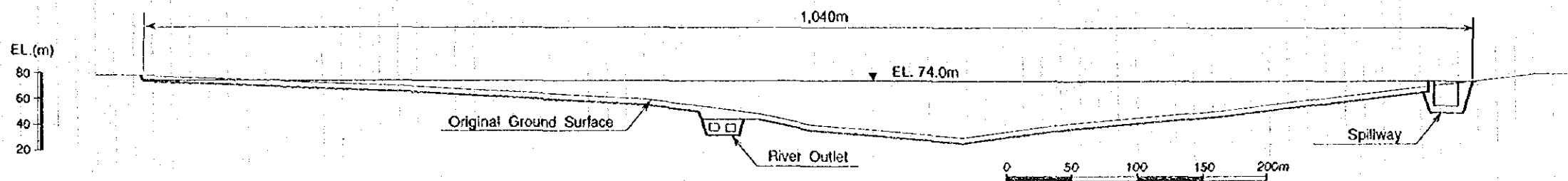


General Layout of Song Ray Reservoir Project

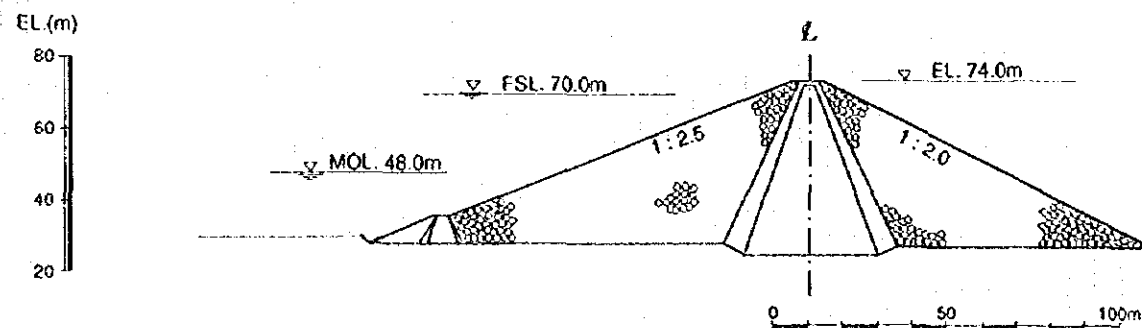


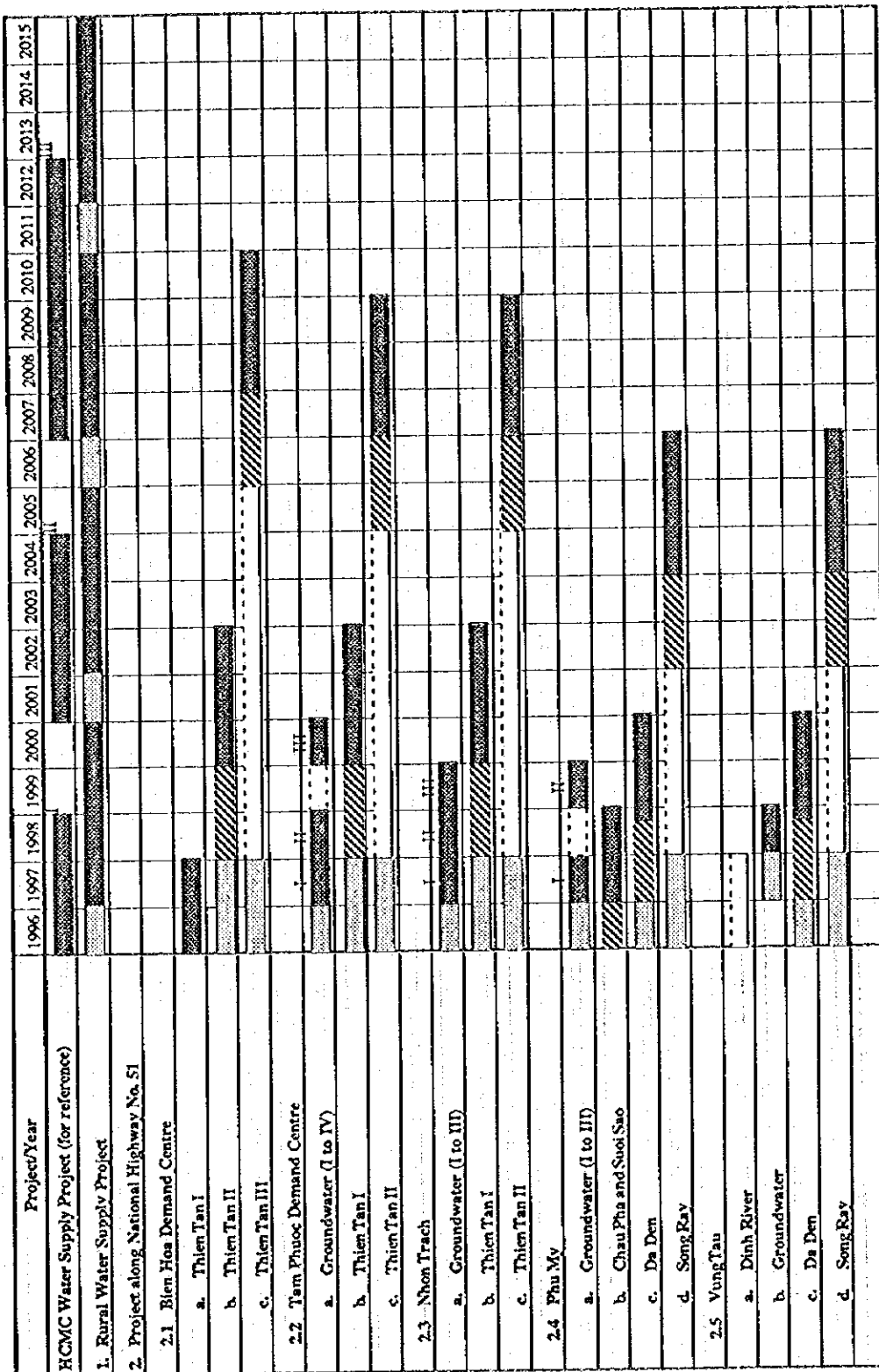
Reservoir Storage Volume Curve and Reservoir Area Curve

Upstream Elevation of Main Dam



Typical Section of Main Dam





: Master Plan Study/Feasibility Study/Investigation
 : Detailed Design
 : Construction

Figure 4.8
Implementation Sequence of the Master Plan
Projects in the Water Supply Sector







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